

Age, Technology, and Culture: Gerontopia or Dystopia?

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Thomas More's *Utopia* (1516) set out an image of an ideal Christian socialist society. Among its many features was respect for older adults. What has *Utopia* to do with long-term care? Brent (1999) proposed to reform the construction of typical long-term care facilities to make them into dwellings that are characterized by "dignity, individuality, independence, privacy, and familiarity" (p. 63). The ideal was to create a "Gerontopia," a place that maintains control, choice, and personal autonomy over the circumstances of one's final days.

In *Utopia* More looked at ways to level or to eliminate classes from his ideal society, drawing on a long line of thinking that stretched back at least to the Greeks (e.g., the concept of the egalitarian Republic, excluding slaves).

However, other writers have warned how the pursuit of that egalitarian society dream can also lead to dystopic societies, with George Orwell's *1984* being the classic example.

One notable trend in our current society is the willingness to accept diversity in our culture. Rather than attempt to eliminate class distinctions, something that fell out of favor following the collapse of the failed communist experiments in the Soviet Union and Eastern Europe, today we celebrate diversity (though grudgingly in some quarters). The embrace of pluralism has led to greater willingness to tolerate the different expressions of lifestyles within our multi-cultural and multi-ethnic sub-populations.

The Long-Term Care Challenge

So, an important challenge facing those who design long-term care facilities is to accommodate the unique needs of our increasingly diverse, aging population. We are going to have to prepare for a much higher percentage of older adults by the second half of the century. In Figure 1, are U.S. Census

Bureau projected changes for the 65+ and 85+ year old populations.

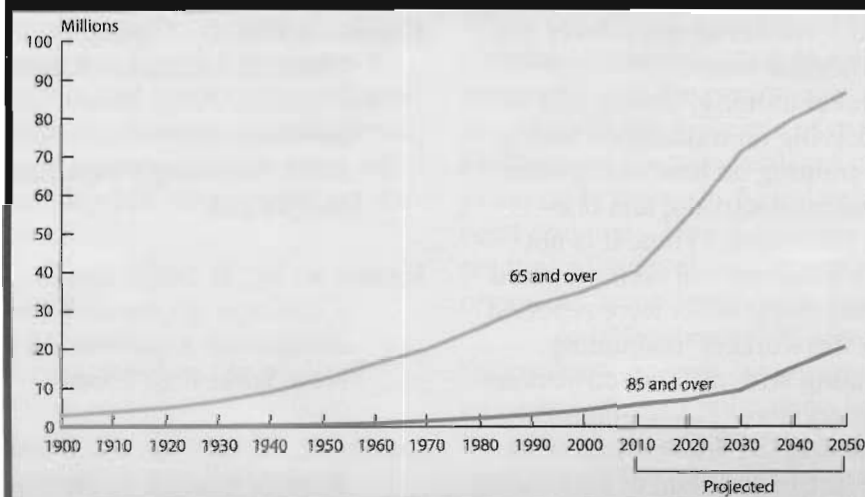
And, if we think that we are diverse now, Census projections show that we are going to see huge increases in minority elders in the next 50 years (see Figure 2).

The non-Hispanic White senior population is expected to increase only about 80%, whereas Hispanics, Asians, and American Indians will increase nearly 7-fold, and Blacks are projected to increase about 3-fold. The differences in these gains represent increased life expectancies for some groups who have traditionally lagged the White

population, as well as the recent influx (both legal and illegal) of Hispanics who are expected to stay in the U.S. In short, although we will continue to grow old in larger numbers than ever before in history, we will see massive changes in the ethnic composition of our gerontariat.

A major concern for those in the long-term care industry is whether there will be adequate facilities available in time for the expected tidal wave of baby boom inhabitants. Coupled with that concern is the concern over whether there will be sufficient staff to manage the influx. One potential solution is to make greater use of technology to enable staff to manage more clients efficiently.

Figure 1 Number of people age 65 and over, by age group, selected years 1900-2000 and projected 2010-2050



Note: Data for 2010-2050 are projections of the population.
Reference population: These data refer to the resident population.
Source: U.S. Census Bureau, Decennial Census and Projections.

Technological Innovations

Fortunately, at the same time that we are seeing a huge expansion in the size and ethnic diversity of the older population we are also seeing an equally astonishing increase in the sophistication and accessibility of technological systems that may be of enormous benefit to older adults.

There has been a remarkable shift in the speed with which technology is adopted by households in the United States. As examples, consider the time it has taken for widespread diffusion and adoption of three communication systems: the fax, the phone, and the Internet.

The fax was patented by Bain in 1843 but took well over a century to reach widespread adoption. Today almost every business has a fax number. The telephone, patented over 30 years later (in 1876) by Bell, took about 50 years to reach widespread adoption. In contrast, the time interval from the invention of HTTP protocol (1990) to widespread adoption of the Internet and particularly, the World Wide Web,

has taken a little under 20 years. According to recent surveys of computer and Internet use (U.S. Department of Commerce, 2002), U.S. households went from less than 20% access to the Internet in 1998 to 50% access by 2001. In short, technology is diffusing faster than ever before. Many of these technologies can help compensate for the normative changes that aging brings.

The *raison d'être* of long-term care facilities is to support activities that are no longer possible unassisted. It is helpful to categorize activities that older adults may choose to engage in by levels. Most readers are probably familiar with a hierarchy starting with Activities of Daily Living (ADLs: bathing, dressing, transferring, walking, eating, toileting, and grooming) and Instrumental Activities of Daily Living (IADLs) such as telephone use, transportation use, food and clothing shopping, meal preparation,

housework, medication use, and money management. A further set of activities has been called Enhanced Activities of Daily Living (Rogers et al., 1998) or EADLs. Such activities involve pursuing hobbies, socializing, and searching for opportunities for learning new information. These different levels of activities can be seen to occupy a hierarchy not unlike the one that Maslow made famous, with ADLs at the bottom, followed by IADLs and EADLs.

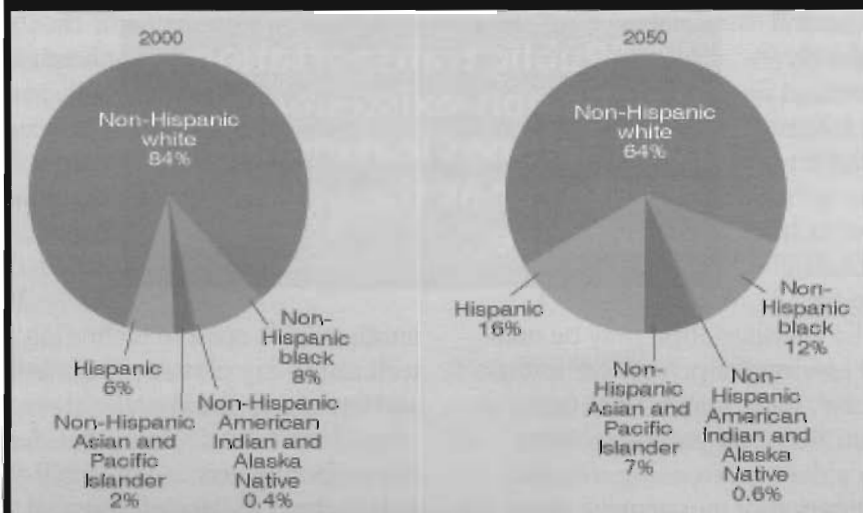
It is pretty clear that for those needing help with ADLs, human helpers are still necessary. But, this may change over time as robotics continues to advance as a

field. Even today, Pearl, a “nursebot”, has already been deployed in a Pittsburgh nursing home facility. Pearl is not yet particularly adept, basically functioning as a clever artificial intelligence (AI) nag system that can communicate only poorly with synthetic speech and much better with a screen that prints out information. As the famous 18th century English writer Samuel Johnson was reputed to have said about a dancing dog,

the marvel is not how well the dog dances, but that it dances at all. The same can be said of Pearl. Obviously we are still a long way from replacing human nursing home staff with robots.

Still it is interesting to see how well current technology can accommodate typical IADL tasks. Take *using a telephone* as the first example. To succeed at this category, you need to be able to look up numbers, dial them, and answer an incoming call. Hearing, vision, and dexterity problems can hamper successful use of a phone, as of course can cognitive problems. Modern cell phone technology can help with vision and dialing issues: numbers can be pre-stored, and in high-end phones speech recognition call permit someone to speak the number to dial, obviating some dexterity issues (after you activate the phone). However, miniaturization of the phone creates its own challenges, particularly for navigating menus and finding and using

Figure 2 Projected distribution of the population age 65 and older, by race and Hispanic origin, 2000 and 2050.



Note: Data are middle-series projections of the population. Hispanics may be of any race. **Reference population:** These data refer to the resident population. **Source:** U.S. Census Bureau, Population Projections.

many of the functions.

Shopping involves the ability to do food or clothes shopping (regardless of transport). Of course, someone with a computer and Internet access can shop without leaving home, so computer-owning seniors who are cognitively intact can easily enough do food or clothes shopping. However, only one out of three of today's seniors have such access. Future cohorts, though, will probably need to have their keyboards and mice "fried from their cold, dead hands." Today, even low-tech television shopping channels coupled with phone use can help with shopping as can the old-fashioned mail order catalog. I am not convinced, however, for the food category, that I would want to live solely on what arrives in the mail and getting courier service is prohibitively expensive. Inability to solve the problem of distribution and transportation costs for timely delivery of fresh food resulted in the collapse of the early Internet grocery companies at the turn of this century.

Traveling via car or public transportation, another IADL, is a significant challenge for many older adults. Public transportation may be non-existent in rural settings leaving the private car as the only alternative. Of course, there may be little need to leave the home if you can shop and socialize online. For socializing, desktop videoconferencing over the public Internet can be remarkably inexpensive once a computer is teamed up with broadband access. My spouse and I use this technology to videoconference with our 1,000-mile-distant grandchildren regularly. However, if we can convince the winners of the 2005 DARPA robotic car challenge on a desert course to turn to navigation in traffic-filled city streets, it may not be that much longer before we get into our cars and use voice commands to instruct our vehicle where to go, and hopefully, it will drive itself safely to that destination.

Meal preparation has been rendered relatively easy since the invention of the TV dinner in the 1950s. Such food may not have been particularly nutritious or palatable, and it was certainly somewhat expensive. Further, those old-fashioned meals were heated in convection ovens that could be left on and the food burned (by those suffering from forgetfulness). The microwave oven does a remarkably good job of avoiding burning (when set correctly) and it is easy enough to create versions that read barcodes and set the temperature automatically when food is placed in the oven. Again, I wouldn't want to depend solely on

microwaved food for sustenance, but microwaveable meals are a realistic option for meeting that IADL.

Housework is still a labor-intensive activity that is not easily turned over to robotic assistants. Still, there is significant progress with consumer robotic vacuum cleaners (e.g., Roomba™) and upcoming floor-washing robots. However, labor-saving devices such as dishwashers, washing machines, and dryers are still very difficult to operate for those with age-related impairments in vision, hearing, and dexterity. Smarter appliances will be somewhat more costly but are quite feasible given the increasingly sophisticated sensor systems available to manufacturers. However, we are still a long way, I suspect, from having robots change the linens and make up a bed from scratch. Cleaning all the surfaces in the kitchen is also going to be a difficult-to-program task. If there are advances here, they will probably be driven by the needs of the hotel trade who will want to replace human chambermaids with robotic counterparts (e.g., The Jetsons's maid).

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Medication use is another ADL open to technology interventions. Low-tech multi-day plastic pill containers are the most useful and inexpensive aid available for overcoming age-related memory declines that interfere with prospective remembering tasks such as pill-taking. More expensive aids include the use of personal digital assistants (handheld computers) as reminding devices, and of course, Pearl, the "Nursebot." However, the problems involved in filling and delivery of prescriptions is an oft-overlooked issue in the management of medication regimens. Mail delivery obviates the need to use transportation to get to the pharmacy, but scheduling delivery of drugs in a timely way is not trivial and may need a cooperative arrangement between prescribing physician, patient, and pharmacist.

Money management is perhaps the most difficult IADL to accomplish, though online banking and brokerage accounts can literally eliminate the need to leave home and apparently some 30 million US households do at least some of their bill-paying that way. Much like the Internet, ATMs can also make bank transactions available 24/7 though they tend to be underutilized by older patrons. Another concern is that online banking provides online fraud opportunities and older adults are sometimes easy targets for criminals. Credit card companies have deployed AI programs to look for unusual patterns of activity on credit card accounts and similar monitoring could be implemented

for individual bank accounts. However, privacy issues would need careful attention. But, for those with cognitive impairments, all the automation in the world will probably not provide adequate safeguards. Of course, a real issue for many older investors is how to build and maintain sufficient savings to be able to retire comfortably, and unfortunately, there do not seem to be any *magic bullets* here.

Still, it is instructive to see how far we have come in the past 30 or so years in terms of technology to assist IADL activities. Nonetheless, people do not live by bread alone, nor would they be satisfied solely by being able to accomplish ADLs and IADLs. So, let's consider the pursuit of EADLs such as socializing, hobbies, and life-long learning. Here too, technologies such as the computer and the Internet have opened up remarkable opportunities. There are online game-playing forums where bridge and chess aficionados can practice their craft. For those who enjoy photography there are wonderful opportunities for creative expression via digital picture processing and movie-making software. Genealogists can get access to online databases about relatives and ancestors in far-flung lands.

Conclusion

In short, there already is a virtual cornucopia of options available today. However, socializing is still a very important human desire in need of fulfillment and videoconferencing is not quite the same thing as being there; it is high tech, low touch. Still, particularly for those with mobility impairments, there is now an opportunity to have a local religious service webcast into your dwelling or to see and speak with a distant grandchild or great-grandchild through desktop videoconferencing. Such options can go some way toward fulfilling social networking needs.

Nonetheless, we still need significant progress to ensure that technological systems are well-designed and provided with adequate instruction materials so that seniors with impairments can interact successfully with these tools. CREATE (Czaja et al., 2001) is one project aimed at ensuring that software, hardware, and training for technological systems are designed with older users in mind. See Fisk et al. (2004) for a primer. There is still a long journey ahead toward optimizing such systems for older adult use in a way that is also sensitive to cultural values. Only then are we likely to build and staff long-term care facilities that enable residents to enjoy their own gerontopia.

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