

## The MetLife Report on **Aging in Place 2.0**

Rethinking Solutions to the Home Care Challenge

September 2010

In conjunction with  
Louis Tenenbaum, CAPS, CAASH

**MetLife**<sup>®</sup>  
Mature Market  
INSTITUTE

## The MetLife Mature Market Institute®

Established in 1997, the Mature Market Institute (MMI) is MetLife's research organization and a recognized thought leader on the multi-dimensional and multi-generational issues of aging and longevity. MMI's groundbreaking research, gerontology expertise, national partnerships, and educational materials work to expand the knowledge and choices for those in, approaching, or caring for those in the mature market.

MMI supports MetLife's long-standing commitment to identifying emerging issues and innovative solutions for the challenges of life. MetLife, Inc. (NYSE: MET), through its subsidiaries and affiliates, is a leading provider of insurance, employee benefits, and financial services with operations throughout the United States and the Latin American, Europe and Asia Pacific regions.

57 Greens Farms Road  
Westport, CT 06880  
(203) 221-6580  
MatureMarketInstitute@MetLife.com  
[www.MatureMarketInstitute.com](http://www.MatureMarketInstitute.com)

## Louis Tenenbaum

Louis Tenenbaum is an advocate and consultant focused on Universal Design and Aging in Place. As a carpenter, Louis completed his first access modifications in 1988. Turned on by the significant impact he had on the family whose home he made accessible, Louis focused his design/build remodeling company on Aging in Place in the early 90s. Though everyone agrees Aging in Place is a good idea, it has not become successfully mainstream, leading Louis to study housing and care systems for older Americans. These investigations lead to the Aging in Place vision expressed in the current paper. Louis Tenenbaum speaks, writes and consults on Universal Design and Aging in Place for developers, builders, health professionals, communities and wide ranging business interests.

Louis Tenenbaum, CAPS, CAASH Independent Living Strategist  
Universal Design — Aging in Place  
Potomac, MD  
(301) 983-0131  
[www.louistenenbaum.com](http://www.louistenenbaum.com)

Variable And Long-Term Care Products Are: • Not A Deposit Or Other Obligation  
Of Bank • Not FDIC-Insured • Not Insured By Any Federal Government Agency

Only Variable Annuity Products: • Not Guaranteed By Any Bank Or Credit Union  
• May Go Down In Value

Only Long-Term Care Products: • Not Issued, Guaranteed Or Underwritten  
By Bank Or FDIC • Not A Condition To The Provision Or Term Of Any Banking Service Or Activity  
• Policy Is An Obligation Of The Issuing Insurance Company

# Table of Contents

<b>2</b>	<b>Executive Summary</b>
<b>3</b>	A New Look at Aging in Place
<b>5</b>	<b>Introduction</b>
<b>5</b>	The Promise of Aging in Place
<b>7</b>	A New Look at Aging in Place
<b>8</b>	Current Older Adult Housing and Care
<b>9</b>	Home- and Community-Based Services
<b>10</b>	The Challenge of Information, Coordination, and Decision-Making
<b>12</b>	<b>AiP2.0: The Vision</b>
<b>12</b>	A Model for Aging in Place 2.0
<b>14</b>	AiP2.0 Development
<b>24</b>	How to Age in Place Today with AiP2.0
<b>25</b>	What Does All This Cost...and Is It Worth It?
<b>27</b>	Leveraging AiP2.0
<b>27</b>	Costs, Cost-Effectiveness, and Opportunities
<b>29</b>	<b>Implications</b>
<b>30</b>	<b>References</b>

# Executive Summary

As the percentage of our older population grows, more people need health care and assistance but there are fewer people to pay for it and perhaps not enough paid caregivers to deliver it. As an alternative to institutional care, “Aging in Place” means staying in one’s own home even when age- or health-related changes may make it difficult to do so. Although a large majority of older Americans say they want to Age in Place, it is often more easily said than done. Today’s care infrastructure, technologies, existing housing, funding sources, and the businesses and services available for Aging in Place are not being fully realized in order to achieve the promise most hope for as America ages.

A significant improvement to today’s current uncoordinated approach to Aging in Place can be achieved by focusing on the following three goals:

- Independence — happier, more satisfied older citizens living in homes of their choice with control, dignity, and respect
- More economical use of available resources
- The creation of a coordinated, comprehensive, and collaborative relationship between businesses and service providers to support Aging in Place.

---

Although a large majority of older Americans say they want to Age in Place, it is often more easily said than done.

---

While steps are being taken to make Aging in Place easier, the real challenge is answering “What strides are required for Aging in Place to reach its promise?”

As we age, health problems tend to be episodic, chronic, and sometimes progressive, resulting in an increasing need for assistance. Most “service-enriched” senior housing (nursing home, assisted living, independent living, and CCRC) is organized to provide care at a certain level of need, sometimes too much or too little for a particular individual. As a result, a housing arrangement often becomes a poor match, requiring residents to move multiple times, such as from a home to a hospital because of a health episode, then to a nursing home for rehabilitation, then back to the home, then on to assisted living for longer term care, etc. Moving between facilities is often disorienting, disturbing, and undesirable, not only for the individual but for the entire family.

The alternative to formal senior housing arrangements — aging in your own home with services — can also be very difficult because the services needed at different times and for different levels of care are not organized into an easily managed system. This report will explore a paradigm for a coordinated system that incorporates efficient use of available resources, technology integration, home adaptation, and care management models that can provide a framework to meet the needs of those who desire to Age in Place.

## A New Look at Aging in Place

Many advocates and experts envision a future “Aging in Place” in which residential design, medical and home monitoring equipment, and comprehensive care services are integrated into a dynamic and efficient monitoring and management system. In this alternative system, Aging in Place 2.0 (AiP2.0), those who benefit from it can stay in the environment of their choice throughout their lives, empowered to take advantage of a system of integrated services. AiP2.0 requires two categories of infrastructure investment:

### I. Connections to the World Outside the Home

- Technology
- Community resources
- Transportation and community infrastructure

### II. Home Design, Devices, and Assistive Technologies Reducing Risk and Facilitating Wise and Effective Use of Resources.

Businesses wishing to provide services to the “AiP2.0 industry” should prepare to work in coordination with multiple partners, seeing opportunities as relationships with intersecting market sectors rather than narrow niches. Technology development and dissemination is critical to efficient resource use in AiP2.0. This includes developing monitoring systems connecting individuals in their homes to management systems in which care coordinators have the capacity to dispatch services to meet the client’s long-term needs. The AiP2.0 monitoring and management system can be leveraged to identify and manage risk, reduce injury, illness, and costs.

Planning for long-term care is difficult because no one knows how their health will play out as they age. One in five older Americans faces significant cost associated with long-term care.<sup>1</sup> Most private health insurance plans and Medicare do not cover ongoing long-term care services. Typically, they will only cover limited amounts of home care and nursing home care if there is a “skilled care need” as defined in the policy. Medicaid is a federal/state program available only to those with very limited income and assets, and covers both regular health care and certain long-term care services.

The growing number of older individuals coupled with the smaller cohorts following them, and the ever-increasing cost of care create an imperative for improved Aging in Place.

**There Are Five Steps to Developing AiP2.0:**

1. Homes are prepared for aging in place through individual investment, subsidies, and incentives.
2. Business investment opportunities are recognized and encouraged as providers prepare to work in coordination, seeing opportunities as relationships with intersecting market sectors rather than narrow niches.
3. Connections for care management, social interactions, wellness, and transportation systems are developed.
4. Care management is designed to dispatch services when needed.
5. Care delivery models are developed to utilize available paid caregiver resources effectively to meet the needs of individuals in the community.

The system developed in the steps above is leveraged to minimize risk, prevent illness, reduce cost, and improve caregiver and care recipient outcomes.

AiP2.0 promises to use integrated home design, tools, equipment, services, and technologies to house and care for more people less expensively, more efficiently, and with more dignity. However, commitments to personal and infrastructure investments are currently lacking, creating challenges to developing a comprehensive system to care for people in the homes of their choice.

## The Promise of Aging in Place

“Aging in Place” is staying in one’s own home even when age- or health-related changes make it difficult to care for oneself easily and safely. Though almost everyone says they want to Age in Place, individuals or families trying to assist an older relative may find it difficult. Organizing, confirming, and managing care and services can be a daunting task because the delivery system is often fragmented, and needed services may be difficult to find or not always available in an individual’s local area. While acknowledging that steps are being taken by agencies, government, and businesses to make it easier to Age in Place, the real challenge is answering “What strides do we need to create a system that is good and easy enough for Aging in Place to reach its promise?”

Aging in Place has three goals. One is happier, more satisfied older citizens living in homes of their choice with control, dignity, and respect — essentially independence. The second is better, more economical use of available resources to make it is less expensive for people to stay at home with services rather than move to residential care facilities if they do not desire to do so. The third goal is the creation of a coordinated, comprehensive, and collaborative relationship between businesses and service providers to support Aging in Place. This would also enhance the creation of business opportunities and jobs to provide the services older individuals need to remain in their homes.

Why is the delivery of quality care in a personalized way to meet an individual’s needs and allow him or her to live safely and comfortably at home a worthwhile goal?

- An AARP study which shows over 80% of those over 45 say they want to remain in their own homes even when they need assistance, is significant in focusing attention on Aging in Place.<sup>2</sup> Another study, by Clarity and the EAR Foundation shows that older people fear losing independence (26%) and moving to a nursing home (13%) much more than they fear death (3%).<sup>3</sup> Together these studies make our path clear; everything we can do to help people from losing independence is the right direction.
- Two demographic facts drive the second goal. One is the increasing number of older people. The 65+ population now comprises 13% of the total population, but was only 6% in 1940.<sup>4</sup> The second is increasing longevity. Life expectancy at birth was 47 in 1900. Now it is over 77.<sup>5</sup> By 2020, life expectancy is projected to be almost 80 years.<sup>6</sup> Older people use more health care and have greater disability, requiring more care and assistance than younger people.<sup>7</sup>

These demographic trends raise concerns about financial, resource, and infrastructure capabilities. For example:

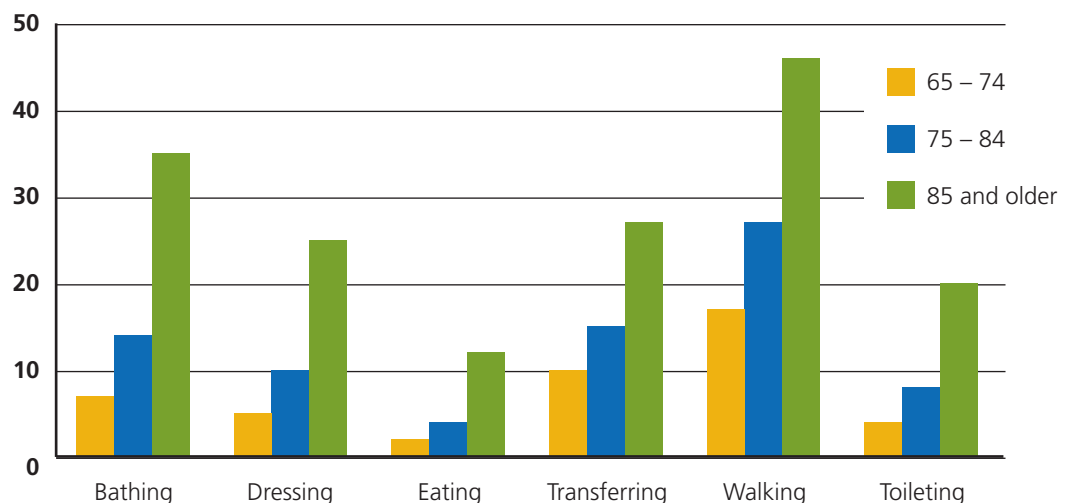
- The most recent May 2009 annual forecast from the trustees of the Medicare system warns that the massive government health insurance program will not be able to pay its bills in eight years.<sup>8</sup>
- The supply of caregivers is a critical factor for aging in America over the next 10 years, according to a recent scenario report from the American Association of Homes and Services for Aging (AAHSA). Qualified paid caregivers are in short supply yet often under-compensated.<sup>9</sup>

As we age, many health problems are episodic, chronic, and progressive.<sup>10</sup> People have ongoing health conditions and also tend to get sick and well again in series. Admittedly, everyone is different and changes uniquely, however, the functional result for many is a progressive need for more assistance, especially at age 85 and older, as Figure 1 demonstrates.

Those over 85 are a rapidly growing group within the older population in the U.S., growing from 122,000 in 1900 to 4.3 million in 2000, 34 times as large as it was in 1900. By 2030, those 85+ are expected to more than double, growing to 8.7 million people. Between 2030 and 2050, it is expected to again double, reaching 19 million.<sup>11</sup>

Additionally, this growing 85+ population is at greater risk for developing cognitive disorders. Among the 5.3 million Americans with Alzheimer’s disease today, the great majority are over age 65. Among those, 2.4 million are age 85+, with that number expected to grow to 3.5 million by 2031, when the first Baby Boomers turn 85.

**Figure 1: Persons with Limitations in Activities of Daily Living by Age<sup>12</sup>**





The demographic trends also point to the importance of recognizing the needs of family caregivers and the impact of this role on the society at large.

A November 2008 AARP Public Policy Institute study estimates the value of unpaid family and informal care to be \$375 billion per year.<sup>13</sup> However, the significant contributions of family caregivers are not without their costs, impacting multiple aspects of the caregiver's life including work, health, stress level, and finances.<sup>14</sup>

A productive workforce is important to a thriving economy. The impact of caregiving is also felt by employers, resulting in up to \$33.6 billion in lost productivity to U.S. business annually with an average cost of \$2,111 per full-time employed caregiver.<sup>15</sup> It also leads to an average 8% increase in employee health care costs for employed caregivers totaling approximately \$13.4 billion annually.<sup>16</sup>

Given these trends, housing and care alternatives to institutional care, where possible, are highly attractive. Model programs focused on keeping people in their homes have higher satisfaction levels providing additional support for Aging in Place.<sup>17</sup> Model programs demonstrate the potential for significant savings from home- and community-based service alternatives to nursing facilities when managing chronic care clients.<sup>18</sup> Providing care and many other services in homes are service sector growth opportunities.

In sum, we know more people need health care and personal assistance and there are fewer people to pay for it and deliver it. Family caregivers, as well as those in need of care, require supports. There is general dissatisfaction with the idea of moving to get care and higher satisfaction with care in the home.

## A New Look at Aging in Place

Since individuals want to Age in Place, we are challenged to make Aging in Place easier to implement. Advocates and experts envision a new model for Aging in Place in which design, equipment, and comprehensive services are integrated into a dynamic and efficient monitoring and management system, pushing toward a more effective and easier Aging in Place experience for the consumer. This next generation Aging in Place model can be characterized as "Aging in Place 2.0" (AiP2.0).

A number of practical questions immediately arise in the context of an evolved model: What will AiP2.0 look like? How is it different and better from what is currently available? What are the parts? How do they interact? How will AiP2.0 work financially?

## Current Older Adult Housing and Care

Aside from independent living, which is simply living in a general community, there are two major categories of older adult housing. Active Adult is described as “lifestyle housing” (i.e., single- or multi-family housing organized around social and recreational activities) with amenities (i.e., clubhouse, recreational facilities, organized social activities) but no care or assistance service. Service-enriched is housing and care packaged together to meet assistance needed by older residents. This includes single- or multi-family, or (congregate) housing arrangements.

Service-enriched housing is what most of us typically think of as “assisted living.” For the most part, moves to service-enriched housing are not discretionary, typically precipitated by inability to live independently or difficulty with current living arrangements often related to a health crisis. Service-enriched housing breaks down further into:

- Co-Housing
- Continuing Care Retirement Communities (CCRC)
- Assisted living communities
- Skilled care nursing home

These divisions reflect the amount of care provided. Service-enriched housing providers offer a defined set of services — theoretically matching resident needs. There is a disconnect, though, because the typical course of aging for many people, i.e., progressive need for more assistance, means that many living in service-enriched housing will soon be mismatched — requiring another move. Moving because your health changes is disorienting, disturbing, and undesirable. In some cases the option with even the minimum of services provides more than is needed. Unfortunately, it can result in residents who want to maintain involvement in some home tasks being forced to discontinue them because the structure of service-enriched housing they reside in can’t accommodate such involvement.

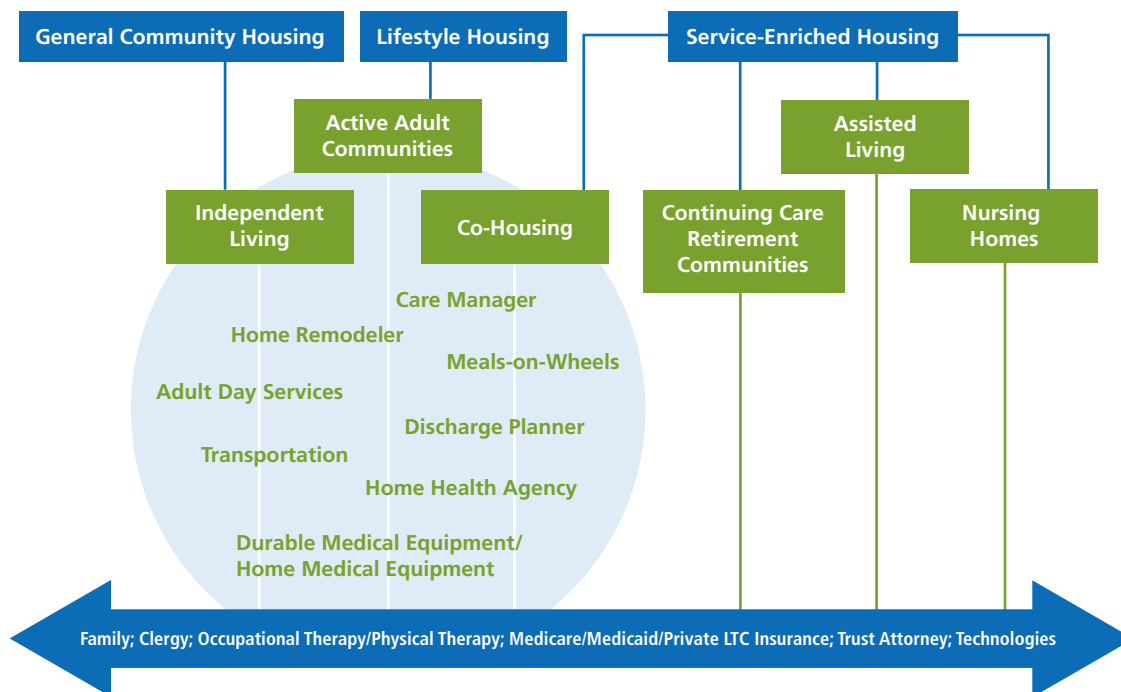
The broadest service-enriched housing, Continuing Care Retirement Communities (CCRC) are housing and care facilities conceived to recognize that aging is individualistic and that some may experience the need for increasing levels of care. The graphic representation of CCRC is a series of concentric circles representing increasing levels of care from the outer ring of cottages, town homes, or apartments to the inner circle of skilled nursing.

The CCRC has a single operator, intake process for all levels of care and location. Individuals move from one “ring” to another as their needs change. In reality, people are moved from one location to another as care needs change. You may move “in” and back “out” of these levels as you progress through a series of health incidents as you age. Nevertheless, for someone in the throes of illness and trauma even this move on the same campus cannot be considered true aging in place.

## Home- and Community-Based Services

Many people receive care from family, friends, and public or private agencies in their homes. Existing networks provide home- and community-based services for older individuals in most communities around the country. Many networks and services are associated with the Area Agency on Aging mandated by the Older Americans Act. Service providers, working in what is called the “Continuum of Care,” meet all or nearly all the needs.

Figure 2: The Continuum of Care



Though all the services may be available, Aging in Place is difficult because the services are not organized into an easily managed, systematic whole. Piecemeal development of home- and community-based services over a long period of time largely explains why the services do not always work in coordination with each other. Additionally, programming and funding have emerged from an array of congressional appropriations, state programs, non-profit grants, private enterprise, and community initiatives. The service provider's inspirations and intentions, background, mission, and purpose are equally varied. Neither funding nor providers are developed for comprehensive care on an at-home basis.

Public funding for home- and community-based care comes from different departments, agencies, and levels of government, sometimes described as "silos" because operationally they are self-contained and vertical. The funding streams, delivery paths, and eligibility criteria vary so much they cannot always be used in integrated and comprehensive application. Federal programs from the U.S. Department of Housing and Urban Development (HUD) and Department of Health and Human Services (HHS) do not match in their program missions or language. State and local programs sometimes impose additional levels of qualification and eligibility.<sup>19</sup>

Funding and services from non-profits and foundations are organized around missions, goals, and funding priorities. Private-pay providers organize their services around a skill set or resources they can manage well. This is fair because all of these provider organizations are meeting their purposes, charters, and goals to provide a program or service. However, none are mandated to provide the whole continuum to match client needs, which is the optimal situation for a service consumer.

## The Challenge of Information, Coordination, and Decision-Making

Another level of complexity in the current system is the decision-making resources available for caregivers and recipients. Private and public efforts to make comprehensive information available are occurring in communities around the country. The goal is often expressed as a "one-stop shop" or "concierge" service for information and referral (I & R). This helps families gather information but does not help them weigh complex issues/alternatives and make decisions about care needs and providers. Without competent decision-making, family members can get worn out simply trying to navigate and organize providers, services, and funds. Long-distance caregiving is even more onerous. In many cases, services are used inefficiently or are unavailable. Private geriatric care management, which can assist families with care decisions and planning, is available in some areas.<sup>20</sup> Costs for this service, however, can be prohibitive for some.

It is important to understand that some individuals experience acute episodes of illness as well as chronic progressive conditions that result in ongoing changes and the need for varying amounts of care to accommodate these changes. Needs change episodically but continually, so the service package needs to change in order to use service resources efficiently. Care must be ramped up during an illness, but can be reduced a few weeks later. Determining that change has occurred, the effect of that change, and who may now be the right provider, as well as contracting for services with that provider is challenging. Confusing and uncoordinated state, county, or federal funding eligibility requirements can exacerbate the situation. Varying eligibility among programs and funding sources may push a client into a funding gap as their needs change. Too often — whether due to a lack of information or eligibility — the best possible tool, service, or intervention is impossible to employ.

Another way to categorize the problems both service-enriched senior housing and home- and community-based services suffer is “overcare” and “undercare.”

- **Overcare** — housing and care is connected in facilities — often with too much service and cost meaning waste of resources, and reduced self-esteem and learned helplessness for the client.
- **Undercare** — in the community, clients often fall through cracks, and/or have difficulty finding, arranging, and managing services and assistance.

If Aging in Place worked sufficiently well enough to minimize this disparity, bathing assistance, meals, durable medical equipment, physical therapy, home modification, etc., would all work together. Unfortunately, programs and providers are not designed to coordinate for easy management by families and clients. In most cases, there is no designated and funded experienced service coordinator.

## AiP2.0: The Vision

What does AiP2.0 look like? AiP2.0 is a vision of Aging in Place in the future in which solutions are provided through improved home design/modification, better tools, effective utilization of available resources, and individually tailored managed services providing a comprehensive, full-term solution. The presumption must be that individuals who select this housing and care option can really stay in the environment of their choice throughout their lives, including services for health-related or chronic conditions that can be provided in the individual's home of choice or a community setting such as adult day services. If individuals are forced to move due to a health crisis, it is not Aging in Place.

AiP2.0 uses a combination of personal and community resources just as current Aging in Place does. The challenge is to move from the current array of home- and community-based services described previously to a comprehensive, integrated, and dynamic system that operates "symmetrically" across services — managing personal and health needs as well as medical and human resources using best possible resources as efficiently as possible. Commitment and infrastructure at both the personal and community level are required. Business interests wishing to provide services to the growing AiP2.0 industry should prepare to work in coordination within this system, seeing opportunities as relationships with intersecting market sectors rather than niches of opportunity waiting to be addressed.

### A Model for Aging in Place 2.0

AiP2.0 requires a custom model of care that matches the client and resources. Resources and needs can be seen as supply and demand. AiP2.0 works when the demand (individual client needs) is met by supply (of functioning and available resources), with balance critical to its success. From an individual client's perspective the AiP2.0 custom model of care ideally results in seamless services.

In AiP2.0, people live in the home of their choice equipped with tools and design features that support independence and assure that individuals and their caregivers are safe. Preventive medical care and wellness assistance encouraging self-management of health is available. Care, meals, supplies, transportation to appointments, and activities as well as social connections, etc. are all managed easily.

Another important component in the AiP2.0 framework, technology, integrates the home and the services/provider network connecting what occurs in the home to the world outside providing alerts, data, and feedback. A mix of active and passive devices connects homes to families, friends, and a neighborhood care hub staffed by care managers who are familiar with the clients in the neighborhood they manage. Neighborhood care hubs may be co-located with senior activity and wellness centers, public transportation, or public safety services. Whether or to what degree responses are automated is not as important as the existence of an integrated system. Critical to the efficient use of resources of AiP2.0, the monitoring system connecting individuals in their homes develops into a management system in which trained and informed care coordinators are empowered to dispatch the best possible service to meet the client's long-term needs.

The range of services, supplies, and assistance provided is not so different from what is available in a nursing home or assisted living. It is just distributed over a community instead of within a building and coordinated to follow or overlap one another smoothly and efficiently. All the technologies for AiP2.0 are already available, either being developed for Aging in Place applications or adaptable from other industries and applications.

**The tipping point for AiP2.0 may be near. For example, the Veterans Administration (VA) is very progressive in developing programs to manage long-term care clients in their homes. They use the Health Buddy™ system from Robert Bosch Healthcare<sup>21</sup> which connects patients and care providers on a regular basis, communicates patient history and chronic conditions, reinforces positive behavior to ensure healthier, happier patients, and reduces the costs associated with emergency room visits and re-hospitalizations. The Health Buddy System is proven to control health care and reduce hospitalization.**

**The VA fully recognizes and values the service management aspect and considers its management training program integral to its success. The comprehensive chronic care in-home program shows substantial reductions in hospitalizations. The VA is spurred to pursue this program and the attendant savings because it has more direct financial responsibility for its client population's health care than comparable systems.<sup>22</sup>**

## AiP2.0 Development

The next questions that arise have to do with actually developing and integrating such a delivery system. What are the developments and elements that make up AiP2.0? How do they interrelate? There are two large categories of infrastructure and commitment that need to evolve to transform current Aging in Place with home- and community-based services to AiP2.0: connections to the world outside the home, and home design/ technologies used within the home.

### I. Connections to the Outside World

#### A. Technology

Devices and sensors connect clients in their homes to the world outside. The impact is analogous to the staff noting individuals in an assisted living or nursing home. In fact, some of the earliest adopters are care facilities where the management recognizes how sensors help make staff more efficient.<sup>23</sup> More robust systems integrate additional sensors (falls, movement, heart rate, glucose, blood oxygen, or gait for example) connecting home to a call center. Distribution and acceptance is growing. Tracking and monitoring is evaluated according to the following:

- The level of client involvement in collecting information and the mechanics and automation of using the information to dispatch services.
- Whether real-time information is compared to client patterns and habits or not.
- To whom the information goes and their capabilities to analyze, forward, and act on the information.

The simplest connection is the phone call or visit to or from a loved one or even a daily monitoring service. For many families, this is an extension or evolution of typical regular calls that start when children leave home, increasing in frequency as emotional and physical health issues demand.

A more advanced connection from homes is a Personal Emergency Response System (PERS), which uses a powerful auto-dial speakerphone installed in the home. The resident wears a button on a wristband or pendant that, when pressed, dials the phone automatically, reaching a 24-hour call center. A responder inquires about the situation through the speakerphone and then relays information to a queue of neighbors, family, paid caregivers, or emergency services appropriately. The system can also actively reach out with monitoring calls, medication reminders, or simply a daily contact call.



Pill dispensers are also a fairly well accepted home care technology. In one unit an alert is triggered if a dose is not removed from a serving tray by a certain time. The responder determines the next step in caregiver notification similar to the PERS notification protocol.

An important distinction between these devices is the level of client participation. The familiar PERS button is activated by the user. If the user is not conscious, not cognizant, or not wearing the button, it is not effective. The pill dispenser, not requiring client activation, monitors inaction. Passive alert monitors are starting to replace devices requiring client activation. For example, although it still must be worn to be effective, the “button” device also recognizes quick movement or horizontal position that may indicate a fall. Other remote sensors detect the movement or shape from a device mounted on the wall or ceiling providing completely passive warnings.

A second emerging distinction is the collecting of real-time information into a database to identify clients at risk by recognizing changes in conditions or behavior. By tracking data over a period of weeks or months a range of normal health and behavior data is available. The system will easily recognize changes, generating alerts before the fall, illness, or other risk. For example, if a resident typically moves down the hall between 7 and 8:30, but one day no movement is detected by 9 a.m., a computer desktop alert or text message is sent to a staffed monitoring station. A queue of responders initiates a call and if the client does not answer the phone, a visit is triggered. The change from a typical pattern may be a health event or a warning of some health change, and triggers an early response and appropriate intervention.

Other technologies such as “tele-health” and “tele-medicine” connect health professionals to clients in their homes for real-time information and direct two-way communication.<sup>24</sup> An example is a blood pressure cuff the clients attach to themselves, which is connected to and interpreted by a health care worker in a remote location. The health care worker provides feedback and answers questions during the “appointment.” These technologies have particular value for rural clients as well as urban dwelling older adults who may have trouble getting out for appointments. Tele-health saves time, energy, and complications for clients, family members, transportation systems, and health workers.

These applications are merely incremental changes, variations, or amalgamations from the way services are provided in service-enriched housing and other industries today. Electronic records replace the “chart” or “shift notes” in a service-enriched facility. Smart phones allow caregivers to enter their time and note a shortage of incontinence supplies or food as they leave a client. The care manager or an automatic prompt then triggers delivery.

Privacy concerns are also receiving attention in the context of passive monitoring. Formal concerns will fall under HIPAA (Health Insurance Portability and Accountability Act). Appropriate safeguards are being discussed and debated by advocates and system designers. One system uses video cameras to detect suspect movement even though it is not capturing images. If a fall is detected the camera shifts from detecting movement alone to video images so the responder can view the situation and take appropriate steps. Clients, queried on the issue often agree that their own homes, sensitively equipped with sensors, will still be more private than a care facility.

The most significant AiP2.0 advance is the management function that emanates from the call center. Once it becomes a management hub rather than just a responder, services are dispatched by a trained and qualified care manager staffing that hub. Determining and delivering the right level of care at the right time and in the right place is called calibrated care.<sup>25</sup> This is a critical factor improving the efficient use of medical and care resources. The care manager is empowered to follow up in assigning vendors to provide service and deliveries and serves as a key to using resources efficiently.

### **B. Community Resources**

One reservation expressed about Aging in Place is the loneliness and isolation many older adults feel when they are confined to their homes. Stories of reluctant moves resulting in unexpected social revival, new friendships, and renewed energy for new residents in service-enriched homes is cited supporting this reservation. To respond to this concern it is clear that we need many alternatives for socialization and connection to community resources to assure that isolation is not a result of AiP2.0.

We already have formal and informal social situations for older people in many communities. The rolling breakfast table of retired men or women in restaurants and cafes in neighborhoods and towns all over the county is a social network serving this purpose. Senior centers located at community centers, churches, and so forth serve people every day all over the country. Mall walking programs are sprouting up to support business and provide weatherproof exercise. Programs using older citizens in the framework of “civic engagement” as community assets for tutoring, docents, and reception are growing everywhere. Once the connections of the management hub are applied to the issue even more can be accomplished both for and by older citizens.

The senior centers and the next generation of these community resources are also the center of wellness and health education programs. Exercise, nutrition, health screening, and self-care management techniques are an important part of social networks and reducing health care costs. The more people do for themselves, the greater the continuing self-esteem and satisfaction. It also may lead to greater savings in health care and personal care costs.

Adult Day Services Centers, another community resource, provide a program of health-related, recreational, and support services for those who require supervision or personal care services that cannot be accommodated in a senior center. This community option provides a cost-effective alternative or an addition to services provided in the home in a supportive group environment. It allows individuals who might otherwise have required residential care to continue to live at home. It also provides support and respite for family caregivers as well as peace of mind for working family caregivers who have the comfort of knowing their family member is receiving care and supervision during their working hours.

Naturally Occurring Retirement Communities (NORCs) are neighborhoods and areas that become retirement communities by default. The clearest examples are urban apartment neighborhoods where working people of an age cohort move, stay, and begin to “age in place.” Funded NORC projects apply social and health professionals to these natural enclaves resulting in socially active hotspots.

A newer development is “intentional” Aging in Place communities such as Beacon Hill Village in Boston. This Aging in Place-motivated community of residents organized their own programming ranging from shared care management, preferred service providers, vendor referrals, and social activities.

### **C. Transportation and Community Infrastructure**

Transportation is a big problem for older people who no longer drive. This is particularly acute in suburban areas where housing and community development were planned around the individual car.

The “new urbanism,” traditional neighborhood and transit-oriented design movement(s) are responding to our recognition of how poorly the suburban development model is working in light of today’s demographics. Not coincidentally, it features techniques that resolve some of the transportation problems the suburbs have created, such as the lack of public transportation in general, and individualized group transportation in particular. A key feature reducing the suburban sprawl problem is an emphasis on walkability and shopping and service cores in new and redeveloped neighborhoods.

Innovative transportation systems are also emerging. Rideshares, programs that match volunteer drivers with those who need rides, and similar programs are being implemented around the country. GPS-enabled buses that will warn a homeowner when a transport is near their home so they do not need to stand out in the heat or cold, and other tech applications are also novel solutions. The management hub infrastructure will help organize transportation for those needing transportation to medical appointments, shopping, and recreation.

“Livable Community,” “Advantage Initiative,” “Smart Growth,” and other community assessment and organizing ideas from big and small organizations such as AARP, National Association of Area Agencies on Aging, Environmental Protection Agency, and Visiting Nurse Service of New York are helping communities prioritize and plan for the future of their aging populations. These initiatives are based on a comprehensive adjustment to our view of the older population. Rather than see the older population as a problem to be solved, older people are viewed as resources.

Other approaches such as Asset Based Community Development (ABCD), asset mapping, and other community planning and organizing techniques help communities to articulate issues that need to be resolved and prioritize them. Most importantly these approaches recognize that many of the needed resources, both individual and organizational, are already available, but typically they are not being identified, appreciated, and managed well for community-based change.

While this changing view of older populations highlights the multiple levels on which change needs to take place, most programming discussed above is local. The commitment must also occur at state and national levels and be embraced as well by individuals.

## **II. Home: “Our House, Is a Very, Very, Very Fine House...”** **— Crosby, Stills, Nash, and Young**

The key difference between our current system of service-enriched housing and Aging in Place is that Aging in Place occurs in homes selected and controlled by the residents. One problem is that most homes were not designed and built for the needs of aging residents or caregiving. Modifying homes and providing tools for this new role is a requirement for AiP2.0.

The numbers and age of older individuals has changed, but home design has not. A huge portion of our housing stock follows design basics developed during the post-World War II housing boom when longevity was considerably less than it is today. These homes were built for growing families not for growing old, reduced mobility or caregiving. The situation is sometimes referred to as “Peter Pan housing” — housing for someone who is never going to grow old. Health conditions are different for older people than younger people, with older people exhibiting more disability, increased risk of injury, and higher use of medical care. A study released in the *Journal of the American Planning Association* shows there is a 60% chance that a single-family home built in 2000 will house at least one disabled resident in the home’s usable lifespan.<sup>26</sup>

Design can revitalize our homes for their “new” occupants, even those who have lived there for 45+ years.

#### **A. Assuring Home Condition**

A house in good condition in terms of weatherization, mechanical systems, and basic safety is a prerequisite for Aging in Place. Though an unfamiliar concept, using public moneys or incentives to update private homes for current Aging in Place standards is not too different from weatherization and energy-efficiency programs that are currently hailed for their value and innovation.

---

“Many seniors may not have supportive service needs, but their ability to remain in their homes is threatened by health and safety issues resulting from poor maintenance or disrepair.”<sup>27</sup>

---

#### **B. Design Factors**

Home modifications for safety and accessibility are more familiar now than ever before. Too often, modifications are carried out without sufficient concern for aesthetics, stigmatizing homes and projects as undesirable. Universal Design (UD), an underlying design philosophy focused on attractive inclusive design, is pushing back against the stigma.

For AiP2.0, Universal Design means homes that are useful over time as changes accompany age. That is sustainability, meeting our needs for the present without compromising future usefulness for ourselves or others. When UD is included as an element of new home design or discretionary remodeling, the cost is relatively small and the benefits can be large. It provides choices and possibilities for Aging in Place and safe caregiving. Our personal and communal investment in the infrastructure for Aging in Place should include Universal Design based building and remodeling. The builders and product manufacturers who follow these principles are rewarded with better products that are of interest to a larger market. That should be enough incentive, but tax breaks, permit-fee waivers, increased density, and other incentives will reap rewards for all of us.

The following principles of Universal Design were developed at The Center for Universal Design at North Carolina State University.<sup>28</sup> Note that the principles are not prescriptive rules like most building codes or regulations. All principles do not apply to every product or building.

- Equitable — providing equal access and opportunity
- Flexibility — accommodating multiple uses and users
- Simple and intuitive — charts and signs that easily communicate
- Perceptible information — bumps at the curb cut provide tactile clues
- Tolerance for error — functions like the “undo” button on your computer
- Low physical effort — features that accommodate small, frail, and those with poor balance
- Size and space for approach and use — easy and unencumbered transit

**Universal Design is the design of products and places so they are usable by all people to the greatest extent possible without special adaptation. Often used incorrectly as a synonym for barrier-free, accessible or “ADA” design, UD is a larger concept whose basic benefits are often clear while corollary benefits are sometimes surprises.**

**The most common example is the “curb cut.” Designed for wheelchair users, it also works equally as well for strollers, roller skaters, and suitcases. Another example is closed captioning. Designed to assist those with hearing impairments, many people use it in bars, restaurants, and airport waiting areas. The corollary benefit is often not expected but useful to a larger population than the intended beneficiaries.**

**Universal Design is larger than regular design. Most of us are pretty much the same size and shape. We are bipedal and, whether tall or short can, for example, reach up to and down to most of the same shelves and storage. Designing access for those with limited reach does not preclude all others from using it. Advances in medical science mean that more people roll, and shuffle and live with limited reach, so builders following UD have a larger, and growing, audience or market.**

**A newer definition of Universal Design is “the process of embedding choice for all people into the things we design.” This refers to the interface providing opportunity rather than limitation. Using our example above, the homeowner can walk or roll into the open shower. A curbed shower does not offer the rolling entry choice.**

There are roughly 100 million houses in America. Less than 1 million new homes are built even in the best years of the U.S. homebuilding industry. Active adult housing is a subset of new home production so the impact Universal Design has through new homes is small. The impact from remodeling, however, can be substantial. Remodeling homes for accessibility using Universal Design principles and products will improve and increase our housing assets, particularly for housing our older population in an AiP2.0 framework. What are the benefits of a well-designed home for Aging in Place?

- Reduced injuries from a home with fewer steps, better rails, lighting, and grab bars. The disability resulting from and financial cost of injuries can be reduced.
- Zero-step entrances, curbless showers, and adequate room for maneuvering make it possible to return from illness, accident, or surgery sooner. People recover more quickly in their own homes and the cost of inpatient rehabilitation is reduced.
- As health declines, less assistance may be needed in a home where the bathroom and bedroom and entry are accessible. In addition, the difficulty and injuries resulting from caregiving are reduced when the environment is prepared for these tasks.

What design features are helpful? The issues to be considered are:

- **Getting in and out.** The entry is the symbolic and real connection from the home to the world outside. Residents who know they can get in and out feel safe, secure, and in control. If possible, entry stairs can be replaced with sloped walkways or ramps. The safety and condition of entry stairs and railings can be enhanced. In some cases electric porch lifts can be employed.
- **Moving through the house.** A clear, safe, and well-lit path through the house can be identified and prepared. This includes more and better rails and grab bars, additional lighting and switching, and door widening. If there are stairs in the path from the entry to the bedroom and bath, strategies to overcome the stairs include changing the use of rooms on the main floor, adding space, or adding a lift mechanism.

- **Use of bedroom and bathroom.** Well-designed bedrooms and baths assure that residents are able to get into and out of bed and to use the bathroom as easily, safely, and independently as possible. Good bedroom and bathroom design also makes it easier and safer for caregivers to assist residents with tasks in these rooms. Features includes lighting, grips/grab bars, curbless showers or tub seats and lifts, roll-under sinks, reachable clothing storage, and space for a caregiver and client to work together safely in the bathroom.
- **Eating and meal preparation.** There is a large variation in how individuals prepare and take meals. For those who cook, kitchens with multiple height work surfaces, seated cooking stations, and better task lighting are helpful. An individually tuned, accessible, and comfortable place to eat is also important.
- **Entertainment/relaxation.** Entertainment includes TV, music, reading, visiting with guests, etc. Solutions may be as simple as rearranging furniture to clear paths and provide rest spots and grips, providing a lift chair, clearing clutter, or providing a better lamp or additional light switches.
- **Household management.** This “instrumental activity of daily living” may be as much about services or assistance as it is about space, but certainly includes space and surfaces for bill paying/household administration and records storage/accessibility.
- **Enjoying the outdoors.** The importance varies with the individual. Some people want to take sun, others shade. Many like to garden, so something as simple as raised beds and potted gardening can be helpful.

At an even higher level of technological enhancement, “Smart Home” technology, usually focused on easing busy lifestyles and home entertainment, uses computer-based environmental controls which can be applied to the furnace, the windows and blinds, the kitchen, door locks, security, lighting, and entertainment systems. All can be monitored, automated, or controlled centrally or remotely. Window and blind controls provide choices, comfort, and safety for a resident with functional limitations. A TV camera at the door coupled with a remote deadbolt allows a grocery delivery or caregiver entry without a trip to the door. An oven that is also a refrigerator means a casserole left by a caregiver the day before can be warmed for a meal when desired without a trip to the kitchen. These devices are available and can play roles in supporting independent living. They provide choice and control, often more than available in an assisted living facility.

The cost of home modifications varies with the existing design, condition, and quality of the house and the scope of work to be done. The accompanying chart lists cost ranges for some modifications and other Aging in Place expenses.



**Figure 3: Potential Costs to Age in Place**

<b>Home*</b>	<b>Modifications</b>		<b>Capital Investment</b>	
		assessment, design, etc.		\$300–\$10,000
		ramp, landscape, lifts		\$2,500–\$20,000
		grab bars		\$250/2 installed
		bathroom		\$3,500–\$35,000
		door widening		\$800–\$1,200
		elevator		\$20,000–\$35,000
		stair glide		\$3,000–\$12,000
		master addition		\$35,000–\$100,000
		<b>Maintenance</b>		
	Regular	furnance	\$100 x 2/year	
		gutter cleaning	\$70–\$350	
	Seasonal	snow, grass, leaves, mulch, weeds	\$10–\$25/week	
	Long-term	roof, paint	\$1,000–\$5,000	
<b>Services**</b>	<b>Ceiling Lift</b>		\$5,000–\$12,000	<b>Regular and Variable Expenses</b>
	<b>Personal Emergency Response (PERS)</b>		\$50 install, \$15–\$35/month monitor	
	<b>Pill Dispenser Monitor</b>		\$160; \$15–\$35/month or w/PERS	
	<b>Multiple Element Monitoring</b>	purchase/install/monitor	\$2,400–\$3,400, \$49/month	
	<b>Paid Assistance</b>	home maker, personal assitance	\$19/hour	
		home health aide	\$21/hour	
		nurse	\$38/hour	
	<b>Money Management, Bill Paying, etc.</b>		\$50–\$75/hour, \$2,400–\$6,000/year	
	<b>Transportation</b>	public		
		family, cabs, volunteers	\$45/hr accompanied	
	<b>Prescription Deliveries and Other Errands</b>			
	<b>Food</b>	meals delivery	\$6–\$10/day	
		grocery delivery	\$8–\$10/week	
	<b>Lifestyle</b>	adult day care	\$67/day	
		senior/social center	\$0–\$75/year	
	<b>Brain Fitness</b>	Internet-based programs	\$400–\$1,250	
<b>Care Management</b>	community social worker	\$0–\$100/hour		
	private geriatric care manager	\$90–\$150/hour, \$2,500–\$5,000/year		
	nurse case manager	\$0–\$55/hour		

\*Prices depend on existing design and conditions

\*\*Costs depend on family and personal resources, health status

### **C. Assistive Technology**

Low-tech tools and devices that help residents and caregivers carry out tasks are called “assistive technology.” Assistive technologies work at the interface between the client and the environment or the client and caregiver/environment.

Assistive technologies used by clients include: canes, walkers and wheelchairs, grabbers, grab bars and lever doorknobs, specially configured silverware, plates and kitchen utensils, bathing assists, hearing enhancements, magnifiers, and lamps. Some devices are reimbursed by Medicare/Medicaid or private insurance. These inexpensive investments can make a world of difference in an individual’s independence and safety.

A critical AiP2.0 element is facilitating wise and effective use of resources. There is no more critical resource in Aging in Place than caregivers. Equipment that makes the jobs easier, avoiding “burnout” and injury is one of the best investments we can make. One example is ceiling lifts. The typical individual is not meant to pick up or move other people. Ceiling-mounted patient handling equipment is an example of valuable assistive technology investments little used in home care that turns caregiving for either paid or informal caregivers from a dangerous job into a safe one. Ergonomics-enhancing techniques can also assure economical use of resources as well with investment in training instead of equipment.

## **How to Age in Place Today with AiP2.0**

What can individuals and families do now, before an AiP2.0 system exists? First, preparations and planning are key. Financial planning through traditional savings, tapping the equity in your home through a reverse mortgage, or purchasing long-term care insurance are good steps to be able to pay for Aging in Place. Personal responsibility, most evident in such activities as fall prevention, which includes medical management, nutrition, and exercise for balance, as well as basic home modifications can have an important impact on your health and quality of life as well as the cost of your individual aging to yourself and the community.

As important as financial planning is to assuring Aging in Place, preparing your home through modifications based on Universal Design considerations, as well as making it an attractive home that enhances independence, helps to avoid risk and provides safety for caregiving by family, friends, and formal caregivers.

It is particularly important to execute home design modifications early. The process of home remodeling requires time to plan and choose, for drawings to be completed, pricing and alternatives to be taken into account, permitting, materials ordering, and scheduling to occur. This process is not possible in the tumult of a health crisis and uncertainty. Unfortunately, most families do not consider any Aging in Place issues or services until a health crisis forces them to do so. Discharge planning describes the scramble to get things organized almost immediately when a loved one is coming home from the hospital or rehabilitation facility. But that is an awful time to make home modifications. Emotions are high whether from relief and facing an uphill climb back to health or fear and uncertainty because the current situation is as good as it will get. This is a bad time for the careful planning required of any home remodeling project.

## What Does All This Cost...and Is It Worth It?

Deciding the priority and scope of home modifications for any particular residence is dependent on individual needs and circumstance as well as home design and condition. Following is a rudimentary priority scale for determining which to address first.

### **First Priority:**

**Falls prevention. Cost: \$1,000 or less**

- Removing throw rugs especially in the bathroom
- Installing grab bars and grips in the bathroom
- Assuring sturdy handrails on both sides at steps
- Good lighting and switching especially at stairs, halls, and entries
- Securing or removing carpets at stairs
- Soft path lighting for nighttime mobility<sup>29</sup>

**Second Priority:**

**Entryway, easy movement, and use of home features. Cost: \$4,500–\$30,000**

- Removing, if possible, or reducing the number and/or height of steps and possibly increasing the horizontal depth of steps for easy side stepping with both hands on one rail
- A clear, no-step path to the bedroom and bathroom
- Rearrangement or repositioning of furniture, entertainment systems and spaces

**Third Priority:**

**More substantial remodeling and equipment. Cost: \$8,000–\$75,000**

- No-step shower or bath lift mechanism, a seated sink, and assistance space at the toilet
- Seated/multi-level food preparation areas
- Sun and rain protected outdoor areas
- Backup power sources for power outages

Each residence, though sometimes built from the same plans as another, is different because of site differences, resident-inspired changes, and deterioration over time. The cost for creating a no-step entry, for example, varies substantially from one end of a row house community to the other because of the number of steps from property entry to the door.

Low-cost interventions have clear payback in terms of fewer hospitalizations and medical costs in a very short timeframe.<sup>30</sup> More substantial but basic design and structural modifications average \$9,000–\$12,000 per one-story residence.

Using \$10,000 as a sample cost for basic structural modifications compared to assisted living costs at \$3,000+/month, a simple equation shows that avoiding those costs for a little more than three months will pay for home modifications. If we include customary expenses for continuing bills such as utilities, taxes, maintenance, etc., of \$850/month, food at \$250/month,<sup>31</sup> three hours of daily assistance twice weekly at \$19/hour or \$456/month, and three days per week in adult day services at \$804/month,<sup>32</sup> it will take about 14 months to break even on the modifications. By the end of 24 months there is a net savings near \$10,000. But if one hospitalization or one serious fall with medical and health care consequences is avoided, the savings appear much earlier.

## Leveraging AiP2.0

AiP2.0, as described here, manages care, in its broadest sense, for people who need assistance but want to age in their own homes over the long term. The AiP2.0 management system applies (and withdraws) assistance when needed. The assistance is more effective because technologies — high, low, and design — are employed to allocate resources and prepare independence-supporting and safe caregiving environments.

But AiP2.0 has larger potential than that. The same technologies, techniques, and systems can save even more resources when they help avoid injury and illness before the need for assistance occurs. Using the monitoring and management system for early warnings helps identify risk rather than need. The system saves precious medical and care resources.

We typically deploy resources only after a health event forces the need. It is easy to see that installing grab bars before a fall reduces the risk and avoids misery and expense. The worst example may be rules requiring a grab bar before discharge from fall injury rehabilitation. The cost is the same. If we commit to employing the AiP2.0 techniques earlier, these risks can be diminished. Leveraging earlier assessment, coordination, intervention, and modification multiplies the value of the investment that will have to be made in any event, and is a significant policy shift in the provision of services.

## Costs, Cost-Effectiveness, and Opportunities

Often families are caught unaware of the financial burden of the costs for long-term care. An individual or family's cost will vary substantially depending on the length of time care is needed, the degree of care needed, and the amount of family or informal care available. The American Association of Homes and Services for the Aging (AAHSA) found that one in five older Americans faces significant cost associated with long-term care needs.<sup>33</sup>

It is not surprising that some people think providing more and better care in homes will cost more money. The basic counterargument to this position states that better use of resources means available medical capacity, human resources, and dollars go further. AiP2.0 strives to make best use of those dollars in many ways.

The AiP2.0 management system becomes a framework for services providers to understand their niche and relationships to others in the care continuum. That makes small business opportunities more attractive investments, because the size and organization of intersecting sectors is understood. Preparing to work in that connected fashion is key to industry development. More providers entering the field create competition, helping hold costs down.

The full savings and mechanisms will not be apparent until the complete system is in place. The shift from Aging in Place to AiP2.0 initially involves integrating currently disparate systems. The house needs to be prepared for Aging in Place needs. The tools need to be on hand. The care and service providers must be in place and a dynamic management system matching needs and resources has to be functioning. The synergies and leverage of AiP2.0 investments, the AiP2.0 system and savings follow with some of these potential benefits:

- Supports the efforts and reduces the stress of family and informal caregivers
- Creates employment opportunities in the caregiving arena to attract individuals to this field in a competitive employment environment
- Uses existing and self-owned real estate
- Eases the burden of building new facilities and hospitals
- Applies resources efficiently
- Chronic care self-management reduces acute costs
- Avoids expensive injuries and illness
- Avoids redundant assessment
- Reduces marketing and sales costs
- Yields more satisfied clients

# Implications

The benefits and the costs for establishing AiP2.0 are much more complex than reflected in these limited analyses. For example, the cost of modifications can be offset by moving costs, transfer fees, taxes, and real estate commissions. Though it is easy to consider Universal Design-based home modifications as expensive insurance against the potential of a forced move in the future, updating and beautifying a home provides value to lifestyle that is hard to quantify. Universal Design-based home improvements also add value to real estate by increasing usability of that home for future residents as well.

The coming generations will bring other opportunities for modified homes to serve future residents. Little data are available on the value of accessibility, though anecdotal information about the difficulty of finding accessible homes is common. Easing the caregiver burden with dynamic and systematic management as well as assistive technologies saves costs employers can also recognize from their caregiving workers. The benefits of a systematic restructuring of Aging in Place extend to every aspect of consideration.

The demographics of both increasing age and increasing numbers coupled with the smaller cohorts following them, as well as the recent housing and financial crises, support the need for additional housing and care options. Earlier investments in and commitment to this evolution of Aging in Place services can translate into earlier benefits to those who participate and to the providers and businesses that embrace it. There is no doubt that more money will be needed as the number of older individuals grows. However, AiP2.0 posits that an alternative to getting more money is always using what you have more efficiently. Aging in Place is a more desirable form of housing and care using design, tools, equipment, technologies, and services managed through a comprehensive and dynamic system that has great promise for solving these problems.

Will public investments in common infrastructure be accompanied by incentives for modifications (i.e., subsidies, tax credits) to update individual homes? When will the reality match the idea and the promise? The AiP2.0 promise can best be realized if we invest in our homes, the technologies, and management systems that will enhance living in them for a lifetime, and commit to doing these in time to reap the rewards of leveraging them in an effective way.

The evolution and integration of Aging in Place to a new, more responsive and effective system involving care recipients, informal and formal caregivers, service providers, and businesses is inevitable given the forces driving the need to do so and the opportunities and benefits that will be generated as it progresses.

# References

- 1 American Association of Homes and Services for the Aging (2006). Financing Long-Term Care: A Framework for America.
- 2 AARP (2003). These Four Walls: Americans 45+ Talk About Home and Community.
- 3 Clarity (2007). Attitudes of Seniors and Baby Boomers on Aging in Place.
- 4 U.S. Census Bureau, National Population Estimates as of July 1 of 1940 and 2009.
- 5 National Center for Health Statistics. Health, United States, 2009: With Special Feature on Medical Technology. Hyattsville, Maryland. 2010. Table 24. Life expectancy at birth, at 65 years of age, and at 75 years of age, by race and sex: United States, selected years 1900–2006.
- 6 U.S. Census Bureau, Statistical Abstract of the United States: 2010 (129th Edition) Washington, DC, 2009. Table 102: Expectation of Life at Birth, and Projections.
- 7 (a) Age: Orszag, P. Congressional Budget Office Testimony: Growth in Health Care Costs. Delivered before the Committee on the Budget, United States Senate, January 31, 2008, pg 6. <http://www.cbo.gov/ftpdocs/89xx/doc8948/01-31-HealthTestimony.pdf>  
(b) Disability: [http://codi.buffalo.edu/graph\\_based/.demographics/.awd/AgeSex.html](http://codi.buffalo.edu/graph_based/.demographics/.awd/AgeSex.html). For age, disability, chronic conditions: [http://assets.aarp.org/rgcenter/health/beyond\\_50\\_health.pdf](http://assets.aarp.org/rgcenter/health/beyond_50_health.pdf)
- 8 2009 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. <http://www.cms.gov/ReportsTrustFunds/downloads/tr2009.pdf>
- 9 American Association of Homes and Services for the Aging and Decision Strategies International, Inc. (2006). The Long and Winding Road.
- 10 AARP. Beyond 50: A Report to the Nation on Trends in Health Security. (Washington, D.C.: AARP, May 2002).
- 11 Administration on Aging, U.S. Department of Health and Human Services. [http://www.aoa.gov/AoARoot/Aging\\_Statistics/future\\_growth/future\\_growth.aspx](http://www.aoa.gov/AoARoot/Aging_Statistics/future_growth/future_growth.aspx)
- 12 Administration on Aging, U.S. Department of Health and Human Services. A Profile of Older Americans: 2009.
- 13 AARP Public Policy Institute (2008). Valuing the Invaluable: The Economic Value of Family Caregiving, 2008 Update.
- 14 National Alliance for Caregiving and AARP (2009). Caregiving in the U.S.
- 15 MetLife Mature Market Institute and National Alliance for Caregiving (2006). The MetLife Caregiving Cost Study.
- 16 MetLife Mature Market Institute, National Alliance for Caregiving, and University of Pittsburgh Institute on Aging (2010). The MetLife Study of Working Caregivers and Employer Health Care Costs.
- 17 Dale, S., Brown, R., Phillips, B., Schore, J., & Carlson, B.L. (2003). The Effects of Cash and Counseling on Personal Care Services and Medicaid Costs in Arkansas, Health Affairs, 10.1377.
- 18 American Association of Homes and Services for the Aging (2006). Financing Long-Term Care: A Framework for America.
- 19 Lawler, K. (2001). Aging in Place—Coordinating Housing and Health Care Provision for America’s Growing Elderly Population. Joint Center for Housing Studies of Harvard University. Neighborhood Reinvestment Corporation.
- 20 National Association of Professional Geriatric Care Managers. <http://www.caremanager.org>
- 21 Health Buddy System. Robert Bosch Healthcare. [http://www.healthbuddy.com/content/language1/html/5578\\_ENU\\_XHTML.aspx](http://www.healthbuddy.com/content/language1/html/5578_ENU_XHTML.aspx)



- 22 Darkins, A., Ryan, P., Kobb, R., Foster, L., Edmonson, E., Wakefield, B., Lancaster, A.E. (2008). Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions. *Telemedicine and e-Health*, December: 1118-1126.
- 23 Orlov, L. (2009, December 4). Ho hum: GE Buys Living Independently Group (QuietCare). Posted to Aging in Place Technology Watch. <http://www.ageinplacetech.com/blog/ho-hum-ge-buys-living-independently-group-quietcare>
- 24 For more information on telemedicine, see American Telemedicine Association. <http://www.americantelemed.org/i4a/pages/index.cfm?pageID=3330>
- 25 2009 Aging and Health Technology Report: Calibrated Care is Closer to Home. <http://www.ageinplacetech.com>
- 26 Smith, S.K., Rayer, S., & Smith, E.A. (2008). Aging and Disability: Implications for the Housing Industry and Housing Policy in the United States. *Journal of the American Planning Association*, Volume 74: Issue 3.
- 27 Commission on Affordable Housing and Health Facility Needs for Seniors in the 21st Century (2002). *A Quiet Crisis in America*.
- 28 The Center for Universal Design. [http://www.design.ncsu.edu/cud/about\\_ud/udprinciples.htm](http://www.design.ncsu.edu/cud/about_ud/udprinciples.htm)
- 29 Stopfalls.org. <http://www.stopfalls.org>
- 30 Mann, W.C., Ottenbacher, K.J., Fraas, L., Tomita, M., & Granger, C.V. (1999). Effectiveness of Assistive Technology and Environmental Interventions in Maintaining Independence and Reducing Home Care Costs for the Frail Elderly. *Archives of Family Medicine*, Volume 8 (3).
- 31 Individuals age 65+ spend \$256 monthly on food at home, and \$854 monthly on housing and utilities. U.S. Bureau of Labor Statistics, Consumer Expenditure Survey, 2008.
- 32 Costs reflect \$19 per hour for homemaker services and \$67 daily for adult day services. MetLife Mature Market Institute (2009). *The 2009 MetLife Market Survey of Nursing Home, Assisted Living, Adult Day Services, and Home Care Costs*.
- 33 American Association of Homes and Services for the Aging (2006). *Financing Long-Term Care: A Framework for America*.

**MetLife**<sup>®</sup>  
Mature Market  
I N S T I T U T E

[www.MatureMarketInstitute.com](http://www.MatureMarketInstitute.com)

200 Park Avenue, New York, NY