

Using Technology to Improve the Lives of Seniors and Persons with Disabilities

Overview

“We have the largest group of elders alive on the planet in human history. By the end of the decade, it is estimated that one in three households in the United States will have at least one family member dealing with cognitive decline. We need to consider how computing can evolve to meet their needs. And tomorrow’s elders will be different than today’s. For instance, baby boomers accustomed to the PC and the Internet will expect applications and services to enhance their retirement years.”¹

“New opportunities for persons with disabilities and low income seniors to live more independent lives and be full participants in communities reflect the astoundingly rapid cultural change we are all experiencing.”²

The way we care for seniors today cannot scale to meet the looming age wave, and before long we’ll face a full-blown national crisis. Indeed, we are already seeing the beginnings of this impact. We have an obligation to our parents -- indeed to the next generation of seniors -- to ensure they get the best possible care and that they receive it in a place they want to call home. As a caring society we must also address the needs of those persons with disabilities. What we need is a countywide strategic plan as well as the will to achieve -- one that brings together leaders from industry, government, health care, research, and consumer advocacy -- to prepare for the aging of our population. Much of what we can do for seniors is also directly and immediately applicable to persons with disabilities.³

New technology solutions offer great promise to improve quality of care while reducing healthcare costs. Technology already has transformed our lives -- from email to MP3s and from online shopping to cell phones. It is time now for technology to transform the experience of aging as well as improving the lives of those persons with disabilities.

Fortunately, today we already see many practical uses for existing technologies and expect exciting new technologies coming in the next 5-10 years that offer the potential to dramatically improve the quality of care we can provide. We can and must make it happen through vision, leadership, and a county commitment to prepare for the demographic and economic changes that will inevitably transform our swiftly aging planet.

We can unleash the potential of technology for innovative development across the continuum of healthcare, housing and services for the aging and persons with disabilities in order to:

- Help older adults and the disabled maximize their independence
- Support the needs of professional and family caregivers
- Improve quality of care and quality of life
- Reduce our nation’s healthcare costs
- Increase aging and disability services provider efficiency

Potential Economic Benefits to the from Accelerated Broadband Deployment to Older Americans and Americans with Disabilities⁴

It is widely understood that broadband technologies that allow rapid and “always on” connections to the Internet will provide significant benefits to the U.S. economy. We now can estimate the economic benefits to the nation due to cost savings and output expansion resulting

from the use of broadband technologies for an important specific sub-group of the U.S. population: the roughly 70 million Americans who are over 65 or under that age but have disabilities.

Three types of benefits from broadband deployment and use are identified:

- lower medical costs;
- lower costs of institutionalized living; and
- additional output generated by more seniors and individuals with disabilities in the labor force.

Considered together, these three benefits are estimated to accumulate to at least \$927 billion in cost savings and output gains in 2005 dollars (with future benefits discounted for the “time value of money”) over the 25-year period, 2005 to 2030. This amount is equivalent to half of what the United States currently spends annually for medical care for all its citizens (\$1.8 trillion). As large as these benefits may appear, they are in line with previous estimates for the benefits of broadband for the population as a whole.

Policies designed to accelerate the use of broadband for these populations, however, could significantly add to the benefits, by cumulative amounts ranging from \$532 billion to \$847 billion (depending on the wages earned by the additional working seniors). The policy benefits are as substantial as what the federal government is likely to spend on homeland security over the next 25 years. Total cumulative benefits, under the right set of policies, could exceed what the United States currently spends annually for health care for all its citizens.

With so much at stake, policymakers have strong reasons to consider measures to accelerate the deployment and use of broadband technologies for America’s seniors and individuals with disabilities. There is wide agreement that broadband will provide enormous benefits to users and to the entire economy, especially as the take-up rate increases. But so far, relatively little attention has been paid to the potential benefits to be reaped by different groups within American society and how this in turn will generate economic benefits and cost savings over time.

It will not surprise many to know that the young -- who typically are among the first to adopt many new technologies -- have benefited and will continue to benefit greatly from the use of broadband. But it turns out that broadband technologies also hold great promise for a different, important and growing segment of the U.S. population: the 35 million Americans over 65 and as many as 36 million non-elderly Americans with disabilities.

We can now project estimates of the potential economic benefits of broadband for these populations from three sources (for a detailed review of the development of the estimates the reader is referred to “Great Expectations: Potential Economic Benefits to the Nation From Accelerated Broadband Deployment to Older Americans and Americans with Disabilities,” Robert E. Litan, 2005 -- see footnotes for a link to the entire report):

- lower medical costs for both seniors and individuals with disabilities (which can be realized largely through broadband “in the background” rather than through individuals tapping away on computers);
- lower costs from delayed or avoided institutionalized living arrangements for senior citizens and individuals with disabilities; and
- additional output made possible by increased labor force participation by individuals in both groups.

Note that none of the economic estimates include the additional benefits of lives saved and quality of life improvements made possible by broadband.

America is graying

...And so too is our county.

Nationwide currently, about 35 million, or 12 percent of the U.S. population, are over the age of 65. By 2030, the Census projects those over 65 will number 71 million, accounting for 21 percent of the population. The reasons are straightforward and commonly understood: the retirement of the baby boom generation and longer life spans due to advances in medical technology.

Many Americans have some kind of disability. Depending on the definition of the term, as many as 50 million individuals are in this category, of which as many as 36 million are under the age of 65 (non-senior citizens with disabilities).

America has multiple government programs in place to meet the special needs of senior citizens and individuals with disabilities. These programs are already hugely expensive, however, and will grow more so over time, as these populations grow and as technology continues to drive up the cost of health care in general. The same forces will also contribute to rising private sector health care costs incurred by senior citizens and individuals with disabilities.

Governments and individuals will be looking for many ways to reduce the financial burden of these programs -- both through cost savings and expansion of national output (which would generate more government revenues). One prominent federal effort is to bring health care into the 21st century by facilitating the widespread use of electronic medical records (EMR).

Broadband: An Unrecognized Source of Potentially Significant Cost Savings

Another important, and heretofore unrecognized, source of potentially significant cost savings for both the public and private sector, and possibly output (and thus revenue) expansion: the broader use of the Internet, and specifically “broadband” technologies, to deliver health care services and information to senior citizens and individuals with disabilities, and to make it easier for members of both populations to work, if they are willing to do so.

For many, the term “broadband” conjures up images of individuals plugged into their PCs, browsing the Internet, and frequently downloading songs or even movies at speeds once thought to be impossible. In fact, many senior citizens and individuals with disabilities currently use broadband in precisely this way.

But broadband is about much more than personal computers, which are only one way to access the Internet. Already today, millions of Americans (and many more around the world) use their cell phones and other wireless devices (such as personal digital assistants or PDAs) to access the Internet through broadband technology. Wireless is also becoming the method of access for many PC users, especially as more city governments roll out plans to turn their cities into giant Wi-Fi “hot spots.” Millions more users will take advantage of one or more broadband access technologies in the future, especially as Internet access devices proliferate and prices for both them and the service come down.

Indeed, broadband will be built into many other devices or goods -- into homes, clothes and other things people wear (wristwatches, eyeglasses, hearing aids, for example), automobiles, and various appliances. This will significantly enhance broadband penetration throughout the population. In short, *broadband eventually will be ubiquitous*, not just for the young who are always the early adopters of any new technology, but for people of all ages, whether or not they want to or know how to use a personal computer.

Broadband will also confer benefits on society that exceed -- very likely far exceed -- the benefits that individuals believe they will get from it when they purchase access to it. That is because, like other networks, broadband technologies are *platforms*, on which a variety of services have been and will continue to be built.

Consumers who buy a basic broadband service, however, only take account of the benefits they privately derive from the service -- such as entertainment, information, and education. They have no reason or incentive to take account of or to anticipate the broader social benefits the platform enables, such as the “network externalities” that users create for others by enlarging the network and by providing added incentives for more content creators to develop more and better applications for Internet users. For example, it is unlikely that subscribers to broadband only several years ago realized the full extent to which they would soon have access to music, videos, video games and the wealth of information that is now available on the Internet. Or that they would have a platform -- via eBay -- to join in what is now surely the world’s largest market for used merchandise.

Although, as of 2003, official government statistics indicated that only a little more than half of all American households had some type of Internet access, more recent private data indicate that the Internet household penetration rate now may exceed 70 percent. Broadband penetration, however, is substantially less, at roughly one-third of all U.S. households, though this fraction has been steadily increasing.

It is important to distinguish between *access to* and *usage of* broadband, for the terms have very different meanings. Virtually all Americans now have “access to” DSL, cable or some form of wireless broadband service. But most Americans who could purchase broadband do not do so because they apparently do not believe that the content justifies the price -- typically about \$40 per month (though some services are now substantially cheaper than this).

Nonetheless, broadband use could and almost certainly will be higher over time, as service prices come down and more content continues to be delivered for the medium. There is a “chicken-and-egg” aspect to the broadband market, as there is for all markets subject to “network externalities” -- or markets in which the value to one user grows as more users join the network. In the case of broadband, the service becomes more valuable as the quality and variety of content improves; but investment in content, in turn, depends on broadband usage. So, which comes first: the service or the content?

Types of Benefits

The estimated benefits are of two broad types: *cost savings* and *additional output*. The cost savings arise because broadband will enable members of both populations to benefit from disease management programs that require constant or “real-time” communication between patients and providers of medical care in a way that would be much less convenient or even impossible in a “dial-up” world (for example, through remote monitoring by healthcare providers and by two-way communications between patients and health care providers, or “telemedicine”).

Lower costs will show up directly in lower amounts spent on medical care. Medical monitoring enabled by broadband should also delay (or conceivably eliminate the need for) institutionalized living for some seniors and individuals with disabilities who through the use of broadband can be monitored at their current residences or less expensive community health care centers. The cost of living in institutional settings is far more expensive than living at home.

The cost savings implicitly assume that seniors and individuals with disabilities will not demand more medical care when it becomes somewhat cheaper. Should they do so, some of the cost “savings” will be offset by additional care -- which clearly would be a good thing, and thus to the extent this occurs (and lowers the “cost savings”), it should be welcomed.

Broadband should also expand total output because it will enable some seniors and individuals with disabilities who choose to continue working to do so remotely. “Telecommuting” through broadband is a qualitatively different experience than working over a dial-up connection. The availability of broadband therefore should effectively expand the size of the labor force and the income it will generate (aside from enhancing the satisfaction and well-being of individuals who choose to take advantage of the technology).

Potential Broadband-Related Medical Cost Savings

It has been widely observed that of all industries in the economy, health care has been among the least beneficially affected by the Internet revolution. As one report puts it, “The health care sector lags every other major service industry in its investment in information technology.”

This disappointing conclusion is due to several factors. One reason is that the limited technology investments that are made in this sector focus on high-tech diagnostic devices (such as CAT scans) that assist in acute care, but not in routine care or in managing patients with chronic illnesses. In addition, many physicians, especially those who have been in practice for some time, grew up in a generation when the Internet and indeed computers were not integral to their practice, or to business in general. As a result, many physicians and other health care providers (including hospitals) still do not take full advantage of information technology to digitize record-keeping, invoicing, prescription ordering, and other functions. Meanwhile, of particular importance to patients, there is no generally available system of portable, easily used patient medical records so that patients need not fill out new sets of forms, including their medical histories, each time they visit a new health care provider (physician, HMO, or hospital).

Electronic Medical Records

Internet-based technologies have much potential to bring substantial cost savings to the medical care system. Analysts conclude that the savings from web-based claims processing alone would shave 1.5 percent off of total U.S. health care expenditures (then estimated at \$1.2 trillion in 1999). Additional savings could be realized through widespread online access to patients’ electronic medical records (EMR); clinical decision support and payer guidelines; prescription and ordering of medical tests; real-time verification of reimbursement eligibility; appointments scheduling and referrals; patient education and interaction (including “email appointments” rather than in-person visits); compliance monitoring; and greater use of the Web in ordering supplies (business-to-business or B2B commerce).

But EMR will not work without cooperation from physicians, and that in turn will require systems that allow easy data entry, portable devices with which physicians are comfortable and

which they will use, and devices that patients trust to carry their information (such as chips on a card, since patients wary of their privacy are unlikely to trust a single, centralized medical data bank). Ultimately, the cost savings from universally used EMR could be substantial. A recent RAND study estimates them at \$42 billion annually over a 15-year period, an amount equivalent to approximately 2.5 percent of all current medical costs (\$1.8 trillion).

Integrated Monitoring

Perhaps the most important way in which broadband may be used to save medical costs is through integrated monitoring and intervention systems for patients with chronic illnesses. As features of this system are introduced for seniors and individuals with disabilities generally, there should be significant opportunities for cost savings. One major factor holding back accelerated implementation of such systems, however, is the failure so far of the highly fragmented U.S. health care system to reimburse -- and thus give incentives for -- physicians and other health care providers to use this technology. In addition, there is a need to educate patients, especially those with one or more chronic conditions, on the benefits of broadband-enabled integrated monitoring and intervention systems.

Although generic cost savings from broadband should help all seniors (in the same way that they should benefit all Americans) -- through lower administrative costs, savings arising from implementation of EMR, and other cost reductions -- the subpopulation among seniors likely to benefit the most *are those with chronic diseases that require continued medical care and monitoring*. These patients are at high-risk for serious health care problems and acute episodes requiring hospitalization.

Roughly 8 million Medicare beneficiaries (out of a total senior population of approximately 35 million) currently have five or more chronic conditions, and account for over 2/3 of the program's spending. Of the U.S. population in general, 45 percent suffer from at least one chronic condition (which can include coronary heart disease, chronic obstructive pulmonary disease, mental health disorders, diabetes, hypertension and asthma). Nationwide, care for those chronic illnesses accounts for at least *78 percent* of all health care spending, or well over \$1 trillion annually -- an amount that is certain to climb as both the population and health care costs continue to increase.

The potential savings that broadband could bring to this population are perhaps best realized through integrated systems of home monitors -- wireless devices and clothes with transmitters that relay information about vital signs to a central office that can alert health care providers when immediate interventions are necessary, and otherwise reduce the need for individuals to see their physicians and even be admitted to the hospital, which is a very expensive form of health care. A key advantage of such systems is that *they do not require the patients to have access to or use a computer, but instead only to wear a monitor that transmits vital signs and other relevant medical data over current wireless networks in real-time--made more efficient with broadband wireless technologies--to a central office that itself has computers and a data base that are linked by broadband connections*.

In fact, the potential savings from disease management enabled by broadband based remote monitoring for all chronically ill patients are potentially quite extraordinary -- as much as 30 percent of all hospital, out-patient, and drug expenses. Since care for the chronically ill already accounts for 78 percent of total medical costs, a 30 percent saving of costs in this category could reduce overall healthcare expenses for the United States by roughly one quarter, or about \$350 billion annually.

One key impediment to more widespread use of such cost-saving programs is that current reimbursement practices do not reward or encourage physicians to use them. Though it may be difficult (or politically impossible) for the federal government to require private insurers to change their reimbursement policies, both federal and state governments have a direct interest in generating efficiencies in the insurance programs they directly operate, Medicare and Medicaid. Thus, the estimates of cost savings from broadband assume that governments eventually will change their reimbursement practices so that these benefits can be realized.

In any event, the cost savings estimates from broadband based solely on chronic disease management programs should understate the potential broadband-related medical cost savings that may be realized for seniors (and individuals with disabilities). The estimates do not take account of the potential cost savings from the wider use of telemedicine – or two-way video communication between patients and health care providers – that would eliminate the need for many in-person visits to health care providers. In addition, the costs savings estimated here are based on existing technologies and thus may understate the range of uses for broadband-enabled remote monitoring and delivery of health care that will benefit both seniors and individuals with disabilities. Thus, researchers are already at work on new technologies that would monitor certain vital signs via attachments to one's personal computer, cell phone and even television. In the future, it is not difficult to imagine even more complete monitoring devices in wristwatches, hearing aids, jewelry and clothing.

Some portion of non-elderly individuals with disabilities also should benefit from a chronic disease management program, while the entire population of individuals with disabilities should benefit to some degree as well as from the savings in general administrative costs, increasing use of EMR, and the ancillary benefits of PC-based broadband.

Lives Saved From Broadband Technologies

In addition to the cost savings it should make possible, broadband should also help save lives -- just as telephone service (through 911) has in the past, but in the case of broadband, perhaps to a greater extent. This should happen in at least three ways.

First, the wider use of broadband should cut down on errors associated with wrong doses or inappropriate medications. In a widely cited study from 2000, the Institute of Medicine reported that as many as 98,000 people die unnecessarily each year because they are given the wrong amount of a medication or indeed even the wrong medication itself. The *Ending The Documents Game* report cites subsequent studies suggesting that the true number may be twice as high.

Medical errors would be significantly reduced if prescriptions were digitized, and if pharmacists and doctors had access to patient-specific medical records that would identify whether the patient was allergic to the medication. Broadband technologies would facilitate this process because physicians, nurses and other medical personnel should find them so much easier and more convenient to use than the much slower dialup services. Physicians and hospitals could use broadband-based landline or wireless transmission devices working over broadband networks to relay this information to pharmacists and thus dramatically reduce the totally unnecessary and tragic loss of life associated with what, in essence, are simple-to-fix problems in the medical system.

Second, as more individuals use the Internet for medical information, many of them may be encouraged to make appointments with physicians at earlier points when their diseases or

conditions may be more amenable to treatment. Similarly, patients can use information on the Internet to avoid seeing doctors when it is unnecessary to do so.

Third, it is quite possible that in the not-so-distant future when a sizeable number of seniors and individuals with disabilities have video capabilities associated with their broadband, they will be able to interact remotely -- in a visual fashion -- with health care providers. These interactions may permit interventions or advice that could save lives, as well as avoid some expenses associated with unnecessary trips to emergency rooms and physicians' offices.

Potential Broadband-Related Cost Savings from More Independent Living

As of 2002, only about 5 percent of all Medicare-eligible individuals, or 1.6 million seniors, lived in nursing homes. This number, however, is expected to dramatically increase over time, especially as the baby boomers retire and as life spans lengthen. By one estimate, 44 percent of 65-year-olds today can expect to live in a nursing home at some point in the future. For the 2020 cohort of 65 year-olds, this figure is projected to rise modestly to 46 percent due to likely longer life spans.

Nursing home, or institutionalized, care is expensive, far more so than personal medical attention given at home. In 2004, a private room in a nursing home facility cost about \$78,000 annually; a semi-private room cost nearly \$62,000. By comparison, home health care -- delivered three hours a day for five days a week -- cost an average of about \$14,000. The difference between institutionalized and home care then, runs easily in the range of \$50,000 or more per person.

In 2004, \$135 billion was spent on long-term care for the elderly, of which \$92 billion (68 percent) was spent on care provided through nursing homes, and the \$53 billion balance (32 percent) spent on home care. Of the total, Medicaid paid 35 percent, Medicare covered 25 percent, and private health insurance picked up 4 percent. The rest, or about 33 percent, of all costs were borne by the individuals and their families.

In principle, the same broadband-based monitoring programs for the chronically ill can be used to monitor the health of the elderly. However, unlike other senior citizens (or many of those with disabilities), monitoring alone cannot deliver services in persons in need. The issue is whether monitoring, *in conjunction with home health care*, can delay or, in some cases, avoid institutionalization of individuals. It is reasonable to expect that the answer is "yes."

As broadband equipped with two-way video transmission diffuses throughout this population, seniors will be able to interact much more intimately with their relatives and friends than is possible now through the telephone. This should reduce feelings of loneliness and depression, and thereby enhance the willingness of some who might otherwise feel resigned toward moving to a nursing home, to remain in their homes.

The cumulative cost savings through 2030 are estimated to be \$32 billion (in 2005 dollars).

The savings assumptions implicitly reflect the possibility that broadband will provide some cost savings that have not yet been fully realized for individuals who live in institutional settings. Such savings can arise from greater use of telemedicine -- and thus savings from avoided physician visits -- as well as through broader use of the Internet by residents to locate more effective treatments for their conditions.

Potential Broadband-Related Output Gains From Increased Labor Force Participation

Because they enable workers to “telecommute” -- that is, to work from home or at locations other than at an employment site -- broadband technologies have the potential for increasing labor force participation by both senior citizens and individuals with disabilities. In particular, broadband can permit individuals to continue working as consultants for their former employers and/or for new clients, or to establish new enterprises so that they are “working” for themselves (for example, by running Internet based businesses).

Opportunity for Economic Development

A considerable amount of the technology necessary to implement these changes already exist (for example for the many types of home monitoring⁵), while others are in development. Assembling the existing technologies and providing installation and maintenance service is one economic development opportunity. Given the rapid aging of the county’s residents as well as the general availability of disposable income in that group, this could become a very good economic opportunity.

Through the process of implementing pilot projects a great deal of experience and knowledge will be gained that could be used to drive additional hardware, software service model development. This too will foster additional economic development opportunity.

We also have some interesting models up and running in some locations in the U.S. One example is BlueRoof Technologies in Pennsylvania.⁶ Blueroof Technologies is developing a comprehensive program for the McKeesport, Pennsylvania area to become a leader in Senior Smart Technology. Senior Smart Technology focuses on Information Technology, sensors, and computer hardware and software to monitor and optimize the lives of senior citizens, thereby avoiding or postponing institutional care by providing a safe home environment. Blueroof Technologies also will stimulate community and economic growth by providing training and long-term employment opportunities. A special focus will be offering youth the opportunity to train as workers in all levels of the program, thereby aiding their development as responsible community citizens.

Additional work needs to be done to size the economic development potential from these activities.

A Gap Exists

There is a gap between availability of innovative technology and effective implementation particularly as it pertains to the needs of low-income seniors and people with disabilities. Although lack of funding continues to be an issue, lack of infrastructure capacity represents a significant barrier to integration of assistive technology into affordable housing development and long-term supports. There is a need for mechanisms to promote systematic consideration of consumers’ assistive technology needs as related to housing and long-term supports. There is also a need for innovative ways to educate and connect consumers, technical assistance providers, and property managers who are responsible for long-term supports in housing communities.

Potential Source of Tax Credits

Oregon Housing and Community Services is Oregon's housing finance agency, providing financial and program support to create and preserve opportunities for quality, affordable housing for Oregonians of lower and moderate income.

The current agency was created in 1991, when the legislature merged the Oregon Housing Agency with State Community Services. The coordination between housing and services creates a continuum of programs that can assist and empower lower-income individuals and families in their efforts to become self-reliant. OHCS administers federal and state antipoverty, homeless and energy assistance, and community service programs. OHCS also assists in the financing of single-family homes, the new construction or rehabilitation of multifamily affordable housing developments, as well as grants and tax credits to promote affordable housing.⁷

The tax credits go hand in hand with the financing OHCS can provide. They are based upon a portion of the project construction cost. The project owner sells the credits, and the cash realized from the sale of the credits is provided to the project to pay some of the development expenses, thereby reducing the amount of debt borrowed and associated monthly debt service - and thereby reducing monthly project operating expenses and the rents to the tenants.⁸

Steps to Bridge the Gap⁹

- Establish a countywide task force to develop a plan for meeting the needs of low-income seniors and people with disabilities.
- Review currently available technologies and identify infrastructure deficits that act as barriers to effective technology integration into housing for seniors and people with disabilities.
 - Prepare a comprehensive review of available technology for enhancement of affordable housing and supports.
 - Conduct a Needs and Awareness Survey to provide a picture of assistive technology awareness, experience, and barriers to use among seniors and people with disabilities. This information will help shape training activities, demonstration projects, and recommendations for systems change.
 - Determine the extent to which current policies address assistive technology.
 - Identify key policies that may be modified to effectively expand the integration of assistive technology.
- Develop a plan for system change that will provide tools to promote the potential of assistive technology and result in its incorporation in key program planning and individual planning processes.
- Implement recommended infrastructure improvements and demonstration projects, and develop information resources and training materials for consumers, housing developers, case managers, families, contractors, and others.

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- ³ “Imagine – the Future of Aging,” Center for Aging Services Technology, http://www.agingtech.org/imagine_video.aspx, retrieved January, 2006
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