

Cathedral Builders Wanted: Constructing a New Vision of Technology for Old Age

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The 2005 White House Conference on Aging placed technology and its potential to greatly improve the quality of life of older adults on the nation's policy agenda—attaining the attention of the aging community as well as policymakers on the local, state and Federal levels of government. Technology and old age are not new to each other. The development and deployment of complex systems ranging from water and sewerage to health care and medical technology systems have enabled the longevity that many of us will enjoy (Coughlin, 2006). Likewise, innovations to assist the frail, disabled and institutionalized elderly have been borne from a long tradition of policy support in the field of assistive technologies touching multiple domains from communications to mobility. What is new is the sustained public attention and visibility now being given to the formal linkage between what is believed to be an unfathomable range of technology solutions and what is anticipated to be an equally vast range of societal challenges caused by aging. The 2005 White House Conference on Aging is the first significant and national policy event that begins to identify what technology can do, at what cost, and ultimately asks what is desirable for today's and tomorrow's older American? In this sense, the Conference begins a larger national dialogue that will lay the foundation for a national technology policy in support of an aging society.

Gadgets and Gizmos A-Plenty

Technologists are increasingly drawn to aging. The complex demands placed upon all parts of society over the next 30 years presents a new frontier for technology researchers, policymakers and industry. Likewise, the aging community is looking to technology as a means to drive improvements in quality, access and cost of aging services to the home, long-term care settings, and in support of caregivers.

Both the White House Conference and the current marketplace reflect an overwhelming trend in how new technology is being applied to old age—one device at a time. Decidedly device-oriented, most of today's technology solutions have not offered a systems approach that speak to innovations in living as much as the development of inventions responding to the singular vision of old age being a problem of health and safety.

Ironically, a children's story might best characterize the rich, yet incomplete collection of technologies currently available to older adults and caregivers. Disney's *The Little Mermaid* presents a young mermaid that collects numerous artifacts from the human world. She laments that she wants to experience life on the surface and needs more than these "things" can offer her:

*Look at this stuff
Isn't it neat?
Wouldn't you think my collection's complete?
...Looking around here you think
Sure, she's got everything
I've got gadgets and gizmos a-plenty
I've got whozits and whatzits galore
You want thingamabobs?
I've got twenty!
But who cares?
No big deal
I want more (Disney, 1989).*

Similar to the Little Mermaid's collection, a scan of the technologies being introduced to aging resembles a disparate collection rather than a comprehensive approach to longevity. Leveraging the increasing power and affordability of information communications technology, countless appliances are available today to support older adults and caregivers.

Ubiquitous computing, the integration of computational power, sensors and the ever-increasing availability of broadband and wireless connectivity is set to change aging. Increasingly invisible and seamless, computing power and connectivity will become pervasive in our lives as older people and

caregivers. Wearable computing power woven into our clothing will monitor our vitals. Radio frequency sensors in our walls will detect our daily movements. “Intelligence” in our kitchen appliances, medicine cabinets and bathrooms will prompt our choice of foods, remind us to take our medication and upload our vitals via the Internet with every flush of our ever “smarter” toilet.

Although these devices offer great promise, the nation’s older adults and families clearly “want more.” Despite their availability, technology has not been widely adopted by older people or their families. Two applications illustrate the slow diffusion and adoption of technology in aging services.

Telemedicine—the use of information communications technologies to link patients and clinical medical expertise at a distance—has been available for nearly 40 years. Use of telephone, video, Web-enabled weight scales, blood pressure cuffs, heart monitors and related technologies are available today. Used appropriately, these systems promise to reduce healthcare costs and improve patient outcomes. Although it has gained some traction in rural health and has benefited from the investment and leadership of the Departments of Veterans Affairs, Health and Human Services, and even NASA, adoption of telemedicine has been slow. Despite four decades of development, growing demands from an aging society, and increased rates of chronic disease, telemedicine has yet to become a mainstay of medical practice.

Far more familiar to the consumer, and infamously characterized by the “Help I’ve fallen and I can’t get up” commercial, are personal emergency response systems or PERS. PERS provide users with immediate connectivity to emergency services in the event of a fall or serious illness. Commercially available for almost three decades, their adoption has not been nearly as robust as the growth of the aging population. One estimate suggests that at least 7 million older Americans (65+) could benefit from these systems. Although the cost of these services are comparable to the average home’s cable bill, and in many states are eligible for government reimbursement, less than 1 million people have actually adopted these systems. Depending on approximations of market size, market adoption could be as low as 2 percent or as high as 10 percent (Coughlin, Lau; 2006).

Does the low adoption rate of these two relatively affordable and usable technologies portend the future of newly developed technologies in the lives of older adults? If technology is to provide its full potential to aging, it must rapidly move from industry

catalogs and laboratory benches to living rooms and long term care. Appeals to health and safety alone do not make a compelling case for older adults or families to adopt technology. Successful translation of inventions into innovations will require an overarching and compelling vision of how high-tech offers an ideal way to live, not just age.

Building Cottages when we are Capable of Cathedrals

Not often thought of as a period of high technological innovation, 12th century Europe introduced improvement in architecture, water power, and farming. However, most important may be the period’s evolving attitudes toward the use of technology. Those attitudes might be best described as “exploitive” and “creative” (Pacey, 1992). While taking liberty with the classic definition, exploiting technology can be thought of as putting invention to work in fulfillment of some existing task or need. For shelter: building a simple cottage; or, to mill grain: constructing a basic water wheel.

In contrast, there was the creative approach to technology—the pursuit of a higher technical ideal. Creative use of technology was reflected in the work of 12th and 13th century craftsmen building cathedrals. Similar to other civilizations building temples and monasteries, cathedral building exemplified “a work of imagination, setting forth an ideal of strength and permanence in contrast to the frailty and feebleness of human beings.” The development of new techniques, such as vaults and flying buttresses, were necessary to make cathedrals possible. However, the methods developed went well beyond the practical requirements to build the structure or to guarantee its “strength and permanence.” Instead, architects and builders pursued innovation “as if beyond these (basic) qualities there was a technical ideal” to be achieved. Cathedral building reflected both technical invention and “a stirring of the imagination (to envision)...the immense possibilities of technical progress (Pacey, 1992; p.4-5).

Today in aging we have immense possibilities—existing technologies and applications still in development offer the opportunity to envision new ways to live as we age. However, the current approach to technology and aging reflects exploitation as cottage builders, rather than the creative energies of cathedral builders in pursuit of a socio-technical ideal. The majority of applications today exploit technologies to achieve the most basic of older adult needs. An integrated and comprehensive ideal of ‘quality aging’, that includes and exceeds health,

is needed to guide technology development, public policy and private investment to fully realize the potential of technology to improve the lives of older Americans.

A Hierarchy of Needs Framework for Technology and Aging Policy

Three years before the baby boomers made their debut in the United States, Maslow (1943) introduced his ideas about human needs and their role in motivating behavior. For more than 60 years Maslow's needs hierarchy has been applied to a variety of social and economic problems.

Figure 1 adapts Maslow's work to reflect selected needs of older adults along with a corresponding list of technologies, applications and services that might respond to those demands. Figure 1 attempts to lay a partial foundation to identify both the range of needs and the target opportunities for policy and market innovations.

Admittedly incomplete, this integrated approach to technology and aging aligns possible innovations with five dimensions of need that together contribute to an ideal of quality aging, not just healthy aging. Moreover, the framework suggests that simply matching technology with needs is insufficient. An integrated approach must include supporting business and public policy strategies to deliver services that strive to address all five dimensions of need—thereby blurring the lines between physical function and fun, connectivity and confidence, and longevity and legacy.

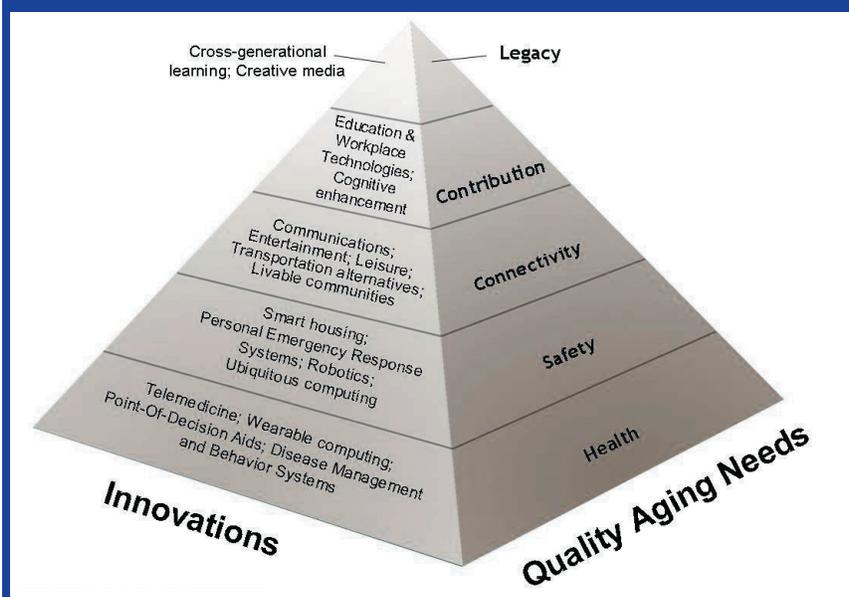
Health – As Figure 1 shows, the most basic need is Health. As used in the aging and technology context, this dimension addresses basic needs such as physical wellness, nutrition, shelter and clothing. Although a fundamental need, the laser-like focus on health is driven by a predominant definition of aging as synonymous with frailty and disability. While not totally incorrect, the definition is incomplete and is

at the expense of innovations in other parts of life. Recent data suggest that health may be improving for older people and disability rates may be static or even declining. Real opportunity may lie in the growing demand for increasingly proactive ways to manage chronic diseases and to guide healthy behaviors as we age, rather than for technologies to assist us after we have become frail. Intelligent systems in our homes may be best used to improve our meal choices, optimize our fitness and to motivate healthy living as much as they are used today to monitor our decline.

Many of these health-related technologies

are developed to respond to markets created by government programs. These programs are critical to ensure equitable access to services. However, innovation by reimbursement will not drive change at the speed, performance and steady price declines that the technology industry has been able to deliver in consumer electronics and entertainment, e.g., the cost and performance of

Figure 1 An Integrated Approach Towards Technology & Quality Aging



Source: Coughlin & Lau, MIT AgeLab, Adapted from Maslow (1943)

the PC since the 1980s. Consequently, development and delivery of health innovations are absolutely necessary, but a broader focus should include proactive health behaviors that contribute to quality aging and applications that tap into discretionary income markets.

Safety – Still a very basic need, just above Health in Figure 1, is Safety. Nearly as common as health applications is the use of technology to monitor the safety of an older adult either in their home or in a long-term care facility. Systems that monitor and report an older adult's behavior predominate here. From the Alzheimer's disease patient at risk of wandering, to the older parent living alone, these systems offer an electronic tether in an emergency. New generations of safety-related systems entering the market enable the integration of radio frequency identification (RFID) sensors, strategically placed

video, motion detectors, biosensors in walls, beds, appliances and front doors into a single system. These systems promise a higher level of safety and security for older adults while providing a capacity to report these data to adult children and 24/7 call centers.

Although the technological invention is ready, the business model translating invention into innovation is not. Inadequately addressed is the trade-off between privacy and safety. While the adult child may view safety as their primary goal, the dignity of the older adult parent may loom in balance. Clearly an opportunity exists here to bundle services that are of equal value to the independent older adult and family caregivers—such a value may be in blurring the line between safety and social connectivity.

Connectivity – Garnering far less attention than health and safety by the technology community are the three ‘higher’ needs of Connectivity, Contribution and Legacy. If inadequately addressed by public policy, baby boomers will translate these higher needs into the critical mass of a new passionate politics of unmet expectations. Business will find that as large as the health and safety market may be, the willingness of older adults and family members to spend disposable income on these three “higher” dimensions is immeasurable.

As portrayed in Figure 1, the first of these is Connectivity. Innovations to fulfill this need include technologies to keep older adults connected while maintaining their freedom and independence to age-in-place. Transportation is perhaps the most prominent among these needs (Carp, 1988). Even if you have your health you do not have everything if it is out of reach. Technologies that make cars safer to drive safely into old age greatly improve our chances of remaining engaged. Equally important are innovations in community design and public transportation that make independence and longevity a complement not a conflict.

Fun is forgotten. How can technology be used to invent new approaches to play in older age? New technologies that are fun and enable us to access new social networks and experiences will become crucial to our social selves. For example, how might technology re-create the “senior center” to meet the needs as well as social expectations of the baby boomers?

Commonplace for many, e-mail stands alone as a technological innovation improving the connectivity of older adults with each other and family members. While PERS adoption rates remain in the single digits, the proportion of the 65+ who use the Internet at least occasionally, are approximately 22%, and those

reporting themselves as occasional computer users are closer to 29% (Pew Internet & American Life Project, 2004). E-mail’s success demonstrates that when technology offers more than the most basic of needs it becomes far more attractive to older people.

Contribution – Nearing the top of the needs hierarchy is Contribution. For the purposes of this framework, contribution captures Maslow’s concept of self-esteem, a combination of personal confidence and lifelong contribution. Contribution relies on more than personal skills or knowledge—it also requires confidence—confidence that you remain mentally agile, possess or can provide value that others seek, e.g., care of a child, volunteer or employee. Technology is used every day by people of all ages to enhance their confidence. The writer who is a poor speller writes with confidence with a spell check. The driver who uses a navigation system on a trip travels with less concern of becoming lost.

Lifelong cognitive function is fundamental to our personal capacity to serve as a contributing member of our family, community and society. The use of technology to improve cognitive function is now becoming market reality. Software designed to retrain function may soon evolve into brain gyms that will seek to improve function, not simply manage decline and the on-set of oft referred to ‘senior moments’. Just recently Nintendo released a handheld game in Japan now popular with the 50+ because of its potential to improve mental function.

Equally important to the capacity to contribute are the means to actually contribute—as caregivers, volunteers, employees and more. How might technology extend enjoyable and productive work years? The creative use of technology in the workplace to support lifelong learning and task point training offers great potential to improve people’s lives as much as it may contribute to national productivity. The opportunity is to go beyond today’s notion of training to support organizational goals and to envision the means that enable older people transfer their knowledge or to change careers and to be more competitive in their next position than they were in their last. Creative uses of technology to enable lifelong contribution may force us to rethink our concept of national dependency ratios based upon birthdays.

Legacy – Legacy is the capacity of the older person to use their personal talents developed over a lifetime. The apex of the needs hierarchy represents the older person’s desire for means to construct one’s legacy. Perhaps the most difficult level of need to achieve and respond to, it may also be the one that

attracts the most interest from older people, as it represents not only self fulfillment and the realization of one's potential, but the potential to help others achieve the same goals. Technology that enables older adults to construct their legacies and transmit their experiences to future generations will improve the quality of life of older adults and enrich younger generations. The attraction of such applications is evident by the popularity of PC-based family albums and family tree software. Even large retail arts and crafts stores have built strategies around low-tech but high-touch products, such as scrapbooks, to satisfy demand from older adults seeking creative ways to record their legacy and tell their stories.

100 Years of Quality Living

Technology has enabled many modern day cathedrals. The space program gave us a dream and new technologies, even foods that have improved our lives. The national transportation system brought communities and a country closer together. The Internet continues to change our sense of time, connectivity and personal access. Perhaps the greatest achievement so far has been technology's demonstrated capacity to extend and improve life. The 2005 White House Conference on Aging was an agenda-setting event that enabled technology advocates to demonstrate today's inventions and to learn of tomorrow's need for innovations in policies, products and services.

The nation spends billions of dollars to improve our health and contribute to our longevity. Optimists and many researchers suggest that we will someday see life expectancy surpass 100 years. While we spend billions to live longer, it is now incumbent on all of us to invest in and invent how—we will live, learn, work, play, and contribute during the additional decades given to us. Therefore, the new frontier for technology, aging, business, and public policy is to launch a national effort with the same verve and vigor as our colleagues in medicine and biology to construct a national infrastructure of integrated systems that will make 100 years of quality living possible. Today the United States does not have a lead government agency, an organized set of stakeholders, nor the policies to provide the public and personal incentives necessary to achieve this objective. We have the need and the technology. Now we need the imagination and the will.

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