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Broadband Deployment: Why it Matters and How it Works

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BROADBAND DEPLOYMENT: WHY IT MATTERS AND HOW IT WORKS

by

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Several initiatives currently underway at the Federal Communications Commission (FCC), the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA), and the U.S. Department of Agriculture's Rural Utilities Service (RUS) have highlighted the growing importance of broadband to continued innovation and economic prosperity in the United States. Indeed, the U.S. Congress charged NTIA and RUS with administering over $7 billion in stimulus funding to support broadband network deployment.[1] Congress also charged the FCC with developing a National Broadband Plan to "ensure that all people of the United States

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[1] NTIA is to allocate $4.7 billion via the Broadband Technology Opportunities Program. *See* American Recovery and Reinvestment Act of 2009 § 6000, 47 U.S.C. § 1305 (2009), *available at* http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_public_laws&docid=f:publ005.pdf [hereinafter "*Recovery Act*"]. RUS is to allocate $2.5 billion.

have access to broadband capability."[2] The near-term goal of each initiative is to ensure that broadband is ubiquitously available to all users across the United States regardless of geographic location,[3] in order to "jumpstart the economy"[4] and to build an infrastructure that supports the long-term goals of fostering innovation, job creation, and economic development.[5]

While these goals are laudable, this article argues that such a focus largely overshadows an issue of critical importance to realizing the full potential of broadband: *actual adoption and utilization of the technology.* Even though each federal initiative includes components for increasing the adoption rate of broadband,[6] they are collectively subordinate to the stated primary goal of spurring network deployment to unserved parts of the country. At a time when the FCC has found that broadband is already available to "most of us,"[7] policymakers must focus on developing

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[2] *Id.*

[3] *Id.* NTIA and RUS are disbursing at least $4 billion in grants and loans for infrastructure deployments to unserved and underserved areas of the country. *See e.g.,* Ryan Singel, *$4 Billion in Broadband Stimulus Grants Tied to Strict Net Neutrality Rules*, July 1, 2009, WIRED.COM, http://www.wired.com/epicenter/2009/07/4-billion-in-broadband-stimulus-grants-tied-to-strict-net-neutrality-rules/.

[4] *See* Julius Genachowski, Chairman, FCC, *Statement of Chairman Julius Genachowski, Seneca High School, Erie, PA*, at 1-2 (July 1, 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291860A1.pdf.

[5] For example, President Obama "believes that modernized infrastructure is a necessary part of the foundation for long term economic stability and prosperity. That includes everything from a comprehensive national broadband plan, to new health care information technology, to a modernized electrical grid." *See* The White House, Issues: Technology, http://www.whitehouse.gov/issues/technology/ (last visited Dec. 22 2009).

[6] For example, the Recovery Act requires NTIA make available "not less than $250,000,000… for competitive grants for innovative programs to encourage sustainable adoption of broadband service." A component of the FCC's National Broadband Plan will be "a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public." *See Recovery Act*, *supra* note 1.

[7] *In the Matter of a National Broadband Plan for Our Future, Notice of Inquiry*, FCC GN Docket No. 09-51, para. 5 [hereinafter "*FCC National Broadband Plan NOI*"]. In addition, an FCC consumer survey released in February 2010 found that only four percent of Americans were "unable to obtain broadband because it is not available." *See* JOHN B.

policies that seek to maximize the adoption rate across all demographic groups, geographic locations, and sectors of the economy.

Section II of this article discusses why broadband adoption matters. After analyzing current levels of broadband adoption across various user groups in the United States, this section provides three in-depth examples that highlight positive impacts enabled by broadband adoption. These examples include the general economic impacts of broadband adoption, the impact of broadband on healthcare, and the impact of broadband on the energy sector. Each example provides insight into the range of benefits that this technology can facilitate and the growing universe of innovative tools and services that broadband enables.

Section III provides an introduction to the dynamics associated with broadband adoption. A variety of factors influence adoption decisions. These vary among different sectors and user groups. In order to illustrate the many dimensions associated with broadband adoption, this section provides a case study of senior citizens. The case study analyzes the current state of broadband adoption among seniors, highlights barriers to further adoption, and assesses approaches to increasing utilization of broadband by older adults. The goal of this case study is to demonstrate that broadband adoption decisions are sector-specific, and that policies and approaches for spurring further adoption and usage of broadband must be developed accordingly.

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BROADBAND ADOPTION IN THE UNITED STATES

The FCC recently reported that broadband is available in 100 percent of census tracts across the United States.[8] In addition, the FCC has also found that only four percent of consumers cited lack of access to a

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HORRIGAN, BROADBAND ADOPTION AND USE IN AMERICA, at 5, OBI Working Paper Series No. 1, FCC (Feb. 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf [hereinafter "*Broadband in America*"].

[8] *See* FCC WIRELINE COMPETITION BUREAU, INDUSTRY ANALYSIS AND TECHNOLOGY DIVISION, HIGH-SPEED SERVICES FOR INTERNET ACCESS: STATUS AS OF DECEMBER 31, 2008, at Table 18, (Feb. 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296239A1.pdf [hereinafter "*FCC Broadband Stats - Feb. 2010*"].

broadband connection in their immediate areas as a reason for not adopting the service.[9] Moreover, the vast majority of the population lives in census tracts where multiple broadband providers offer service.[10] Yet, despite such robust availability and widespread competition for subscribers, a significant amount of people have yet to adopt broadband. Part A provides an overview of the current state of broadband adoption in the United States.

Maximizing the broadband adoption rate is critical since numerous studies have found that adopting and effectively using a broadband connection enables a wide variety of positive economic, social, and health-related benefits. Part B analyzes these impacts and discusses why robust broadband adoption matters.

A. The Current State of Broadband Adoption

Adoption of broadband in the United States continues to increase each year. According to recent data, the FCC reported that 65 percent of homes had adopted broadband by the end 2009, up from 63 percent in April 2009, 55 percent in April 2008 and 42 percent in March 2006.[11] Home adoption increased across every major demographic group between 2008 and 2009, and over the last several years, there has been a general upward trend in adoption across all demographic groups.[12] However, a closer look at adoption data reveals several worrying trends.

First, under-adopting demographic groups often see no clear and compelling value proposition for adopting and using broadband. Indeed,

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[9] *See* Federal Communications Commission, *FCC Broadband Taskforce Presentation* at Slide 81, Sept. 29, 2009, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-293742A1.pdf [hereinafter "*FCC Broadband Taskforce Presentation - Sept. 29, 2009*"]; *Broadband in America, supra* note 7 at 5.

[10] *FCC Broadband Stats - Feb. 2010, supra* note 8 at 30-33.

[11] *Broadband in America, supra* note 7 at 3; *see also* JOHN HORRIGAN, PEW INTERNET & AMERICAN LIFE PROJECT, HOME BROADBAND ADOPTION 2009, at 9-11 (June 2009), *available at* http://www.pewinternet.org/~/media//Files/Reports/2009/Home-Broadband-Adoption-2009.pdf [hereinafter "*Home Broadband Adoption 2009*"].

[12] *Home Broadband Adoption 2009, supra* note 11 at 13-14.

the Pew Internet & American Life Project (Pew) has found that half of non-broadband adopters "question the relevance of connecting to the Internet – either at all or with high-speed at home."[13] Studies issued by the NTIA and FCC in February 2010 confirmed this finding.[14] Some have suggested that a lack of relevant online content could explain a perceived lack of value of using broadband among some demographic groups.[15] For example, one study has suggested that enhancing online content targeted at African Americans could spur further adoption of broadband among this segment of the population.[16]

Second, there appears to be a positive correlation between income and broadband adoption. Pew reports that adoption rates increase with higher income levels: households with incomes over $100,000 per year have an 88 percent adoption rate, compared to 82 percent for those earning between $75,000 and $100,000 per year, and 80 percent for households reporting between $50,000 and $75,000 per year.[17] The adoption rate for those earning less than $20,000 per year is 40 percent.[18]

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[13] *Id.* at 8.

[14] *See* NTIA, DIGITAL NATION: 21ST CENTURY AMERICA'S PROGRESS TOWARD UNIVERSAL BROADBAND INTERNET ACCESS, at 12-13 (Feb. 2010), *available at* http://www.ntia.doc.gov/reports/2010/NTIA_internet_use_report_Feb2010.pdf (observing that "households without high-speed Internet access at home stated that "don't need" (a value proposition) is more important than cost (affordability)" and that "respondents who do not use the Internet anywhere ranked the value proposition significantly higher than affordability [47 percent v. 8.6 percent]") [hereinafter "*Digital Nation*"]; *Broadband in America*, *supra* note 7 at 30 (identifying relevance as one of the top three reasons non-adopters cite for not subscribing to broadband).

[15] *Broadband in America*, *supra* note 7 at 30 ("19 percent of non-adopters say they do not think digital content delivered using broadband is sufficiently compelling to justify getting it. Many view broadband as an avenue to irrelevant content, and others seems content with the offline alternatives currently available to them.").

[16] *See* THE NATIONAL BLACK CAUCUS OF STATE LEGISLATORS ET AL., BROADBAND IMPERATIVES FOR AFRICAN AMERICANS: POLICY RECOMMENDATIONS TO INCREASE DIGITAL ADOPTION FOR MINORITIES AND THEIR COMMUNITIES at 17, (Sept. 2009), *available at* http://www.jointcenter.org/index.php/content/download/2638/17064/file/MTI_Broadband_Report_Print.pdf [hereinafter "*Broadband Imperatives*"].

[17] *Home Broadband Adoption 2009, supra* note 11 at 14.

[18] *Broadband in America*, *supra* note 7 at 3.

The relationship between income levels, non-adoption, and the price of broadband, however, is less clear. Only 15 percent of non-broadband adopters cite the price of monthly broadband service as the primary reason for not subscribing.[19] Yet, affordability of accessing broadband – which includes more than the price of broadband service – is a barrier to broadband adoption for certain demographic groups (e.g., seniors on fixed incomes and people with disabilities who require an assistive technology to use a computer or broadband connection)[20] even though monthly subscription prices have stayed flat, on average, over the last several years.[21] Affordability is a relative term and varies from group to group and person to person. *Some may find broadband affordable at any price, whereas someone who lives on a fixed income may find broadband unaffordable at most prices*. Data suggest, however, that the monthly subscription price of broadband is but one of a variety of factors impacting adoption decisions and is not significantly more impactful than other non-financial variables.[22]

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[19] *Id.* at 30.

[20] ADVANCED COMMUNICATIONS LAW AND POLICY INSTITUTE, BARRIERS TO BROADBAND ADOPTION 26-7 (New York Law School 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/ACLP%20Report%20to%20the%20FCC%20-%20Barriers%20to%20BB%20Adoption.pdf (observing that "The multiple cost components for people with disabilities who wish to adopt broadband have had a discernible impact on broadband adoption. Individual components – e.g., a broadband subscription – may be affordable, but when combined with expensive ATs and the cost of purchasing a computer, broadband adoption becomes beyond the means of many people with disabilities.") [hereinafter "*Barriers*"].

[21] *Home Broadband Adoption 2009, supra* note 11 at 25.

[22] A number of recent studies and observations support this statement. For example, the FCC's consumer survey on broadband adoption found that the monthly cost of broadband was only the fourth most cited reason for not using the Internet among nonusers. The three reasons ahead of broadband cost included: (1) lack of digital literacy skills, (2) inability to afford a computer, and (3) online safety concerns. *Broadband in America, supra* note 7 at 27. NTIA has also found that affordability concerns are secondary to a lack of a value proposition for using broadband. *Digital Nation, supra* note 14 at 12-13. In addition, an empirical study of household demand for broadband service, submitted to the FCC in January 2010, observed that "valuations for Internet increase substantially with experience," which means that public and private sectors efforts focused on enhancing the relevance of broadband to non-adopters "have potential to increase overall penetration in the United States." *See* GREGORY ROSSTON ET AL., HOUSEHOLD DEMAND FOR BROADBAND INTERNET SERVICE, AT 36-37, FINAL

Third, there is a wide adoption gap between older users and younger users. Indeed, only 35 percent of adults over the age of 65 have adopted broadband, compared to 75 percent of those aged 18-29.[23] Moreover, there is a "gray gap" between younger seniors and older seniors.[24] Indeed, one study found that home broadband adoption usage rates were 58 percent for people age 55-59;48 percent for those age 60-64, 42 percent for those age 65-69, 31 percent for those age 70-75, and only 16 percent for those over 76.[25] Within the senior population, an array of factors influences adoption decisions.[26]

Fourth, minority populations have lower broadband adoption rates than whites. For example, less than half – 46 percent – of African American households had adopted broadband by 2009, compared to 65

REPORT TO THE FCC BROADBAND TASK FORCE, STANFORD INSTITUTE FOR ECONOMIC POLICY RESEARCH (submitted Jan. 29, 2010; revised Feb. 3, 2010), *available at* http://siepr.stanford.edu/system/files/shared/Final_Rosston_Savage_Waldman_02_04_10__1_.pdf. Finally, Blair Levin, a top staffer at the FCC overseeing the development of the National Broadband Plan, has observed that "if broadband is as valuable as we think it is – as we know it to be – why is there such a dramatic adoption gap? Cost is certainly an issue…But it can't be – it isn't – the only issue." *See* Blair Levin, Executive Director, Omnibus Broadband Initiative, FCC, *Wired for Social Justice, Speech at the Minority Media and Telecommunications Council's Broadband and Social Justice Summit*, at 3 (Jan. 22, 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-295886A1.pdf [hereinafter "*Wired for Social Justice*"].

[23] *Broadband in America*, *supra* note 7 at 13.

[24] CHARLES M. DAVIDSON & MICHAEL J. SANTORELLI, THE IMPACT OF BROADBAND ON SENIOR CITIZENS, A REPORT COMMISSIONED BY THE U.S. CHAMBER OF COMMERCE (Dec. 2008), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/BroadbandandSeniors.pdf [hereinafter "*Broadband & Seniors*"].

[25] *See* SYDNEY JONES, PEW INTERNET & AMERICAN LIFE PROJECT, GENERATIONS ONLINE IN 2009 at 5, (Jan. 2009), *available at* http://pewresearch.org/pubs/1093/generations-online [hereinafter "*Generations Online in 2009*"].

[26] *Barriers, supra* note 20 at 10-17 (highlighting several barriers to broadband adoption for seniors).

percent of white households.[27] African Americans are more likely than other demographic groups to cite lack of relevance as a primary reason for not adopting broadband.[28] However, African Americans are the most avid users of wireless Internet service, often accessed on mobile phones.[29]

Fifth, data support a "clear correlation between education and [broadband] adoption."[30] Thirty percent of people with less than a high school degree have adopted broadband, whereas 83 percent of those with a college degree have adopted it.[31] This relationship is evident among people with disabilities. As a group, disabled people have completed less education than those without disabilities.[32] The broadband adoption rate among this segment of the population was estimated to be 42 percent in

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[27] *Home Broadband Adoption 2009, supra* note 11 at 13. A recent survey released by the FCC, reporting on data collected at the end of 2009, reports a significantly higher adoption rate among African Americans – 59 percent. *Broadband in America*, *supra* note 7 at 3.

[28] *Broadband Imperatives, supra* note 16 at 4. *See also* JON P. GRANT ET AL., NATIONAL MINORITY BROADBAND ADOPTION: COMPARATIVE TRENDS IN ADOPTION, ACCEPTANCE AND USE, at 4, REPORT OF THE JOINT CENTER FOR POLITICAL & ECONOMIC STUDIES (Feb. 2010), *available at* http://www.jointcenter.org/publications1/publication-PDFs/MTI_BROADBAND_REPORT_2.pdf.

[29] *See* JOHN HORRIGAN, PEW INTERNET & AMERICAN LIFE PROJECT WIRELESS INTERNET USE, at 4 (July 2009), *available at* http://www.pewinternet.org/~/media//Files/Reports/2009/Wireless-Internet-Use.pdf [hereinafter "*Pew Wireless Study 2009*"].

[30] *See* Rahul Gaitonde, *Clear Correlation Between Education and Adoption, Says FCC Consumer Research Director*, BROADBANDCENSUS.COM, Oct. 20, 2009, *available at* http://broadbandcensus.com/2009/10/clear-correlation-between-education-and-adoption-says-fcc-consumer-research-director/; *Broadband in America*, *supra* note 7 at 3.

[31] *Home Broadband Adoption 2009, supra* note 11 at 14.

[32] *See* CORNELL UNIVERSITY, REHABILITATION RESEARCH AND TRAINING CENTER ON DISABILITY DEMOGRAPHICS AND STATISTICS, 2007 DISABILITY STATUS REPORT – UNITED STATES at 42, *available at* http://www.ilr.cornell.edu/edi/disabilitystatistics/StatusReports/2007-PDF/2007-StatusReport_US.pdf?CFID=7676403&CFTOKEN=73912389&jsessionid=f030ad698d2ccb1a9bcc345172777623 61b1.

2009.[33] In addition to influencing income levels, less educational attainment oftentimes has a negative impact on exposure to broadband and its positive impacts.[34]

Finally, a wide range of data indicates that each demographic segment faces many unique barriers to broadband adoption, which, in most cases, has resulted in low adoption rates.[35] For example, among senior citizens, lack of training to effectively use a broadband connection, along with a low computer ownership rate and fears about online security, are major barriers to broadband adoption.[36] Affordability of accessing broadband (e.g., costs associated with purchasing a computer, necessary assistive technologies, and a broadband connection) is a major concern among people with disabilities,[37] but a widespread negative perception regarding the accessibility of broadband is oftentimes the primary barrier to adoption within this segment of the population.[38]

These trends suggest that the dynamics associated with broadband adoption are multiple and sector specific. As a result, policymakers should develop policies that address the particular needs of discrete user groups in order to enhance the adoption rate across the entire population.

B. Assessing the Impacts and Potential of Broadband

Increased adoption and usage of broadband will facilitate a number of short- and long-term benefits. Indeed, a growing number of studies have found actual and potential cost savings, economic opportunities, and other life-enhancing benefits associated with robust broadband adoption

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[33] *Broadband in America*, *supra* note 7 at 3.

[34] *Barriers, supra* note 20 at 25 (noting that lack of exposure to broadband in educational and work environments is a barrier to broadband adoption for people with disabilities).

[35] *Id.*

[36] *Id.* at 10-17.

[37] *Id.* at 26-27.

[38] *Id.* at 2.

and utilization among the general population, within specific demographic groups, and across all sectors of the economy. In particular, this part focuses on: (1) the general economic impacts of broadband, (2) how broadband is impacting healthcare, and (3) the impacts of broadband on the energy sector.

1. *Economic Impacts of Broadband*

Broadband has numerous positive economic impacts, both on the economy as a whole and on individual users.

With regard to economy-wide impacts, wide availability and robust adoption of broadband affects employment, small business creation, and productivity.[39] Studies from as early as 2001, when less than 13 million broadband lines were in service,[40] projected that annual consumer welfare gains enabled by broadband could exceed $400 billion.[41] Several more recent studies suggest that actual annual consumer welfare gains associated with broadband use run into the tens of billions.[42] Moreover, other recent studies have honed in more specifically on discrete economic impacts of broadband availability, adoption and usage. For

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[39] *See, e.g.,* JED KOLKO, DOES BROADBAND BOOST LOCAL ECONOMIC DEVELOPMENT? AT 2, PUBLIC POLICY INSTITUTE OF CALIFORNIA (Jan. 2010), *available at* http://www.ppic.org/content/pubs/report/R_110JKR.pdf (observing a "positive relationship between broadband expansion and economic growth.").

[40] *See* FEDERAL COMMUNICATIONS COMMISSION, WIRELINE COMPETITION BUREAU, INDUSTRY AND TECHNOLOGY ANALYSIS DIVISION, HIGH-SPEED SERVICES FOR INTERNET ACCESS: STATUS AS OF JUNE 30, 2005 at 16 (April 2006), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-264744A1.pdf.

[41] *See* ROBERT W. CRANDALL & CHARLES L. JACKSON, CRITERION ECONOMICS LLC, THE $500 BILLION OPPORTUNITY: THE POTENTIAL ECONOMIC BENEFIT OF WIDESPREAD DIFFUSION OF BROADBAND INTERNET ACCESS at iv, BROOKINGS INSTITUTE (July 2001), *available at* http://www.att.com/public_affairs/broadband_policy/BrookingsStudy.pdf.

[42] *See, e.g.,* JONATHAN ORSZAG, MARK DUTZ AND ROBERT WILLIG, THE SUBSTANTIAL CONSUMER BENEFITS OF BROADBAND CONNECTIVITY FOR US HOUSEHOLDS, INTERNET INNOVATION ALLIANCE (July 2009), *available at* http://internetinnovation.org/files/special-reports/CONSUMER_BENEFITS_OF_BROADBAND.pdf (estimating that "Consumers receive more than $30 billion of net benefits from the use of fixed-line broadband at home," at 4).

example, a study from 2005 found that "communities in which mass-market broadband was available…experienced more rapid growth in employment, the number of businesses overall, and businesses in IT-intensive sectors."[43] Another study found that a seven percentage point increase in broadband adoption "could result in $92 billion through an additional 2.4 million jobs per year created, $662 million saved per year in reduced healthcare costs…and $134 billion per year in total direct economic impact of accelerating broadband across the United States."[44] In 2009, LECG, a research company, estimated that the "addition of ten more broadband lines per 100 individuals across the United States (30 million new broadband lines) would raise U.S. GDP by over $110 billion."[45]

Wireless broadband, in particular, is projected to have increasingly positive and discernible impacts on U.S. GDP. One report estimates that "by 2016, the value of the combined mobile wireless voice and broadband productivity gains to the U.S. economy [is estimated to be] $427 billion per year."[46] Another recent study estimated that "new wireless broadband investments of $17.4 billion will, within twenty-four months of making this additional investment, increase GDP by 0.9 percent to l.3 percent, which translates into dollar terms to $126.3 billion

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[43] See WILLIAM A. LEHR, CARLOS A. OSORIO, SHARON E. GILLET & MARVIN A. SIRBU, MEASURING THE ECONOMIC IMPACT OF BROADBAND DEPLOYMENT, at 3, A REPORT TO THE U.S. DEPT. OF COMMERCE, ECONOMIC DEVELOPMENT ADMINISTRATION (2005) [hereinafter "*Measuring Economic Impact of Broadband*"].

[44] *See e.g.* CONNECTED NATION, INC., THE ECONOMIC IMPACT OF STIMULATING BROADBAND NATIONALLY at 5, (Feb. 21, 2008), *available at* http://connectednation.com/_documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf.

[45] *See* LECG, ECONOMIC IMPACT OF BROADBAND: AN EMPIRICAL STUDY, at 8-9 (Feb. 2009), *available at* http://www.connectivityscorecard.org/images/uploads/media/Report_BroadbandStudy_LECG_March6.pdf.

[46] *See* ROGER ENTNER, THE INCREASINGLY IMPORTANT IMPACT OF WIRELESS BROADBAND TECHNOLOGY AND SERVICES ON THE U.S. ECONOMY at 2 *available at* http://files.ctia.org/pdf/Final_OvumEconomicImpact_Report_5_21_08.pdf.

to $184.1 billion, and will result in an increase of between 4.5 million and 6.3 million jobs."[47]

For individuals, broadband facilitates a number of economic opportunities and benefits for those who are able to effectively use their connection.[48] Specific impacts tend to vary among user groups. For example, broadband allows people with disabilities to participate in an array of employment and educational activities that may otherwise be inaccessible.[49] Among many other things, broadband can be used to launch a business from home. This is significant to this demographic group since people with disabilities have traditionally demonstrated a strong desire to work for themselves. Over the last several decades, evidence suggests that people with disabilities "have a higher rate of self-employment and small business experience than people without disabilities."[50]

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[47] *See* Alan Pearce & Michael S. Pagano, *Accelerated Wireless Broadband Infrastructure Deployment: The Impact on GDP and Employment*, 18 MEDIA L. & POL'Y 105, 105-106 (2009).

[48] A recent study highlighted the importance of "useful connectivity," which depends "not just on the number of people connected to a network or infrastructure, but how well those connected people utilize the network or infrastructure." *See* Press Release, *Study Shows Significant Economic Benefits From Broadband if Overall ICT Access and Skills are High*, NOKIA SIEMENS NETWORK (Mar. 5, 2009) *available at* http://www.nokiasiemensnetworks.com/global/Press/Press%20releases/news-archive/Study%20shows%20significant%20economic%20benefits%20from%20broadband%20if%20overall%20ICT%20access%20and%20skills%20are%20high.htm (citing LECG/NOKIA SIEMENS NETWORK'S *CONNECTIVITY SCORECARD* (2009), *available at* http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2009.pdf) [hereinafter "*Useful Connectivity*"].

[49] *See* CHARLES M. DAVIDSON & MICHAEL J. SANTORELLI, THE IMPACTS OF BROADBAND ON PEOPLE WITH DISABILITIES, Report to the U.S. Chamber of Commerce at 25-31, (Dec. 2009), *available at* http://www.uschamber.com/NR/rdonlyres/eg527llrwtht77nu6ifxqxyfyam3pbbdizzwuwwu3kuomn37hitdicjmnox7onfsc3ad4iwevg4babodfjivqtctiad/U%2eS%2eChamberPaperonBroadbandandPeoplewithDisabilities.pdf [hereinafter "*Broadband & People with Disabilities*"].

[50] *See* U.S. DEPT. OF LABOR, OFFICE OF DISABILITY EMPLOYMENT POLICY, SMALL BUSINESS AND SELF EMPLOYMENT FOR PEOPLE WITH DISABILITIES, http://www.dol.gov/odep/programs/promotin.htm (last visited Dec. 19, 2009).

Senior citizens use broadband to enable cost-savings by comparison shopping online for prescription drugs,[51] to work past retirement by telecommuting,[52] and to manage retirement savings online.[53] According to a 2005 study, the aggregate cost savings due to the use of broadband by seniors, people with disabilities, and in the care of seniors and people with disabilities was estimated to be between $532 billion and $847 billion by 2030[54] (this estimate includes savings realized from increased efficiencies in healthcare and the economic impact of having more members of each segment in the workforce).

Overall, one study estimates that "consumers receive more than $30 billion of net benefits from the use of fixed-line broadband at home per year."[55] This study also linked increased broadband speeds with increased consumer benefits: "the benefits of an increase in broadband speed from 100 times the typical historical speed of dial-up Internet service to 1,000 times dial-up are on the order of $6 billion per year for existing home broadband users."[56] However, in order to realize these gains, policymakers must focus their efforts on ensuring that broadband is adopted and used effectively.[57]

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[51] *Broadband & Seniors, supra* note 24 at 17-18.

[52] *Id.* at 19.

[53] *Id.* at 18.

[54] *See* ROBERT E. LITAN, NEW MILLENNIUM RESEARCH COUNCIL GREAT EXPECTATIONS: POTENTIAL ECONOMIC BENEFITS TO THE NATION FROM ACCELERATED BROADBAND DEPLOYMENT TO OLDER AMERICANS AND AMERICANS WITH DISABILITIES, (Dec. 2005), available at http://www.newmillenniumresearch.org/archive/Litan_FINAL_120805.pdf.

[55] *See* MARK DUTZ ET AL., THE SUBSTANTIAL CONSUMER BENEFITS OF BROADBAND CONNECTIVITY FOR U.S. HOUSEHOLDS, at 4, (July 2009), *available at* http://internetinnovation.org/files/special-reports/CONSUMER_BENEFITS_OF_BROADBAND.pdf.

[56] *Id.*

[57] *See e.g. Measuring Economic Impact of Broadband, supra* note 43 at 11 (observing that "Once broadband is available to most of the country, differences in economic outcomes are likely to depend more on how broadband is used than on its basic availability. The implication for economic development professionals is that a portfolio of broadband-related policy interventions that is reasonably balanced (i.e., also pays

2. *Broadband and Healthcare*

Broadband is playing an increasingly vital role in healthcare by enabling a universe of telemedicine services[58] that, in turn, provide a number of life-enhancing, and potentially lifesaving, benefits. Among other benefits, broadband-enabled telemedicine and health information technology services (e.g., electronic health records or EHRs) extend the range of enhanced medical services to rural parts of the country, streamline the administration of healthcare, enable a wide array of cost savings, and empower individuals to have more control over medical decisions.[59] In sum, broadband-enabled telemedicine is poised to shift the traditional healthcare paradigm toward increased individualized care by empowering patients to make more informed decisions and to receive targeted medical care in their homes.[60]

For patients, broadband-enabled telemedicine facilitates a number of positive impacts. These include:

- *Rural healthcare access.* Telemedicine allows patients who live in remote parts of the country or who are physically unable to travel long distances to receive quality healthcare, often via real-time broadband-enabled

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attention to demand-side issues such as training) is more likely to lead to positive economic outcomes than a single-minded focus on availability.").

[58] "Telemedicine" refers to "the use of electronic communications and health information technology (HIT) to provide clinical services" for remote patients. *See* AMERICAN TELEMEDICINE ASSOCIATION, TELEMEDICINE, TELEHEALTH, AND HEALTH INFORMATION TECHNOLOGY, AN ATA ISSUE PAPER, at 3 (May 2006), *available at* http://www.americantelemed.org/files/public/policy/HIT_Paper.pdf. For the purposes of this paper, telehealth, which encompasses a "broader application…of electronic communications and information technologies" that is used to "support healthcare services," is also implicated in the general telemedicine discussion. *Id.*

[59] *See generally* CHARLES M. DAVIDSON & MICHAEL J. SANTORELLI, THE IMPACT OF BROADBAND ON TELEMEDICINE, A REPORT TO THE U.S CHAMBER OF COMMERCE (April 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/BroadbandandTelemedicine.pdf [hereinafter "*Broadband & Telemedicine*"].

[60] *See, e.g.,* Eric Dishman, *Inventing Wellness Systems for Aging in Place*, COMPUTER MAGAZINE (May 2004); *Broadband & Telemedicine*, *supra* note 59, at 3.

services like videoconferencing. Whereas in the past, these types of patients would have to either delay treatment or risk traveling long distance to consult with a specialist, broadband-enabled telemedicine services provide fast, reliable, effective, and convenient healthcare to patients regardless of geographic location.[61]

- *Remote monitoring.* This encompasses a wide range of tools and services, including the use of sensors to record movements, the use of wireless devices to monitor vital signs and symptoms (e.g., glucose levels[62]), and the use of cameras and software to remotely monitor several intensive care patients at once.[63] A recent study estimated that "a full embrace of remote monitoring alone could reduce healthcare expenditures by a net of $197 billion (in constant 2008 dollars) over the next 25 years with the adoption of policies that reduce barriers and accelerate the use of remote monitoring technologies."[64]
- *In-home care.* A recent trial involving patients with various heart-related ailments found that in-home

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[61] *Broadband & Telemedicine, supra* note 59, at 14.

[62] MedApps, for example, has released an FDA-approved product that allows for information gleaned from its glucose measuring to be sent via Bluetooth to a patient's cell phone and transmits the information to a central server in near real-time. *See* MedGadget.com, *MedApps D-PAL Remote Patient Monitoring System for Diabetes,* July 12, 2007, *available at* http://medgadget.com/archives/2007/07/medapps_dpal_remote_patient_monitoring_system_for_diabetes.html.

[63] *See* Laura Landro, *The Picture of Health*, WALL ST. J. Oct. 27, 2008, (describing an electronic ICU [eICU] program that "uses two-way video cameras and software that tracks patients' vital signs and instantly registers any changes in lab test results or physical condition. That enables doctors in the command center to spot early warning signs that a patient is taking a turn for the worse, advise bedside staff on giving medications and treatments, and point out potential errors or oversights." Further, a recent study found that average cost savings flowing from eICU programs was $5,000 per case.).

[64] *See* ROBERT LITAN, VITAL SIGNS VIA BROADBAND: REMOTE HEALTH MONITORING TRANSMIT SAVINGS, ENHANCES LIVES, at 2, (Oct. 2008), *available at* http://www.betterhealthcaretogether.org/Library/Documents/VITAL%20SIGNS%20via%20BROADBAND%20FINAL%20with%20FOREWORD%20and%20TITLE%20pp%2010%2022.pdf.

monitoring devices were effective and popular among both care providers and patients. In particular, this study estimated that broadband-enabled real-time video consultations could replace upwards of 45 percent of in-person visits regarding heart-related matters.[65]

- *Increased access to specialists,* which allows for more efficient diagnosis and treatment.[66] Leveraging the expertise and experience of a specialist often leads to more successful and effective treatments.[67]
- *Early disease detection.* For example, in-home monitoring systems are being tested to detect the early onset of cognitive diseases like Alzheimer's.[68] Treating these types of diseases "costs the United States more than $148 billion annually in Medicaid and Medicare services and in indirect costs to businesses that employ [Alzheimer's] and dementia caregivers."[69] Yet, it is estimated that the early "interventions that could delay the onset of Alzheimer's disease by as little as one year would reduce prevalence of the disease by 12 million fewer cases in 2050," which could lead to dramatic cost savings for this disease alone.[70]

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[65] *See* Mark Terry, *Three Modalities of Cardiovascular Telemedicine*, 14 J. TELEMED. & E-HEALTH 1031, 1032 (Dec. 2008) [hereinafter "*Three Modalities*"].

[66] *See* Stacie Huie, *Facilitating Telemedicine: Reconciling National Access with State Licensing Laws,* 18 HASTINGS COMM. & ENT. L.J. 377, 389 (1996).

[67] *Id.*

[68] The Oregon Center for Aging & Technology ("ORCAT") is one institution that has launched a pilot program that uses in-home wireless sensors to monitor cognitive decline among older adults. For more information, *see* ORCAT, Current Research, http://www.orcatech.org/research/studies.

[69] *See* International Conference on Alzheimer's disease, *Highlights of Research Findings*, at 2, Alzheimer's Association, *available at* https://www.alz.org/icad/documents/2008_ICADhighlights.pdf.

[70] *See* Press Release, Johns Hopkins University Bloomberg School of Public Health, Alzheimer's disease to Quadruple Worldwide by 2050, (June 10, 2007) *available at* http://www.jhsph.edu/publichealthnews/press_releases/2007/brookmeyer_alzheimers_2050.html (announcing a study by Ron Brookmeyer et al. entitled *Forecasting the Global Burden of Alzheimer's Disease*).

For healthcare providers, broadband is being used as a platform to enable a variety of advanced medical tools that enhance care and streamline operations. Examples include:

- *Outsourcing critical medical data to specialists for diagnoses*. For example, teleradiology is increasingly popular in rural areas like Alaska, where local healthcare providers send x-rays via email to colleagues in other states or other countries. Indeed, over the past few years, increasing amounts of radiological data have been outsourced to doctors in India for review and diagnosis.[71] While this and other types of "outsourced" medicine have been somewhat controversial,[72] these efforts produce synergies that maximize the readily available talents of those who live in distant places by using broadband connections and decrease costs for patients and doctors in the United States.[73]
- *Reduce the number of physicians needed in rural areas.* Broadband helps to make up for a dearth of physicians who practice in rural areas. Indeed, a 2005 study found that only three percent of medical students expressed a desire to work in rural areas.[74]
- *Continuing medical education.* Broadband enables chat groups, videoconferencing, and Internet-based continuing education programs based in urban healthcare facilities for use by rural physicians. For example, the Telemedicine Program at Texas Tech University offers a number of distance learning opportunities for healthcare providers

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[71] *See, e.g.,* Andrew Pollack, *Who's Reading Your X-Ray?* N.Y. TIMES, Nov. 16, 2003.

[72] *See* Archie A. Alexander, III, *American Diagnostic Radiology Moves Offshore: Is This Field Riding the "Internet" Wave Into a Regulatory Abyss?* 20 J. L. & HEALTH 199 (2007) (explaining the controversy surrounding outsourcing in general and arguing in favor of teleradiology as beneficial to patients and doctors.).

[73] *Barriers, supra* note 20 at 46-47.

[74] *See* Myrle Crosdale, *Admissions Process Aims to Boost Rural Doctors*, AMERICAN MEDICAL NEWS, Feb. 7, 2005, *available at* http://www.ama-assn.org/amednews/2005/02/07/prsb0207.htm.

throughout the state of Texas. One class, Telemedicine 101, introduces patients and doctors to the concept of remote healthcare and encourages healthcare providers to assess whether they need to implement such services in their towns.[75] These types of programs allow rural doctors and patients to stay abreast of new developments in the field of medicine and telemedicine.

- *More efficiently manage patient data.* EHRs store an individual patient's medical history – test results, doctor recommendations, medications, etc. – in a digital form.[76] These and other health IT tools facilitate better communication among healthcare providers, which in turn allows doctors to provide their patients with more comprehensive care.[77]

Actual usage of many of these tools, however, remains sporadic. For example, by 2006 less than half – 46 percent – of community hospitals reported moderate or high use of HIT.[78] According to the U.S. Department of Health and Human Services, only four percent of physicians have adopted fully functional EHR systems.[79] Many patients

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[75] *See* Texas Tech Health Sciences Center, Telemedicine Training & Consulting, http://www.ttuhsc.edu/telemedicine/institute.aspx.

[76] *Broadband & Telemedicine, supra* note 59 at 3.

[77] *See e.g.,* Press Release, Compressus, National Survey of Radiologists Reveals Systemic Problems Hurting Industry and Patient Care (Dec. 3, 2008) *available at* http://www.compressus.com/PDF_Press%20Releases/FH%20Compressus%20Survey%20Release%20Final-120208.pdf (reporting the results of a survey that found, among things, that "Ninety-four percent [of surveyed radiologists] connected the inability of medical imaging systems to communicate with information systems of physicians and hospitals with missed or delayed diagnosis" and "[71] percent of radiologists consider this failure to share data with other physicians and hospitals as a growing crisis for the industry.").

[78] *See* AMERICAN HOSPITAL ASSOCIATION CONTINUED PROGRESS: HOSPITAL USE OF HEALTH INFORMATION TECHNOLOGY, at 1 (2007), *available at* http://www.aha.org/aha/issues/HIT/resources.html [hereinafter "*Continued Progress*"].

[79] See *Press Release, U.S. Dept. of Health & Human Services, Large Survey of Physicians Show Size and Setting Continue as Major Factors Influencing EHR Adoption Rates (June 18, 2008)* available at

are also wary of telemedicine services. Studies have shown that, while patient satisfaction with telemedicine services is generally positive, patients express negative concerns both before and after receiving treatment. A recent study of remote monitoring patients found that "[a]lthough the response to the home telehealth service [for congestive heart failure] was overwhelmingly positive, respondents remained undecided regarding the perceived benefits of telehealth versus in-person care."[80] Many view telemedicine as a supplement to, rather than a replacement of, traditional face-to-face doctor visits so long as adequate privacy measures are taken.[81]

Enhancing adoption and use of these services is essential to realizing the many cost savings associated with telemedicine tools. For example, many believe that using telemedicine for in-home care has the potential to save millions, if not billions, each year in healthcare costs. In 2009, a U.S. Veterans Affairs in-home telehealth pilot reported a 19 percent decrease in hospitalizations, a 25 percent decrease in bed days of care, and a 27 percent decline in the 4-year diabetes mortality rate.[82] The decrease in hospitalizations alone totals $2.2 billion per year in cost savings.[83] Moreover, broadband-enabled telemedicine could replace in-person consultations,[84] eliminate unnecessary transfers,[85] and increase

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http://www.hitadoption.org/index.php?module=News&id=cntnt01&cntnt01action=detail&cntnt01articleid=4&cntnt01returnid=30.

[80] *See* Pamela Whitten, et al., *St. Vincent's Home Telehealth for Congestive Heart Failure Patients,* J. TELEMEDICINE AND E-HEALTH 151-152 (March 2009).

[81] *See* PHILIPS HOME HEALTHCARE SOLUTIONS, NATIONAL STUDY ON THE FUTURE OF TECHNOLOGY & TELEHEALTH IN HOME CARE at 32, (April 2008), *available at* http://www3.medical.philips.com/resources/hsg/docs/en-us/custom/PhilipsNationalStudyFullReport.pdf.

[82] *FCC Broadband Taskforce Presentation, supra* note 9 at slide 100 (citing: Chumbler NE et al, *Mortality risk for diabetes patients in care coordination, home-telehealth program,* JOURNAL OF TELEMEDICINE AND TELECARE 2009:15:98-01; Bates DW et al, *Veteran senate hearings, available at* http://veterans.senate.gov.)

[83] *Id.*

[84] A recent study estimated that broadband-enabled real-time video consultations could replace upwards of 45% of in-person visits regarding heart-related matters. *Three Modalities, supra* note 65 at 1032.

prescription accuracy.[86] Studies have also estimated that robust utilization of EHR systems could lead to annual cost savings of between $77 billion[87] and $80 billion.[88]

3. *Broadband and the Energy Sector*

In addition to having the potential to transform the U.S. healthcare paradigm, broadband is increasingly essential to energy reform efforts at the state and federal levels. Indeed, the ability of broadband to transmit data in real-time provides energy companies with a number of ways for integrating this technology into various aspects of the energy business. Two examples are illustrative of this trend.

First, broadband is being used to modernize the electric grid by enabling "smart" technologies that provide energy providers and consumers with real-time consumption information. A wide-scale "smart grid" will have a number of impacts on the energy sector. These include:

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[85] One study estimates that telemedicine "could save the U.S. healthcare system $4.28 billion [annually] just from reducing transfers of patients from one location, such as a nursing home for medical exams at hospitals, physicians' offices, or other caregiver locations." *See* ALEXANDER H. VO, UNIV. OF TEXAS MEDICAL BRANCH THE TELEHEALTH PROMISE: BETTER HEALTHCARE AND COST SAVINGS FOR THE 21ST CENTURY, at 8, *available at* http://attcenter.utmb.edu/presentations/The%20Telehealth%20Promise-Better%20Health%20Care%20and%20Cost%20Savings%20for%20the%2021st%20Century.pdf.

[86] Computerized physician order entry could save up to $1.1 billion nationally through a 13% decline in duplicate tests. *FCC Broadband Taskforce Presentation, supra* note 9, at slide 102.

[87] *See* Sharona Hoffman & Andy Podgurski, *Finding a Cure: The Case for Regulation and Oversight of Electronic Health Records Systems,* 22 HARV. J. L. & TECH. 104, 116 (2008) (citing Jan Walker et al., *The Value of Health Care Information Exchange and Interoperability*, 25 HEALTH AFFAIRS W5-10, W5-16 (2005)).

[88] *See* Richard Hillestad et al., *Can Electronic Medical Record Systems Transform Healthcare? Potential Health Benefits, Savings, and Costs*, at 24 HEALTH AFFAIRS 1103 (2005). It is estimated, however, that implementing EHRs across the entire U.S. healthcare system could cost upwards of $100 billion. *See* David Goldman, *Obama's Healthcare Challenge*, CNN MONEY, Jan. 12, 2008, *available at* http://money.cnn.com/2009/01/12/technology/stimulus_health_care/index.htm.

- *More efficient energy distribution.* According to the U.S. Department of Energy, "electricity losses in the transmission and distribution systems exceed 10 percent of total energy generated."[89] These losses cost rate payers hundreds of millions of dollars per year; reducing them via a smart grid could result in better energy efficiency and cost savings.[90]
- *Lower carbon emissions.* The U.S. Department of Energy estimates that robust use of the smart grid could equate to eliminating fuel and greenhouse gas emissions from 53 million cars.[91] In addition, the FCC has estimated that use of the smart grid may save between 60MM and 480MM tons of carbon emissions per year, while annually creating $6 billion to $40 billion in value.[92]
- *More diverse fuel supply.* An intelligent grid that can monitor and react to changes in consumer usage in real-time will enable the incorporation of key renewable energy fuel sources – e.g., wind and solar – that are also intermittent in nature.[93] This will boost the energy supply and cut carbon emissions.[94] According to one study,

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[89] *See* U.S. DEPARTMENT OF ENERGY, NATIONAL TRANSMISSION GRID STUDY at 63 (May 2002), a*vailable at* http://www.pi.energy.gov/documents/TransmissionGrid.pdf.

[90] *Barriers, supra* note 20 at 51.

[91] *See* LITOS STRATEGIC COMMUNICATION, THE SMART GRID: AN INTRODUCTION at 7 (2008), *available at* http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages.pdf [hereinafter "*Smart Grid Introduction*"].

[92] *FCC Broadband Taskforce Presentation, supra* note 9 at Slide 108 (citing: Normalized from *The iGridProject*, The Brattle Group, July 2009; *Smart 2020: Enabling the Low Carbon Economy in the Information Age*, United States Report Addendum, GESI and BCG, Nov. 2008; *Power Delivery System of the Future: A Preliminary Estimate of Costs and Benefits*, EPRI, July 2004; *The Green Grid: Energy Savings and Carbon Emissions Reduced Enabled by a Smart Grid, EPRI*, Jun. 2008).

[93] *Barriers, supra* note 20 at 53.

[94] *See, e.g., Wiser Wires,* THE ECONOMIST, Oct. 8, 2009 (observing that "More intelligence in the grid would also help integrate renewable sources of electricity, such as solar panels or wind turbines. As things stand, the trouble is that their output, being hostage to the weather, is highly variable. A standard grid becomes hard to manage if

> "integrating wind or solar power into the grid at scale – at levels higher than 20 percent – will require advanced energy management techniques and approaches at the grid operator level. The Smart Grid's ability to dynamically manage all sources of power on the grid means that more distributed generation can be integrated within it."[95]

Second, households and businesses are using an array of broadband-enabled energy efficiency tools to decrease consumption, limit carbon emissions, and save money. In combination with other "holistic" approaches "executed at scale," widespread and coordinated energy efficiency programs, which would include broadband-enabled smart grid services and devices, could result in over $1.2 trillion in gross energy savings thru 2020.[96] This approach is expected to "reduce end-use energy consumption in 2020 by 9.1 quadrillion BTUs, roughly 23 percent of projected demand, potentially abating 1.1 gigatons of greenhouse gases annually."[97] Specific examples of these types of tools include:

- *Demand response programs.* The constant flow of real-time usage data, and a consumer's ability to access that data via an online portal, will allow the customer to alter usage patterns and lower their bills via responsive pricing programs.[98] The Federal Energy Regulatory Commission ("FERC") estimates that the potential reduction in

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too many of them are connected to it; supply and demand on electricity-transmission systems must always be in balance. A smart grid could turn on appliances should, for instance, the wind blow more strongly.").

[95] *Smart Grid Introduction, supra* note 91 at 25 (citing a study by the European Wind Energy Association).

[96] *See* HANNAH CHOI GRANADE ET AL., MCKINSEY GLOBAL ENERGY AND MATERIALS, UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY at iii, *available at* http://www.mckinsey.com/clientservice/electricpowernaturalgas/downloads/US_energy_efficiency_full_report.pdf[hereinafter "*McKinsey Energy Efficiency*"].

[97] *Id.*

[98] *See, e.g.,* CHARLES RIVER ASSOCIATES, PRIMER ON DEMAND-SIDE MANAGEMENT at 30-32, (Feb. 2005), *available at* http://siteresources.worldbank.org/INTENERGY/Resources/PrimeronDemand-SideManagement.pdf (describing a real-time pricing pilot project in Chicago).

consumption due to demand-response programs is approximately 41,000 MW per year.[99]

- *Smart meters.* These tools relay transmission and usage information in real-time to the consumer and provider, allowing for instantaneous adjustments to transmission and usage patterns.[100] Eventually, smart meters will allow customers to "set temperature preferences for their thermostats…or opt in or out of programs that let them use cleaner energy sources, such as solar or wind power."[101]
- *Smart buildings.* Buildings contribute 43 percent of the carbon emissions in the United States.[102] The smart grid could allow buildings to be fitted with technologies that allow internal systems (e.g., heating and cooling) to seamlessly communicate with the electric grid.[103]
- *Telecommuting.* According to one study, "[e]ach Internet telecommuter saves about… 3500 kilowatt hours a year."[104] Another study has found that "[t]elecommuting will reduce greenhouse gas emissions by 247.7 million

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[99] *See* U.S. DEPT. OF ENERGY, SMART GRID SYSTEM REPORT at 30 (July 2009), *available at* http://www.oe.energy.gov/DocumentsandMedia/SGSRMain_090707_lowres.pdf (citing a Dec. 2008 FERC staff report on advanced metering and demand response).

[100] *Barriers, supra* note 20 at 54.

[101] *See Building the Smart Grid*, THE ECONOMIST, June 4, 2009 *available at* http://www.economist.com/sciencetechnology/tq/displaystory.cfm?STORY_ID=13725843.

[102] *See* BRACKEN HENDRICKS, CENTER FOR AMERICAN PROGRESS, WIRED FOR PROGRESS: BUILDING A NATIONAL CLEAN-ENERGY SMART GRID, VERSION 1.0 at 1 (Feb. 2009), *available at* http://www.americanprogress.org/issues/2009/02/pdf/electricity_grid.pdf [hereinafter "*Wired for Progress*"].

[103] *McKinsey Energy Efficiency, supra* note 96 at 32 (arguing that viewing a building as one integrated system, "rather than as a set of independent end-uses," can result in "additional energy savings in a cost effective manner").

[104] *See* JOSEPH ROMM, THE INTERNET AND THE NEW ENERGY ECONOMY in WORLD WILDLIFE FUND – SWEDEN, SUSTAINABILITY AT THE SPEED OF LIGHT (Dennis Pamlin, ed.) at 39 (2002), *available at* http://assets.panda.org/downloads/wwf_ic_1.pdf.

> tons due to less driving, 28.1 million tons due to reduced office construction, and 312.4 million tons because of energy saved by businesses."[105]

Some have estimated that "better use of this sort of real-time information across the entire electrical grid could allow at least a 20 percent improvement in energy efficiency in the United States."[106] With energy demand expected to increase by 30 percent by 2030, and with electricity prices projected to increase by 50 percent over the next several years, widespread adoption and use of smart grid-enabled consumer tools is critical to more efficient energy distribution and more affordable consumption for both individual customers and large institutions.[107]

C. Conclusions

The preceding analysis supports three important observations.

First, even though broadband adoption continues to increase across the general population, a significant number of users remain unconnected. Indeed, more than half of some demographic groups – including seniors, those earning less than $20,000 per year, and people with disabilities – have yet to adopt broadband even though it is widely available.[108]

Second, broadband is having positive impacts on individual users and the overall U.S. economy, and is an increasingly vital platform that enables economic opportunities for all users. However, these benefits

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[105] *See* JOSEPH P. FUHR JR. & STEPHEN B. POCIASK, THE AMERICAN CONSUMER INSTITUTE CENTER FOR CITIZEN RESEARCH BROADBAND SERVICES: ECONOMIC AND ENVIRONMENTAL BENEFITS (Oct. 2007), *available at* http://www.theamericanconsumer.org/2007/10/31/broadband-services-economic-and-environmental-benefits/.

[106] *Wired for Progress, supra* note 102 at 31.

[107] *See* LITOS STRATEGIC COMMUNICATION TECHNOLOGY PROVIDERS: ONE OF SIX SMART GRID STAKEHOLDER BOOKS at 3 (2008), *available at* http://www.oe.energy.gov/DocumentsandMedia/TechnologyProviders.pdf.

[108] *Home Broadband Adoption 2009, supra* note 11 at 13-14; *Broadband in America, supra* note 7 at 3.

depend on actual adoption and effective utilization of a broadband connection. Mere connectivity is "not enough."[109]

Third, broadband is poised to transform individual sectors of the economy. For example, broadband has the potential to shift the traditional healthcare paradigm towards more individualized care that is focused on disease prevention, not disease management.[110] In addition, broadband will be indispensible to energy efficiency efforts on the user-end and the provider-end.[111]

In light of the many life-enhancing impacts, consumer welfare gains, and cost savings enabled by broadband, increasing broadband adoption among under-adopting groups and maximizing the adoption rate for the general population should be a priority for policymakers.

II
BROADBAND ADOPTION DYNAMICS: AN INTRODUCTION & A CASE STUDY

An essential prerequisite to developing effective policies that seek to enhance actual utilization of broadband is an understanding of the dynamics associated with broadband adoption. Section II highlighted two important characteristics of broadband adoption: (1) adoption decisions vary from user group to user group and (2) a number of factors influence these decisions. Part A of this section develops these observations in more detail.

Part B provides a case study of these dynamics by focusing on how the senior demographic approaches broadband adoption decisions. The case study then assesses the effectiveness of a training program on broadband adoption among senior citizens living in New York City. This section concludes with a set of best practices and guiding principles for

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[109] Levin, *Wired for Social Justice, supra* note 22 at 5-6 ("connectivity to devices is just not enough… we must weave our investments in digital access into the fabric of our communities.").

[110] *See, e.g., Broadband & Telemedicine, supra* note 59 at 3.

[111] *See, e.g., Barriers, supra* note 20 at 51-55.

spurring broadband adoption across all user groups that are extracted from this case study.

A. An Introduction to Broadband Adoption Dynamics

Technology adoption is generally a multi-stage process.[112] To date, much of the technology adoption literature has focused on each step of this process in order to understand how and why potential users decide to adopt a certain technology.[113] Oftentimes users are sorted into different categories based on how quickly they adopt a technology.[114] In addition, these groups of users are often identified based on their perceptions of a given innovation.[115] These usually include early adopters, who are generally more avid users of technologies, and laggards, who are usually skeptical of new technologies.[116] Much of this literature has approached technology adoption from a marketing perspective and has profiled these niches of users for use in bolstering utilization of new products.[117]

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[112] *See, e.g.,* Anja Lambrecht, Katja Seim & Catherine Tucker, *Stuck in the Adoption Funnel: The Effect of Delays in the Adoption Process on Ultimate Adoption*, NET Institute Working Paper No. 07-40 (May 2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=941697# (analyzing "the relationship between time spent in different stages of the adoption process and whether the customer ultimately uses the technology substantially," at 1) (hereinafter "*Adoption Funnel*").

[113] For a seminal work on this subject, *See* EVERETT M. ROGERS, DIFFUSION OF INNOVATIONS (5th ed. 2003).

[114] *See* GEOFFREY A. MOORE, CROSSING THE CHASM: MARKETING AND SELLING DISRUPTIVE PRODUCTS TO MAINSTREAM CUSTOMERS at 12-14 (2002). Moore draws on Rogers' research in identifying five different types of potential adopters: (1) innovators; (2) early adopters; (3) early majority; (4) late majority; and (5) laggards).

[115] With regard to adoption of innovative new technologies, Rogers links individuals' perceptions of an innovation with their decision to adopt it. In particular, he identifies five characteristics of innovations "individuals' perceptions of these characteristics predict the rate of adoption of innovations." These five characteristics are: (1) perceived attributes of innovation; (2) type of innovation-decision; (3) communication channels; (4) nature of the social system; and (5) extend of change agents' promotion efforts. ROGERS, DIFFUSION OF INNOVATIONS, *supra* note 113 at 219-222.

[116] MOORE, CROSSING THE CHASM, *supra* note 114 at 12-13.

[117] *See, e.g.,* GEOFFREY A. MOORE, INSIDE THE TORNADO: STRATEGIES FOR DEVELOPING, LEVERAGING AND SURVIVING HYPERGROWTH MARKETS TORNADO at 20-

Moreover, many studies generally provide qualitative analyses of user types in order to provide a framework for assessing adoption decisions. Empirical assessments have contributed to this literature by providing more granular insight into the adoption process. For example, a recent study has identified an "adoption funnel" that describes high rates of technology adoption (e.g., signing up for a particular service) and progressively lower rates of actual usage.[118] This study also observed a relationship between the time it takes for a user to adopt a technology and a "customer's probability of substantially using" it.[119] Those who adopt a technology sooner tend to use it more often, whereas someone who delays adoption tends to use the service less frequently. These types of analyses provide further insight into traditional qualitative frameworks for assessing technology adoption decisions and the diffusion of innovative new services across the general population.[120]

Broadband adoption decisions are impacted by many of the factors discussed above. These include the availability of broadband, awareness of its value, and adequate knowledge of how to use it.[121] However, the

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21 (Collins Business Essentials) (2005) (identifying "the chasm" between the "early market" for new technologies and the "mainstream market" and observing that "whenever truly innovative high-tech products are first brought to market, they will initially enjoy a warm welcome in an early market made up of technology enthusiasts and visionaries but then fall into a chasm, during which sales will falter and often plummet. If the products can successfully cross this chasm, they will gain acceptance within a mainstream market dominated by pragmatists and conservatives.").

[118] *Adoption Funnel*, *supra* note 112 at 1.

[119] *Id.*

[120] *Id.* at 3-4 (observing that many "aggregate diffusion studies usually treat the outcome of the individual adoption decision as a single discrete choice" whereas others have observed that "the adoption process often requires the completion of several distinct stages involving multiple decision-makers or other complicating factors").

[121] *See, e.g., Broadband & Seniors*, *supra* note 24 at 6; *Broadband & People with Disabilities, supra* note 49 at 8 (both provide a framework for analyzing broadband adoption within the relevant user group). Rogers describes these factors as compatibility ("the degree to which an innovation is perceived as consistent with the existing values" of a user group), complexity ("the degree to which an innovation is perceived as relatively difficult to understand and to use"), trialability ("the degree to which an innovation may be experimented with"), and observability ("the degree to which the

reasons for non-adoption are more nuanced than those set forth in much of the traditional technology adoption literature. For example, as previously discussed, broadband adoption decisions tend to be sector-specific and often do not lend themselves to generalized classification. To this end, one recent report studied broadband adoption decisions among six distinct user groups – two demographic groups (senior citizens and people with disabilities) and four sectors (telemedicine, energy, education, and government) – and observed that each group or sector faced a unique set of barriers to further adoption.[122] In particular:

- "For senior citizens, a general lack of adequate education and training are key contributors to a relatively low broadband adoption rate;
- For people with disabilities, widespread negative perceptions regarding the accessibility of broadband impedes further adoption and use of this technology;
- In the telemedicine sector, a number of outdated legal and policy frameworks hinder more robust adoption and use of broadband-enabled telemedicine services by patients and healthcare providers;
- In the energy arena, the highly regulated and conservative nature of many energy utilities challenges the dynamic nature of broadband and the ecosystem of innovation that it fosters;
- In the education space, lack of targeted funding and inadequate training impede further adoption and usage of broadband and broadband-enabled educational tools in schools across the country; and
- For government entities, institutional inertia and a lack of cross-government collaboration regarding best practices have slowed the effective integration of broadband into many government processes."[123]

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results of an innovation are visible to others," ROGERS, DIFFUSION OF INNOVATIONS, *supra* note 113 at 266.

[122] *Barriers, supra* note 20 at 2.

[123] *Id.*

The FCC has identified additional factors that influence broadband adoption decisions such as perceptions regarding the usefulness of broadband and proximity to a digital support system.[124] In light of the variety of factors influencing broadband adoption, the FCC has concluded that "proposed solutions [for increasing broadband adoption] should address segment-specific needs."[125]

The dynamics of broadband adoption thus include:

- The *availability* of a broadband connection. Broadband must be available for it to be adopted;
- *Awareness* of its availability and of the benefits that its use can enable. Early adopters are usually the only ones who adopt a technology without being fully aware of how it may impact their lives;[126]
- *Demand* for connection. Demand is impacted by a number of factors, which tend to vary from user group to user group.[127] For example, a major barrier to adoption among certain user groups (e.g., people with disabilities) is a general perception that broadband is difficult to use;[128]
- *Actual adoption* of the technology. This includes not only subscribing to the service, but also possession of necessary supporting technologies (e.g., a computing device for all users and necessary assistive technologies for disabled users[129]); and

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[124] *FCC Broadband Taskforce Presentation*, *supra* note 9 at Slide 87.

[125] *Id.* at Slide 92.

[126] MOORE, CROSSING THE CHASM, *supra* note 114 at 12 (observing that early adopters are "people who find it easy to imagine, understand, and appreciate the benefits of a new technology, and to relate these potential benefits to their other concerns").

[127] *See generally Barriers, supra* note 20 (identifying major barriers to broadband adoption among six different user groups).

[128] *Id.* at 25-26.

[129] *Broadband & People with Disabilities*, *supra* note 49 at 12-13 (discussing the various types of assistive technologies available to people with disabilities).

- *Effective utilization* of the connection. This depends on the level of skill that a user possesses and the ability to use a broadband connection in a "useful" way.[130]

B. Broadband Adoption & Senior Citizens: A Case Study

The following case study focuses on (1) the current state of broadband adoption among senior citizens, (2) barriers to further broadband adoption among older adults, and (3) an overview of an approach to spurring broadband adoption among senior citizens living in New York City. This case study seeks to underscore the sector-specific nature of broadband adoption dynamics and the need for policies that address these distinct needs.

1. *Overview of Broadband Adoption among Senior Citizens*

Currently, only 35 percent of adults over the age of 65 have adopted broadband, compared to 75 percent of those aged 18-29.[131] Moreover, a "gray gap" has resulted in nearly 85 percent of adults over the age of 76 unconnected to broadband.[132] However, there is a general upward trend in broadband adoption among this demographic group.

Broadband adoption by adults over 65 has increased more than any other age group over the last several years. The percent change in broadband adoption between 2008 and 2009 among adults over 65 was approximately 58 percent.[133] Similarly, senior use of mobile Internet grew by 67 percent between April 2008 and April 2009.[134] Senior growth rates for both broadband and mobile Internet adoption outpaced all other age groups over the past year. Yet, seniors continue to have the lowest

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[130] *Useful Connectivity, supra* note 48.

[131] *Broadband in America, supra* note 7 at 13.

[132] *Generations Online in 2009, supra* note 25 at 5.

[133] *Home Broadband Adoption 2009, supra* note 11 at 15.

[134] *See Women, Teens, and Seniors Help Fuel 34% Mobile Web Spike,* NIELSENWIRE, Sept. 30, 2009, *available at* http://blog.nielsen.com/nielsenwire/online_mobile/mobile-web-up-34-percent-july-09/.

broadband adoption rate of any other age group and one of the lowest for any demographic group. A number of reasons account for this relatively low adoption rate.

2. *Barriers to Broadband Adoption for Senior Citizens*

Seniors face a number of barriers to further adoption and usage of broadband. For example, seniors are more likely to be located in non-traditional living arrangements that are not conducive to robust broadband adoption. According to the U.S. Department of Agriculture (USDA), some 15 percent of seniors live in rural areas, compared with just 12 percent of the general population.[135] In addition, the USDA has observed that, compared to their more urban counterparts, rural seniors "generally have less income, lower educational attainment, and a higher dependence on social security income."[136] Broadband availability and adoption rates tend to be much lower in rural parts of the country than in non-rural parts.[137]

Moreover, even though a majority of adults over the age of 65 live at home, a little over four percent live in nursing homes.[138] However, these numbers vary widely among generations of seniors. While only one percent of seniors between 65 and 74 are in nursing homes; this number rises to 15 percent for those over age 85.[139] Thirty percent of seniors live

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[135] *See* U.S. Dept. of Agriculture, *Rural Population and Migration: Trend 6—Challenges From an Aging Population*, (2007) http://www.ers.usda.gov/Briefing/Population/Challenges.htm (last visited December 22nd, 2009).

[136] *Id.*

[137] *See, e.g.,* MICHAEL J. COPPS, FEDERAL COMMUNICATIONS COMMISSION BRINGING BROADBAND TO RURAL AMERICA: REPORT ON A RURAL BROADBAND STRATEGY at 12 (May 22, 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf ("Although inexact, currently available data and studies suggest that, in comparison to non-rural areas, broadband services are less extensively adopted in rural areas generally, and that this stems in part from less extensive deployment of broadband capability in rural areas.").

[138] *See* U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, ADMINISTRATION ON AGING,A PROFILE OF OLDER AMERICANS: 2008 at 5 (2009), *available at* http://www.aoa.gov/AoARoot/Aging_Statistics/Profile/2008/docs/2008profile.pdf.

[139] *Id.*

alone.[140] These trends are important because the traditional household is a valuable source of information about computers and the Internet for seniors, as children and grandchildren are likely to utilize such technologies.[141] Data also suggest that broadband use is positively correlated with marital status, or living with a partner, and whether one is the parent of a minor child in the household.[142]

Other barriers to broadband adoption among senior citizens include:

- *Low rate of computer ownership.* As a group, senior citizens are less likely than any other age group to own a computer.[143] As the Consumer Electronics Association has observed, "[a]dults over the age of 65 are 21 percent less likely to own a home computer than adults under the age of 30."[144] Owning or having access to a computer is essential to using wire-based broadband and is essential for developing technology skills and overcoming initial cost-barriers to broadband adoption.[145]
- *Lack of interest or skepticism regarding the value of broadband.* Seniors are more likely than any other age group to cite low interest or lack of relevance to their lives as a reason for not adopting broadband. Among seniors without broadband access, 44 percent state that they are not interested in broadband, nothing could get them to

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[140] *Id.*

[141] *Barriers, supra* note 20 at 15.

[142] *Home Broadband Adoption 2009, supra* note 11 at 38.

[143] SEE SUSANNAH FOX, PEW INTERNET & AMERICAN LIFE PROJECT OLDER AMERICANS AND THE INTERNET at 3 (March 2004), *available at* http://www.pewinternet.org/~/media//Files/Reports/2004/PIP_Seniors_Online_2004.pdf .pdf [hereinafter "*Older Americans*"].

[144] *See* CONSUMER ELECTRONICS ASSOCIATION , BROADBAND IN AMERICA: ACCESS, USE AND OUTLOOKS, at 6 (July 2007), *available at* http://www.ce.org/PDF/CEA_Broadband_America.pdf [hereinafter *CEA Report*].

[145] *Barriers, supra* note 20 at 13.

switch, or they are just too busy;[146] only eight percent of adults ages 18 to 29, and 26 percent of those 50 to 64, made such claims.[147] Seniors as a group did not grow up using computers and the Internet and may also not have been in the workforce when computers became standard.[148] Indeed, according to a study from 2004, seniors "often live lives far removed from the Internet, know few people who use email or surf the Web, and cannot imagine why they would spend money and time learning how to use a computer."[149] A lack of understanding of what broadband is and what it can do thus remains a large obstacle.[150]

- *Online safety concerns.* Older adults tend to be wary of providing personal information online. Pew found that 82 percent of senior Internet users did not like sharing their credit card number or personal information online, compared with 71 percent of those aged 18 to 29.[151] Anxiety over Internet use stems largely from the many reports of identity theft, viruses, malware, Internet fraud, and technology breakdowns.[152] A 2008 study found that

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[146] *Home Broadband Adoption 2009, supra* note 11 at 42-43.

[147] *Id.*

[148] *See* FCC National Broadband Plan Workshop Building the Fact Base: The Standard of Broadband Adoption and Utilization at 78-79 (August 19, 2009) (Statement of Susannah Fox, Associate Director, Digital Strategy, Pew Internet & American Life Project), a*vailable at* http://www.broadband.gov/docs/ws_09_adoption_utilization.pdf [hereinafter "*Fox FCC Comments*"].

[149] *Older Americans, supra* note 143 at 11.

[150] *See* William G. Korver, *Broadband Adoption and Not Availability is Key Challenge, Says One Economy*, July 31, 2008, BROADBANDCENSUS.COM, http://broadbandcensus.com/blog/?p=225; *Broadband in America, supra* note 7 at 30.

[151] *See* JOHN HORRIGAN, PEW INTERNET & AMERICAN LIFE PROJECT, ONLINE SHOPPING, at 8, (Feb. 2008), *available at* http://www.pewinternet.org/~/media//Files/Reports/2008/PIP_Online%20Shopping.pdf.pdf.

[152] *See OATS "Family Link" Program,* Older Adults Technology Services (Jan. 2008).

older adults are afraid of venturing into chatrooms, where they might fall victim to predatory conduct.[153] In addition, many seniors doubt the trustworthiness of online information sources.[154] Moreover, some seniors express a fear of having their financial information or e-mail address to fall into the wrong hands.[155]

- *Lack of training to effectively use a broadband connection.* Many baby boomers and younger seniors typically develop computer and Internet skills in the workplace, carrying those skills into retirement.[156] However, many older seniors likely left the workforce before computers were regularly used.[157] Thus, many now lack the requisite skills to use broadband to enhance their lives.[158] To this end, a survey of older adults participating in a SeniorNet computer-learning course found that personal frustrations, functional limitations, and time constraints were among the most significant barriers to Internet use.[159] Many of the participants had experienced frustration with their own perceived limitations during the

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[153] *See* S.L. Gatto & S.H. Tak, *Computer, Internet, and E-mail Use Among Older Adults: Benefits and Barriers,* EDUCATIONAL GERONTOLOGY: AN INTERNATIONAL JOURNAL, *34(4),* 800-811 (2008) [hereinafter "*Computer, Internet, and E-mail Use Among Older Adults*"].

[154] *Id.*

[155] *Id.*

[156] *See* ARKANSAS GERIATRIC EDUCATION CENTER, *Perceived Benefits and Barriers of Computer, Internet, and E-mail Use by Older Adults*, AGEC VISION, vol. 9, no. 2, *available at* http://www.agec.org/news/news_app.asp?id=178.

[157] *See, e.g.,* ROB SALKOWITZ, GENERATION BLEND: MANAGING ACROSS THE TECHNOLOGY AGE GAP 67 (Wiley 2008) (noting that many members of the "Silent generation" [i.e., those born between 1925 and 1945] are "the most likely generation to have avoided digital technology in their work and lives. Even the youngest were well into their careers when general-purpose computers appeared in the workplace, and older still when they became affordable as consumer devices. Many Silents express an initial fear or reluctance to experiment with technology.").

[158] *Fox FCC Comments, supra* note 148 at 78-79.

[159] *Computer, Internet, and E-mail Use Among Older Adults, supra* note 153.

> learning process.[160] Mental and physical limitations include their perceived lack of knowledge of computer skills, loss of mental acuity, and mobility limitations. Other seniors feared that they lacked enough time to learn how to effectively use the technology.[161]

Despite these many formidable barriers to further broadband adoption, anecdotal evidence suggests that, once seniors adopt broadband and receive training on how to use their connection, they are very capable users.[162] Indeed, seniors who go online regularly are active email users,[163] are among the most avid searchers for health information,[164] and are increasingly participating in social media like blogs.[165] These and other activities are important since regular Internet usage has been found to stimulate brain activity and sharpen mental acuity.[166] Moreover, as discussed above, effective utilization of broadband can result in a number of positive welfare gains for seniors (e.g., more affordable prescription drugs, in-home telemedicine services, etc.).

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[160] *Id.*

[161] *Id.*

[162] *Broadband & Seniors, supra* note 24 at 12.

[163] *Older Americans*, *supra* note 143 at ii.

[164] *See* Susannah Fox, *Panel: Can the Health Informatician Help Seniors Cross the Digital Divide?* at 3, Pew Internet and American Life Project (Nov. 2006).

[165] *See, e.g.,* Carla K. Johnson, *Senior Citizen Bloggers Defy Stereotypes*, USA TODAY, Nov. 6, 2005, *available at* http://www.usatoday.com/tech/news/2005-11-06-geezer-blog_x.htm.

[166] For example, a recent UCLA study found that "for computer-savvy middle-aged and older adults, searching the Internet triggers key centers in the brain that control decision-making and complex reasoning. The findings demonstrate that Web search activity may help stimulate and possibly improve brain function." *See* Rachel Champeua, *UCLA Study Finds that Searching the Internet Increases Brain Function,* UCLA NEWSROOM, Oct. 14, 2008, *available at* http://newsroom.ucla.edu/portal/ucla/ucla-study-finds-that-searching-64348.aspx; *see also UCLA Study: The Internet is Altering our Brains*, FOXNEWS.COM Oct. 19, 2009, *available at* http://www.foxnews.com/story/0,2933,568576,00.html?test=latestnews.

Effective approaches for overcoming these barriers have been developed and implemented in municipalities across the country.[167] Many of these programs provide tailored training services for older adults. The next section describes an approach that has been launched in New York City.

3. *A Case Study of Older Adults Technology Services*

It is widely agreed that targeted education and awareness initiatives are effective in spurring broadband adoption among specific user groups, including senior citizens.[168] These programs address the unique needs of different user groups by tailoring training programs to meet specific needs. One organization that has succeeded in developing an effective model for increasing awareness of broadband and spurring adoption of it among senior citizens is Older Adults Technology Services (OATS).[169] This section provides a case study of the OATS model in order to highlight best practices for increasing adoption and utilization of broadband by seniors.[170]

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OATS, a New York City-based nonprofit founded in 2004, has attempted to overcome many of the barriers to broadband adoption among seniors in a coordinated and strategic manner. First, OATS surveyed a number of senior services organizations in diverse neighborhoods to learn why many efforts to teach older individuals in

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[167] For an overview of demand stimulation programs that target a broader swath of potential users, *see* Janice Hauge & James E. Prieger, *Demand-Side Programs to Stimulate Broadband Adoption: What Works?* (Oct. 14, 2009) (Unpublished Manuscript, *available at* http://ssrn.com/abstract=1492342) [hereinafter "*Demand-Side Programs*"].

[168] *Broadband & Seniors, supra* note 24 at 31-35; *FCC Broadband Taskforce Presentation, supra* note 9 at Slide 92.

[169] *See* OATS, http://www.oatsny.org (last visited Dec. 20, 2009).

[170] Some of this information can be found in *Broadband & Senior Citizens, supra* note 25 at 11. The remainder of the information was provided by co-author Kamber, who is the Founder and Executive Director of OATS, and is based on first-hand knowledge and on data OATS has collected over the past several years. This and other data is available upon request.

community labs were failing to sustain classes and interest from participants. Their research identified several key factors that detracted from success.

- A lack of appropriate, quality technology devices and connectivity. Computers in many public computing labs were often not functioning adequately or not connected to reliable Internet lines (i.e., not broadband).
- Many training programs were not customized for older learners. Trainers used generic curriculum such as "Computers for Dummies," which present information too quickly and with no sensitivity to the learning priorities or styles of older individuals.
- Many training programs relied on either volunteer educators or very low paid episodic consultants who taught under short-term contracts at the centers. High turnover of trainers contributed to dissatisfaction among participants.
- Finally, many of the programs simply failed to take advantage of the rich context in which seniors were learning. No effort was made to link content in course guides to specific opportunities such as health resources, government services, social activities, or workforce training programs.

OATS worked to address this problem by developing a high capacity city-wide training program with curriculum specifically adapted to the patterns and learning styles of older adults. The curriculum focused immediately on teaching older adults to use the Internet and e-mail. Courses were structured to meet twice weekly for 75 minutes, to facilitate retention and minimize participant fatigue.

Second, OATS hired a cadre of trainers dedicated entirely to the task of training older adults and deployed those trainers across the city in partnership with local sites, which were responsible for recruitment of the senior participants and maintenance of the lab environment (e.g., computer equipment and Internet connections[171]). Because OATS

[171] OATS will only provide its services in venues that have a broadband connection. *Broadband & Senior Citizens, supra* note 25 at 11.

trainers develop very high levels of competency supported by the organization's professional development program, and because they had the opportunity to develop large pools of experience, the organization was able to provide higher quality training in a sustainable fashion. After five years of operation, most OATS trainers have taught over 500 class sessions, and one has taught over 1,000 sessions to older adults.

In addition, the OATS model assumes that, not only do seniors want to learn to use computers, but one of the critical barriers for ongoing participation is their lack of opportunity to connect to other older Internet users and build community amongst senior citizens. To address these needs, OATS developed a "digital community" based around a website – www.seniorplanet.org – which provided a chance for seniors to share resources through a wiki-based resource guide, to learn about community events through a weekly calendar of events (emailed to nearly 2,000 participants), and finally to have a voice in the Internet through an easy-to-use blogging functionality.

OATS has also begun to diversify its program offerings. For example, OATS organized and operated 28 clinics around New York City to train seniors how to use the newly launched Medicare Part D website, which provided seniors with a wide array of choices for purchasing prescription drug insurance plans. As a result of OATS's efforts, senior participants saved a total of $19,000 on their drug costs.[172] OATS has also partnered with Per Scholas (www.perscholas.org), a computer recycling company based in New York City, to provide free computers to seniors who complete a 10-week training course.[173] After seniors graduate, Per Scholas delivers and installs a computer in the senior's home. The expectation is that seniors will subscribe to broadband after having experienced it in their class.

To date, the results of these various initiatives and programs have been very positive, with strong increases in computer usage, communications with family and friends, use of the Internet for health research, and confidence living independently. Eighty-nine percent of participants surveyed in a recent study indicated they planned to take

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[172] *Id.* at 17-18.

[173] *See* Per Scholas, Comp2Seniors, http://www.perscholas.org/c2s/index.html (last visited Dec. 20, 2009).

another OATS course. Overall, the program has achieved rapid growth, training more than 1,500 seniors a year in collaboration with over 50 community partners, and has received support from the local and state government, more than a dozen private and corporate foundations, and a wide range of community partners who contribute cash and in-kind resources to sustain the trainings.

These results support the conclusion that high-quality programming, sustained over time in partnership with local organizations, with curriculum, training, and support tailored to the particular needs of demographic segments, can be very successful at converting large numbers of under-served individuals into broadband adopters. The implications for policymakers are significant. Currently there are no local, state, or federal programs to support these kinds of services for older adults, despite the measurable benefit of initiatives that promote broadband adoption.[174] In addition, government policies and practices that can help reverse the technology gap for older adults should be considered. These might include creating more senior-friendly interfaces for public sector websites,[175] directing workforce development resources toward retraining older adults on technology skills,[176] or expanding the definition of "durable medical devices" in the medical field to include a wider range of technology tools.[177]

C. Conclusions

The preceding discussion underscores several important conclusions regarding broadband adoption dynamics.

First, there is agreement regarding the sector-specific nature of broadband adoption decisions. Unlike traditional technology adoption literature, it is difficult to sort adopters and non-adopters in the

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[174] *Barriers, supra* note 20 at 17.

[175] *Id.* at 12-13.

[176] *Id.* at 16 (highlighting clauses in the Medicare and Social Security laws that create disincentives for working past retirement).

[177] *Id.* at 37-38 (observing that there is a general lack of adequate reimbursement mechanisms in most insurance programs to cover new telemedicine devices).

broadband context into ready-made categories. Non-adoption of broadband varies from sector to sector and oftentimes varies within a specific segment. For example, older physicians tend to be warier of adopting broadband-enabled telemedicine services.[178]

Second, given the sector-specific nature of broadband adoption, it is necessary to collect granular data in order to assess the contours of a given sector or segment. For example, knowing that younger seniors and baby boomers are adopting broadband at a higher rate than older seniors allows for more targeted efforts to raise awareness of broadband among this specific segment. Similarly, lack of such granular data regarding the broadband adoption rates and factors impacting adoption decisions for people with specific types of disabilities is a major impediment to more targeted efforts for spurring further adoption and usage of broadband within this segment of the population.[179]

Third, in order to develop effective policies, stakeholders, including policymakers, regulators, service providers, innovators, and educators, must appreciate the wide range of policy and non-policy barriers that influence adoption decisions. Identifying these barriers will likely include a thorough survey of individual user groups in order to understand the interplay between certain policies and adoption decisions. Moreover, a close examination will likely reveal important nuances in how a particular policy might negatively impact the adoption decisions of one user group but not another. For example, many senior citizens elect not to go online due to a fear of identity theft.[180] However, such concerns are not as widespread among other under-adopting groups (e.g., people with disabilities). Understanding these contours will facilitate the development of more carefully tailored policies and approaches to spurring broadband adoption.

Fourth, once the barriers to broadband adoption for a specific user group have been identified, it is necessary to carefully formulate and tailor outreach initiatives to overcome these impediments. OATS

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[178] *Id.* at 50; *see also* Heath Stover, *The Truth About EMR- Physician Resistance*, EzineArticles, *available at* http://ezinearticles.com/?id=878043.

[179] *Barriers, supra* note 20 at 29-30.

[180] *Id.* at 14.

provides a good model. It has succeeded in training thousands of senior citizens to use broadband largely because it undertook a comprehensive review of the needs of its target demographic. For policymakers and other stakeholders, data regarding the effectiveness of these types of programs would likely help with assessing whether a given approach is successful and capable of being used as a model in other contexts.[181]

Fifth, in order to scale out initiatives like OATS, it will be necessary to aggregate and disseminate best practices for effective education and outreach among discrete user groups. To date, there has been a lack of such coordination in many sectors.[182] The FCC is considering a "clearinghouse" approach regarding best practices for broadband deployment.[183] A similar idea has been proposed within the disabilities space.[184] Coordination at the local, state and national levels regarding best practices could bolster adoption efforts.

III
CONCLUSION

In order to realize the full range of welfare gains, cost savings, economic opportunities, and other positive benefits described in this article, it is essential that policymakers develop and implement policies that seek to maximize the broadband adoption rate. This article has argued that these efforts should not result in a one-size-fits-all approach. Rather, this article has highlighted the sector-specific nature of

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[181] *Demand-Side Programs, supra* note 167 at 3 (observing that "reliable evidence establishing the effectiveness of existing demand-side policies has been insufficient").

[182] *Barriers, supra* note 20 at 30 (highlighting a lack of best practices as a barrier to further broadband adoption among people with disabilities).

[183] *See Comment Sought on Broadband Clearinghouse*, National Broadband Plan Public Notice # 10, GN Docket No. 09-51 (Oct. 2, 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-09-2167A1.pdf (noting that "several parties have suggested that a broadband clearinghouse should be created for easy access to broadband best practices" and that a "broadband clearinghouse could reduce information barriers for municipalities, agencies, businesses, and non-profits that want insights into more effectively utilizing broadband infrastructure, or into broadband deployment or adoption projects. Such a clearinghouse could also provide information and a forum for scholars and policymakers to gather and contribute data.").

[184] *See, e.g., Broadband & People with Disabilities*, *supra* note 49 at 53-54.

broadband adoption and underscored that a broad spectrum of factors influence these decisions. Given this dynamic, solutions must follow a similar logic and address the needs and barriers of particular demographics in order to draw them to broadband.