

The State of Technology in Aging Services in Pennsylvania

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in partnership with

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Center for Aging Services Technologies

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American Association of Homes
and Services for the Aging (AAHSA)

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1. INTRODUCTION

The purpose of this paper is to describe the current state of affairs of technology in aging services and related policy in the Commonwealth of Pennsylvania, particularly with regard to the advancement of technology-enabled services in long-term care and individual home settings. This paper seeks to highlight innovative practices of state government, aging services organizations, universities and others and identify opportunities to further advance the use of aging services technologies in Pennsylvania. It serves as a foundation for a call to action for providers, technology companies, and government and private payers to advance technology development and application. This paper is part of a series of papers that focus on individual states' progress to date and potential opportunities for advancement in the use of aging services technologies. It is also intended that this effort will serve as a practice and advocacy guide for use in states nationwide.

This paper was completed in partnership with PANPHA and benefited from the insights and experience of its members and staff.

It also benefited greatly from the assistance of the Pennsylvania Homecare Association, the Pennsylvania Association of Area Agencies on Aging and several Area Agencies throughout the state. The contributions of CAST members and all those interviewed were invaluable and are greatly appreciated.

DEFINITIONS

The National Alliance for Health Information Technology, which managed a federally funded initiative to seek industry consensus on the use and definitions of specific information technology terms, has published the following definitions which may be referred to in this paper.

Electronic Health Record: An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed and consulted by authorized clinicians and staff across more than one health care organization.

Electronic Medical Record: An electronic record of health-related information on an individual that can be created, gathered, managed and consulted by authorized clinicians and staff within one health care organization.

Health Information Exchange: The electronic movement of health-related information among organizations according to nationally recognized standards.

Health Information Organization: An organization that oversees and governs the exchange of health-related information among organizations according to nationally recognized standards.

Personal Health Record: An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared and controlled by the individual.

Regional Health Information Organization: A health information organization that brings together health care stakeholders within a defined geographic area and governs health information exchange among them for the purpose of improving health and care in that community.

In addition, the following are definitions of key terms used in this paper:

Aging services technologies (ASTs): Technologies that can be used by older adults, caregivers (both professional and informal), health care providers and aging services providers to improve the quality of care, enhance the caregivers' experience, efficiencies and cost-effectiveness. These technologies broadly include assistive, telemonitoring, telehealth, telemedicine, information, and communication technologies that intend to improve the aging or care experience. Aging services technologies can be categorized into three broad areas based on the relationship these technologies address between the older adult and his/her environment (safety), oneself (physical and mental health/ wellbeing), and others (social interaction). For more information on specific types of aging services technologies see www.agingtech.org.

Health information technology (HIT): Hardware and software used to store, retrieve, share and use health information to treat patients effectively.

2. EXECUTIVE SUMMARY

The Center for Aging Services Technologies (CAST) developed this paper to describe the current state of affairs of technology in aging services and related policy in the Commonwealth of Pennsylvania, particularly with regard to advancing technology-enabled services in long-term care settings, including the homes of individuals in the community. It also serves as a foundation for a call to action for providers, technology companies, and government and private payers to further advance technology development and application.

Current rates of aging services technology adoption, primarily by home care organizations based on existing survey research, were reviewed to provide an overall baseline. Several examples of early adopters are discussed in detail. The investments of both private non-profit providers and public home and community based services providers were highlighted. Examples range from wireless point of care

systems to cognitive fitness, to telehealth monitoring and videoconferencing for socialization and care coordination. These early achievements can serve as a point of reference for other providers in the field, as well as a foundation to evaluate and improve the application of specific emerging technologies.

The policy and legislative context for HIT and aging services technologies in Pennsylvania is presented to capture substantial policy advances to date, pending legislation to address deficiencies in current practice, and remaining gaps. Governor Ed Rendell's administration has begun several major aging services initiatives over the past few years that are to be commended, including a Medicaid reimbursement program for aging services technologies that is among the very first and most comprehensive in the nation. These efforts require continued focus and development.

In addition, an important component of this paper is a review of recent and current efforts by research universities. CAST believes that robust research in partnership with aging services providers in a "living test bed" approach is crucial to the development, validation and evaluation of technology, and hence the effective proliferation of these technologies. Following this review is a sampling of opportunities and resources for providers, technology companies and consumers.

Finally, a call to action is given to providers, government and private payers, and technology companies. Pennsylvania is significantly further advanced in aging services initiatives than many states. There are abundant opportunities to build upon existing efforts and further successes will require all parties involved to take action. CAST hopes to help bring about further advancements.

3. CURRENT TECHNOLOGY ADOPTION RATES IN AGING SERVICES

President Bush in 2004 issued an Executive Order to establish the goal of nationwide adoption of interoperable health information technology infrastructure, including electronic health record systems (EHRs), by 2014. He created the position of National Health Information Technology Coordinator in the U.S. Department of Health and Human Services to lead the country in achieving this goal. If that goal is eventually translated into firm mandates, all health facilities, including nursing facilities, could be required to implement electronic record systems by that date. Pennsylvania Governor Ed Rendell in March of this year signed an executive order to create the Pennsylvania Health Information Exchange, which is intended to develop the information technology architecture necessary to support interoperable electronic health records and electronic prescribing statewide by 2012 (see section 4.1.5).

With the exception of mandated Minimum Data Set (MDS) electronic reporting and electronic billing by Medicare- and Medicaid-certified nursing homes, adoption rates of electronic health records among aging services providers in Pennsylvania is to date largely unexamined. Current research in this

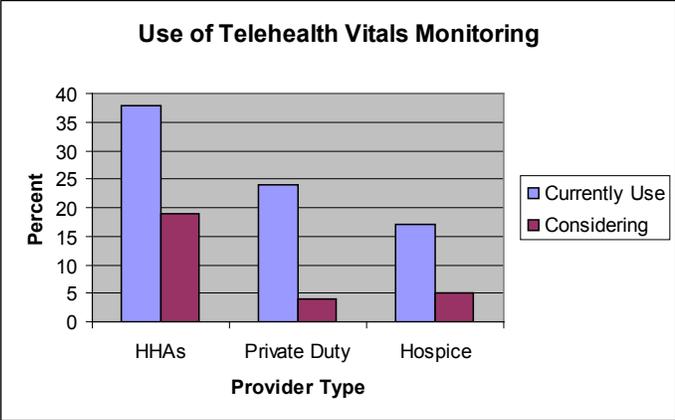
area will provide greater clarity. Adoption rates of technologies other than electronic health records by Pennsylvania providers is well documented for homecare providers, showing extensive use of multiple technologies (see below), but no recent surveys have been conducted of other aging services provider’s adoption of technology.

Further research is needed to develop a baseline of technology adoption by the full range of aging services providers. In addition to homecare, settings that should be scientifically surveyed include nursing homes, assisted living, independent living, and affordable senior housing. Section five of this paper highlights several examples of aging services providers employing various technologies, including EHR-like systems, and one example of a long-term care provider participating in a regional health information exchange to develop a robust EHR system.

Pennsylvania Home Care Providers’ Use of In-home Technologies

Pennsylvania homecare providers are regarded as national leaders in using technology in consumers’ homes as demonstrated in research findings below. This is due, in part, to three Congressional Appropriations awarded in recent years to the Pennsylvania Homecare Association (PHA), totaling \$800,000, which provided agencies with seed funding to purchase telehealth equipment. PHA has been a strong advocate of increased adoption of aging services technologies and was instrumental in developing the Pennsylvania Medicaid TeleCare reimbursement policy (see section 4.1.6).

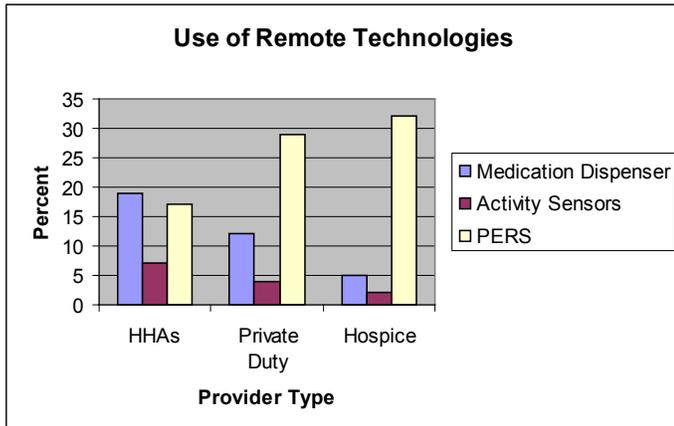
Data from a 2006 survey conducted by researchers at the University of Pittsburgh Department of Health Policy and Management on behalf of PHA shows extensive use of in-home technologies by Pennsylvania homecare providers to a largely older adult population.¹ Surveys were sent to all homecare providers in Pennsylvania, including Medicare-certified home health agencies (HHAs), private duty agencies and hospice providers. A total of 167 completed questionnaires were received from HHAs, 67 from hospice agencies, and 121 from private duty agencies, resulting in an overall response rate of 53 percent. The sample is representative of all home care provides in Pennsylvania. In-home technology adoption rates examined in the survey were for telehealth remote vital signs monitoring, electronic medication



¹ Pennsylvania Home Care Association and University of Pittsburgh, N. Castle and J. Engberg, “The State of the Homecare Industry in Pennsylvania: Bringing Care Home”, 2007

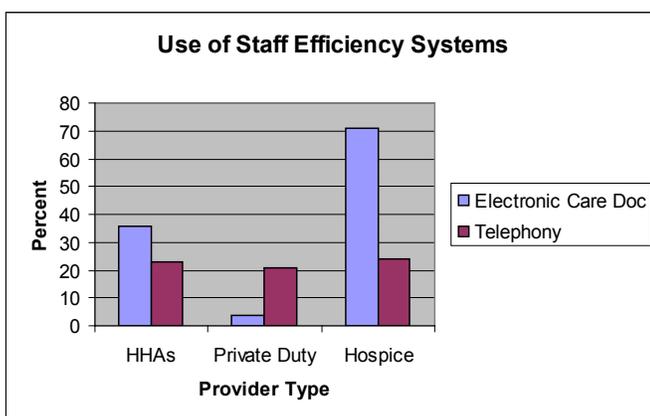
dispensers, activity sensors, and personal emergency response systems (PERS), as well as electronic care documentation and scheduling software.

When asked about the use telehealth for remote vital signs monitoring, 38 percent of HHAs, 24 percent of hospice and 17 percent of private duty nurses indicated they are using remote vital signs monitoring in delivering care. An estimated 6,336 certified home health agency clients in Pennsylvania use remote vital signs monitoring technologies. Another 19 percent of certified home health agencies, four percent of hospice agencies, and five percent of private duty nurse agencies indicated they were actively considering using remote vital signs monitoring.



Electronic medication dispensers are used by 19 percent of HHAs, 12 percent of private duty nurse agencies and five percent of hospice providers. “Smart house” or activity sensor technologies are used by seven percent, four percent and two percent of agencies, respectively. Personal emergency response systems (PERS) have higher utilization rates at 17 percent of HHAs, 29 percent of private duty agencies and 32 percent of hospice agencies.

Interestingly, many more hospice providers use electronic care documentation (71 percent) than do HHAs (36 percent) and private duty agencies (four percent). However, adoption rates of telephony systems (i.e., time and attendance verification) is virtually even across homecare provider types at 23 percent of HHAs, 21 percent of private duty and 24 percent of hospice agencies.



It should be noted that private duty homecare agencies and registries mostly provide non-medical services such as help with activities of daily living (ADLs), including assistance with bathing, grooming, transportation and meal preparation. Recently, Pennsylvania passed a law requiring these agencies and registries to be licensed. Also, while most hospice agencies provide end-of-life care to individuals in private homes, hospice care also is provided in nursing homes, hospice houses and inpatient hospice facilities.

4. POLICY AND LEGISLATIVE CONTEXT

This overview of policy and legislative activity related to HIT and aging services technologies provides a critical context for the proliferation of these technologies in Pennsylvania. Significant executive branch initiatives have been implemented and major legislation has been proposed in recent years.

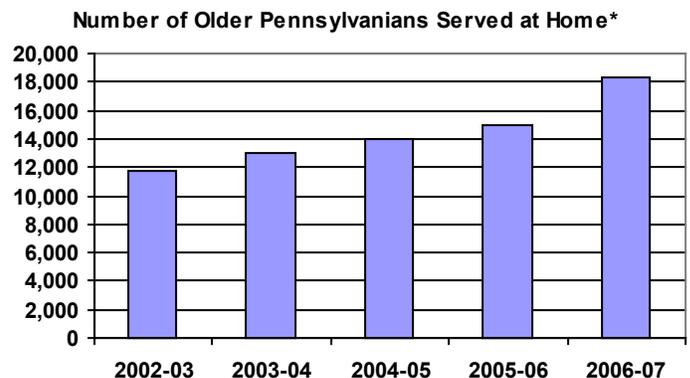
4.1 Governor's Policy Initiatives

Governor Rendell and his Administration have been actively promoting effective utilization of technology in the context of healthcare and long-term care (or "Long-term Living") reform in Pennsylvania. When Governor Rendell first took office in 2003, he established the Governor's Office of Health Care Reform (GOHCR) by executive order with the goal of improving accessibility, affordability and quality of health and long-term living services in Pennsylvania. His first priority for the Office was creating meaningful long-term care reform. Several reform initiatives ensued, including "rebalancing" of state traditional and community-based long-term care resources.

Pennsylvania is making a significant financial investment in home and community based services: between 2002 and 2007, the amount of money spent on these services more than doubled. The

number of older Pennsylvanians served at home grew from 12,000 in 2002-03 to more than 18,300* in FY 2006-07 (*number represents consumers age 60 and older in four of the state's Medicaid waivers).

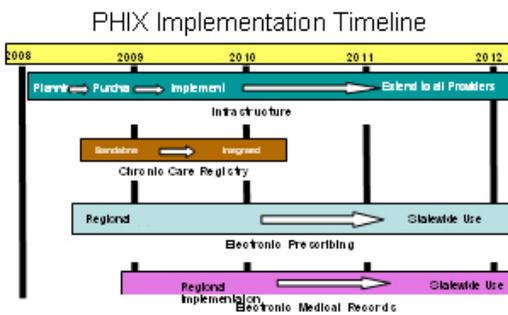
As a governmental manifestation of this reform agenda, the Office of Long-term Living (OLTL) was created. It is comprised of staff from two state departments – the Department of Public Welfare, the state's Medicaid agency, and the Department of Aging. Consistent with its goals to remove barriers to providing care in homes and communities and to serve as many consumers as possible with high-quality care and services, the OLTL has launched two recent major technology initiatives for public long-term living providers (see 4.1.6 and 4.1.7 below). Additionally, a new Pennsylvania long-term living website was recently launched (www.Ltlinpa.com) and while it is not specific to technology, technology will play an important role in future OLTL efforts. The Office is partnering with the Housing Finance Authority to coordinate, expand and improve using home modifications, including piloting smart home and other technologies.



Effective December 1, 2007, the Department of Public Welfare modified the Medical Assistance (MA) Program by adding a telehealth technology procedure code and to the MA Program Fee Schedule. The procedural change is for consultations related to high-risk obstetrical care and psychopharmacology performed using telecommunication technology, including videoconferencing and telephone. The Department of Aging has embarked upon a pilot project using technology to deliver care management in a rural county (see 4.1.8 below).

4.1.1 Pennsylvania Health Information Exchange (PHIX)

On March 27, 2008 Governor Rendell by executive order created the Pennsylvania Health Information Exchange, or “PHIX”– to provide the information technology architecture to support statewide interoperable electronic health records by sharing data that is captured at the point of care in a physician’s office or hospital. The PHIX will eventually allow most doctors’



offices, hospitals, laboratories and pharmacies to share information with various health care providers and other authorized care providers, including long-term care providers such as nursing homes, assisted living and home care providers for treatment purposes by 2012. The initiative also will promote Electronic Medical Records (EMRs) and Electronic Prescribing (eRx) by working with local collaboratives, leveraging federal actions, and finding ways to provide seed money to regional efforts. A chronic care initiative of PHIX is to provide physicians with a free web-based patient registry and provide a pooled-claims database for measuring performance.

The PHIX program received \$4,483,000 in the 2008/09 state budget. These funds will allow the program to hire staff and secure a connectivity partner. The Governor’s Office of Health Care Reform (GOHCR) will oversee the PHIX initiative.

4.1.2 Medicaid Aging Waiver TeleCare Reimbursement Program

Pennsylvania is one of the first states in the nation to provide reimbursement for home “TeleCare” through a Medicaid waiver for older adults ages 60 and older under approval from the Centers for Medicare and Medicaid Services (CMS). On September 1, 2007 the Office of Long-term Living began a demonstration TeleCare reimbursement policy to cover a range of services provided by home health, durable medical equipment providers, pharmacies or hospitals through contracts with local county Area Agencies on Aging (AAAs).

A new Medicaid aging waiver (“PDA 60+ Waiver”) began in July 2008 that includes placeholder language for a permanent TeleCare reimbursement program. The draft TeleCare policy was revised and submitted for approval to CMS for final inclusion in the new five-year waiver program. Final provisions are expected to be substantially similar to the draft policy, with improvements in clarity of protocols and respective responsibilities for AAAs and providers.

Under the draft policy, reimbursement for TeleCare not only covers use of equipment that performs remote vital sign monitoring (telehealth)

but also covers telemonitoring with activity sensors by which a family member can access a website and determine activity status such as when the consumer awakes in the morning, the frequency of refrigerator openings, how many times the bathroom is used, if medications were taken and whether a consumer suffers a possible fall. State officials expect the TeleCare program to help with

a workforce shortage by increasing the number of persons that can be served by homecare staff, while enabling state Medicaid savings by allowing more consumers to remain safely in their homes and delay moves to more expensive skilled nursing care. While it is often not feasible to provide an in-home aide 24 hours a day, the technologies can monitor consumers’ wellbeing 24 hours a day, seven days a week.

**PA TeleCare Medicaid Waiver
Demonstration Reimbursement Rates**

Health Status Measuring & Monitoring: \$10/ day

Activity & Sensor Monitoring: \$200/ install
\$79.95/ mo.

Medication Dispensing & Monitoring: \$50/ mo.

PERS: \$30/ mo.

TeleCare Demonstration Reimbursement Policy Requirements:

- Demonstrated medical need (physician’s order) for the services and evidence that services are not covered under Medicare, State Plan or other third party resources
- Participant’s home must be evaluated for suitability for the technology application
- Participants must:
 - Meet nursing facility clinically eligible (NFCE) determination
 - Meet at least three of the following needs criteria:
 - Three (3) or more hospitalizations in the past year
 - Frequent, recurrent, repeated or regular use of the emergency room
 - Poor adherence with physician orders or medications
 - Formal or informal support systems are limited or absent

- Documented history of falls within the last six months that resulted in an injury that required medical or emergency care
- Lives alone or is at home alone for extended periods of time or care access challenges exist (for example, RN shortage, rural access issues, etc.)
- Be cognitively able to operate equipment if needed or have a caregiver operate equipment.

The policy change is expected to spur an increasing number of agencies to adopt the technology. Because administration of the policy requires AAAs to develop contracts for TeleCare services

**PA Telecare Medicaid Waiver
Demonstration Use Data
September 1, 2007 to June 30, 2008**

18 Counties Authorizing TeleCare Services
105 Consumers Authorized to Receive TeleCare Services
33 Providers of Service

in their county(s), ramp-up of the program will likely take a couple of years. AAAs need to collectively become more familiar with the parameters of the program and develop standards of practice for entering into contracts with in-home providers and technology companies. It will also require revising existing models of care management and developing new ways of interacting with providers regarding tracking the wellbeing of older adults receiving

care at home under the Medicaid waiver. The Office of Long-term Living plans to compare pre and post-TeleCare use and client assessment data to reveal any relevant care outcomes.

Early Demonstration of Value Fostered State Policy Change:

The Pennsylvania Homecare Association (PHA), representing the state's visiting nurse associations, home health agencies, hospices and private duty agencies has long advocated for the advancement of technology to improve care and efficiency of limited health care dollars. Through testimony at advisory and legislative bodies, PHA cited national and local research findings to make the value case for using technology and for state reimbursement. As discussed above, PHA also commissioned recent research on the current proliferation of technology adoption among homecare providers.

In addition to PHA's groundwork, Keystone Home Health & Hospice and the Living Independently Group Inc., the maker of the "Quiet Care" remote monitoring system (www.quietcare.com), were integral in the development of the Pennsylvania TeleCare reimbursement program by demonstrating value of telecare technologies in local care delivery models. The home health provider and the technology company partnered to demonstrate the use of this technology for comparable state client populations and to cultivate awareness and positive regard among state officials. They successfully showed the potential to improve best practices and maximize the

ability for those with chronic conditions to stay at home for as long as possible, while minimizing cost (see section 5.1.3 for further details).

Workgroup Approach Used to Craft TeleCare Policy

After state officials were convinced of the value of using telecare technologies and its potential for cost efficiencies with the state's burgeoning older Medicaid population, the Department of Public Welfare and Department of Aging (which together formed a new Office of Long-Term Living) convened a workgroup to develop various components of a new telecare program and craft reimbursement policy for Medicaid 60+ Waiver consumers. Represented on the workgroup were homecare providers, Area Agencies on Aging, senior service providers, and staff from the departments of Public Welfare and Aging. The workgroup's mission was to: *Develop an infrastructure for a TeleCare program for older Pennsylvanians that helps them to remain independent in the community.* Upon completion of the draft TeleCare policy discussed above, state officials held three regional training sessions for AAA staff and providers.

4.1.3 Long-Term Living Training Institute and Videoconference Initiative

This year the Pennsylvania Office of Long-term Living created a Long-term Living Training Institute for the state's aging and disability service provider networks. A total of \$3 million was allocated for the effort to increase preparation of the state's workforce to care for an increasing population of older and disabled individuals with ongoing care needs. Approximately \$1 million has been designated for videoconferencing equipment for all 52 AAAs and 25 disability providers throughout the Commonwealth. It is intended to provide ubiquitous capacity to provide training and communications in all agencies and build critical staff skills without burdening agencies with travel costs and lost work time. It is possible the two-way video equipment could be used for other purposes, such as multi-disciplinary care teams, for more efficient complex-care planning.

4.1.4 Department of Aging Virtual Care Management Pilot

The Pennsylvania Department of Aging is piloting "PDAVirtual," a virtual network of information outreach and tele-care management services to better meet the needs of Pennsylvania's expanding senior population. The pilot will be conducted at five locations in a very large four-county rural area in western Pennsylvania. The pilot will use the Family Virtual Visits technology by AgeServe Communications (www.familyvirtualvisits.com).

In the PDAVirtual model, virtual centers will be established in selected Senior Centers and in selected affordable senior housing (i.e., HUD Section 202) communities to link AAA staff, care managers and resources directly to seniors. Older adults will access AAA care managers

remotely – yet face-to-face – from their housing community or a near-by Senior Center instead of having to travel to AAA offices or have care managers travel to meet them. The pilot also aims to empower seniors who are not currently utilizing public resources that are available to them. Elimination of travel expense and travel time will enable care managers to reach more seniors than currently possible by reducing “windshield time,” without impacting provider incomes or exceeding service expense caps for any one senior. In addition, more personalized sessions by trained personnel will potentially provide older adults with a higher level of care management for the same care dollars.

The PDAVirtual network technology components include:

- 1) The PDAVirtual Center: videoconferencing equipment that is completely hands-free for seniors.
- 2) Webcam-enabled service provider resources contracted by the AAA’s to deliver senior services, including case management.
- 3) A direct phone link from the PDAVirtual Center to the appropriate AAA office servicing the locations’ seniors. This will enable seniors to call and schedule service.
- 4) A fax machine to transmit documents and authorization signatures to and from the senior’s location.

The video linkage will be between the AAA service providers and the PDAVirtual Center location. Some providers may in fact be AAA staff, while others will be remotely located, contracted service agencies. A senior’s phone call request will be processed/ triaged by the AAA reception desk to an available video-enabled resource person who can then direct (video) dial into the PDAVirtual Center where the senior is located. This enables a live person-to-person videoconference to address the request. Features of the program include:

- One care manager can serve older adults in several locations, and/or triage to specialized provider via videoconference (mental and behavioral health, legal aid)
- Provides capacity for “walk-in” AAA services at senior centers and increased utilization of center programs
- Follow-up conferences can be conducted by appointment with the resource person as needed, without needing to route through the triage phone link
- HUD Neighborhood Networks funding is available for videoconference technology installation costs and monthly fee at affordable senior housing communities
- Free video visits with seniors’ families

4.2 Pending Legislation

Pending legislation in both the Pennsylvania State Senate and House would enable substantial advancements in utilizing aging services technologies in the Commonwealth. Advocates and legislators have invested significant time and energy to develop and consider the bills discussed below. However, none currently have a clear path to enactment this legislative year.

SB 8 (Wonderling) Medical Safety Automation Program for EHRs

Introduced by Senator Robert Wonderling and subsequently introduced in the House by Representative Mark Cohen as HB 2564 (printer's #3415), SB 8 would establish a medical safety automation program and grants for regional health information organizations. A medical safety automation system is defined by the bill as an interoperable system that utilizes health information technology to integrate health information, clinical activities and data sharing in any of the following areas: pharmacy ordering and tracking; laboratory testing and results; physician order management; access by clinicians; access by consumers; telemedicine; data sharing among health care facilities, physicians and health insurers; or other transaction monitoring or health information exchange that promotes patient safety and efficiency in delivering health care. Grants of up to \$1 million would be provided to regional organizations to purchase the health information or telecommunications technology necessary to create an interoperable and integrated medical safety automation system and to cover training physicians and personnel in using the system. SB 8 is currently pending in its first committee and is said to be associated with consideration of physician medical liability fund ("MCARE") legislation.

As chair of the Senate Communications and Technology Committee, Senator Wonderling also has formed the Pennsylvania Technology in Healthcare Working Group, which brings together state leaders in academia, technology, healthcare and government to find ways in which the Commonwealth can better integrate and promote technology in healthcare.

SB 340 (Browne) Medicaid Rates for Telemedicine

Introduced by Senator Patrick Browne and subsequently in the House by Representative Mark Cohen as HB 2545 (printer's #3794), SB 340 would establish that any rates established by the Department of Public Welfare for telemedicine services to Medicaid beneficiaries shall be equal to those for services provided in-person. The bill has passed its first policy committee and is pending before the Senate Appropriations Committee.

SB 1094 (Williams) – ePrescribing Requirement for Health Facilities

Introduced by Senator Connie Williams, SB 1094 would require all health facilities, including skilled nursing facilities and hospice providers, to develop a full implementation plan within 60 days to

provide easy and timely access to an e-prescribing system for use by all medical staff who have prescription authority in the Commonwealth. The system would need to be able to monitor and notify staff of potentially harmful drug interactions. The bill also would require the State Board of Medicine to establish guidelines for using e-prescribing by every physician that chooses to write prescriptions electronically. SB 1094 would appropriate \$25 million in grants to assist health facilities in acquiring the systems. The grants would be capped at no more than 50 percent of the facility's costs for the system and the Department of Community and Economic Development would be required to review the fiscal condition of the health facility. SB 1094 has been referred to committee but is not expected to be acted upon this legislative session.

HB 1849 (Cohen) Requirement of Telemedicine/ Telehealth Coverage by Health Insurers

Introduced by Representative Mark Cohen, HB 1849 would require all health insurers in Pennsylvania to provide coverage for telehealth if a health care professional certifies that certain conditions are met. The bill defines telehealth as the remote interaction between a health care professional and a patient through the use of video camera or computer video transmission; an electronic health monitoring device; or another telecommunications device that delivers health information concerning a patient to a health care professional. Qualifying conditions include the following (all must be met):

- 1) the use of telehealth is appropriate for the patient;
- 2) the health care professional will be able to maintain proper direct examination of the patient or that direct examination of the patient is not necessary;
- 3) and the use of telehealth will result in lower health care costs than if it were not used.

HB 1849 is pending before the House Insurance Committee and has received the most public debate of any of the bills above. On April 15, 2008 the committee, chaired by Representative Anthony DeLuca, held a public hearing on HB 1849 to receive testimony from representatives of the insurance industry, visiting nurse services and other homecare providers, hospitals, and the PA Medical Society to determine whether or not insurance reimbursement of telemedicine makes sense in Pennsylvania.

In his opening remarks, Representative DeLuca stated that "As technology evolves, the practice of medicine must advance along with it. It is incumbent upon us to investigate and consider these technologies and advances and how they can benefit our constituents." DeLuca further asserted that it appears "the use of telehealth medicine would be more convenient for both the providers and the

patients” and that it “would reduce the demands for health care services and save the patients time and money going for the doctors’ visits.”²

Highmark, a large health insurer in Pennsylvania, testified that they currently provide limited coverage for clinical applications of telemedicine that do not require face-to-face encounters between the clinician and patient. Such use cases are limited to radiology for the transmission of medical images to a radiologist for interpretation, pathology images transmitted through “store and forward” image technology, and in certain cases patient monitoring – mostly for cardiac monitoring as well as some cases of fetal and pulmonary monitoring. Highmark does not provide coverage for clinical applications normally involving face-to-face encounters that would require cognitive skills such as visits, consultations, counseling, therapy sessions, and on-line medical evaluations or assessments citing a lack of scientific evidence demonstrating that cognitive telemedicine services are medically and diagnostically equivalent to face-to-face care. Highmark opposes HB 1849 because they believe it has the potential to expose health care consumers to services that could be harmful if not provided during direct, face-to-face contact with their physician. They also contend that the broad nature of the bill raises questions about costs and medical liability.

The North Penn Visiting Nurse service testified on behalf of homecare providers in strong support of the measure, citing research findings of cost efficiencies through decreased rehospitalizations, particularly for chronic heart failure patients. The agency, which began its telehealth program in 2006 and now utilizes 60 remote vital sign monitoring units, has been able to reduce the number of in-person visits per-patient (one or more per week) while safely monitoring patient recovery and avoiding unnecessary rehospitalizations. Because there is no requirement for insurers, including long-term care managed care plans, to reimburse for the use of such equipment, nearly all do not. North Penn asserted that for as little as \$10 per day a patient with Medicare or Medicaid can be evaluated remotely by a nurse, receive quick response to an impending medical emergency and avoid an unnecessary visit to an emergency room or hospitalization.

Large hospital networks covering western and eastern Pennsylvania and the Hospital and Health System Association of PA (HAP) testified in support of HB 1849. However, HAP contended that the legislation could have a somewhat limited impact because it does not cover federal programs, such as Medicare, and many private insurers would not be required to follow the requirements since federal law (ERISA) would exempt them from following this state mandate. Therefore, HAP further advocated for the passage of SB 8 and SB 340, discussed above, to further advance the proliferation of telehealth. The Pennsylvania Medical Society also testified in support but asserted that the legislation

²Transcript of PA House Insurance Committee Public Hearing on HB 1849, April 15, 2008

does not go far enough, and suggested it be expanded to require reimbursement for telemedicine for real-time interactive physician treatment in addition to telehealth services.

5. EARLY ADOPTERS OF AGING SERVICES TECHNOLOGIES

Several providers and public home and community-based service providers have been “early adopters” in ASTs because of their early commitment to the use of technology to achieve their service mission and goals. The following is a snapshot of the efforts of a few early adopters in Pennsylvania.

5.1 Aging Services Providers

The following are detailed examples of care providers to older Pennsylvanians that have made strategic investments in aging services technology infrastructure and tools. It should be noted that this summary does not purport to capture all examples of early adopter providers, but rather presents a few key examples. There are many other providers who have made investments in technology, some of which are referenced in section 5.1.6 and others who are not discussed in this paper.

5.1.1 Acts Retirement-Life Communities

Based in Southeastern Pennsylvania, ACTS Retirement-Life Communities is the largest not-for-profit builder, owner and manager of continuing care retirement communities (CCRCs) in the United States. Begun in 1972, ACTS now has more than 7,800 residents and 5,600 employees in 18 ACTS communities in several states. ACTS’ aging services technology adoption to date has been focused on making improvements in quality, service and efficiency in traditional settings of care within the CCRC model. With regard to technology adoption, senior staff refer to ACTS as “conservatively proactive,” meaning they are continually exploring the technology horizon but are rarely the very first adopter – but may be the first evaluator of the technology. It has excelled in its areas of technology focus.

Since the late 1990s – early 2000s, all of ACTS’ core operational services areas have been electronic, including front-line systems. For example, for seven years its food management and maintenance workers have been using hand-held electronic tools to manage their day-to-day operations. Security systems, hospitality services, and clinical systems are all electronic.

For its clinical point of care system, ACTS currently uses CareTracker by Resource Systems (<http://www.resourcesystems.net/caretracker.htm>). What makes ACTS’ implementation unique is that the system extends across all levels of care. ACTS has kiosks throughout its CCRCs, even in fitness centers to document resident physical activity in independent living settings.

With CareTracker, front-line workers are able to chart resident information using touch-screen kiosks. To simplify staff workflow, the system identifies required activities and documentation

with highlighted yellow icons and visually alerts staff to past-due care activities and situations that require their attention (i.e., when a resident's biometric measurements indicate an unhealthy trend or show insufficient nutrition). By automatically identifying at-risk residents and communicating resident information, CareTracker facilitates quality care and allows for immediate follow-up. CareTracker's reporting features allow ACTS to analyze the quality of care and compliance – from the facility to the corporate level – against its own internal quality standards. Though CareTracker provides ACTS with a pseudo electronic medical record (EMR), leadership is currently pursuing a more comprehensive system to move them closer toward adoption of a full electronic health record (EHR) and a plan to deploy a new platform over the next year.



ACTS is now planning significant technology upgrades. Information technology staff are beginning to provide all 5800 employees with hand-held and touch-screen access, through multiple points of contact including hand-held, voice and kiosk technologies. ACTS has taken this step because they believe it is imperative that all relevant services be supported at all times by tools and information so that they are measurable. They are currently building a wired and wireless data communications infrastructure to support a ramp-up from the current personnel footprint of 1000 daily technology users to 5800.

From this broad platform, ACTS also plans to provide self-service resident access to all campus services. This would include scheduling and ordering entertainment, health and wellness, safety and security, energy management and communications systems to name a few. ACTS believes that technology will provide a connected, collaborative community that will empower greater synergy of care and a greatly enhanced quality of service and experience for residents. Eventually, ACTS hopes that this kind of coordinated virtual and physical space will enable them to build more flexible and configurable living environments rather than care-specific rigid settings that currently are the norm.

5.1.2 Diakon Lutheran Social Ministries

Diakon Lutheran Social Ministries (www.diakon.org) is among the largest not-for-profit retirement care providers serving Pennsylvania, Maryland and Delaware and has 3200 employees.

It also serves children, youth, adults, families and community groups through a variety of programs and services. Diakon offers CCRCs, retirement living accommodations, assisted living services, dementia care, nursing care, memory care and outpatient rehabilitation services.

Diakon is two years into a 10-year “reposition plan” in which it is building new independent living product, for both homes and apartments, and renovating its existing personal and healthcare facilities at six of 13 locations. They believe it is important to design senior living in a way that will be attractive to the coming age wave, and ascribe to the “aging in place” design approach.

The company seeks to utilize technology to support the existing staff and services on its campuses and then use this model to reach out in the community with its new home services programs.

Its strategic activities toward this goal include participating in product research and development, actively participating in CAST, collaborating with vendors and other service providers, and conducting small pilot projects of potential solutions. Internally, Diakon is holding discussions and demonstrations with staff, its board, and residents and families to educate them on technologies and services that are available.

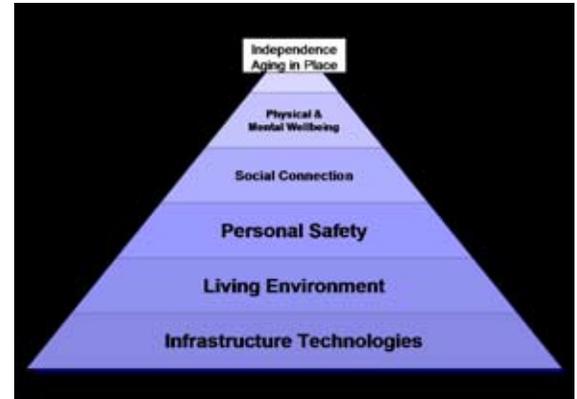
Consortium for the Future of Senior Living

In order for all levels of the organization and its partners to use the same language or overall plan, Diakon developed a “future of senior living pyramid” that incorporates its key areas of focus. They are:

- *Infrastructure* – physical connection to others, Internet, caregivers, databases and includes fiber optic, copper, coaxial, and wireless technologies
- *Living Environment* – physical living environment includes universal design, lighting, temperature, security, access, fire/smoke, call assistance
- *Personal Safety* – fall detection, activities of daily living monitoring and assessment, mobility aids
- *Social Connection* – phones, email, intranet, portals, private cable channels, two-way video, messaging, TV
- *Physical/Mental Wellbeing* – wellness monitor, telehealth, cognitive stimulation, reminder systems

Specifically, Diakon is creating a local partnership, named the “Consortium for the Future of Senior Living,” among several technology companies, a senior living contractor, an architect, a design firm and a leading university. The Consortium will address known existing obstacles,

discover additional unmet needs and find solutions to assist individuals to remain independent longer. The Consortium plans to build a model apartment on Diakon's Luther Crest campus in Allentown, Penn. and a model home on its Topton campus in Topton, Penn. campus. These models will be used as education centers for seniors, families, staff and the local community to showcase technology that is currently available and how it can assist people in their homes. The Consortium also will pilot new technologies with the goal to incorporate proven solutions and services throughout Diakon's independent and assisted living communities and eventually into the neighborhood home.



Cognitive Impairment - Brain Fitness

One of the technologies Diakon has tested and adopted for improved resident health and engagement is the Dakim [m]Power (www.dakim.com). Positioned as fun and easy to use, [m]Power is a cognitive exercise system that provides residents with a challenging, entertaining and enjoyable mental workout. It employs touch screen technology and combines original content with memory-invoking images to stimulate participants' minds. It is a self contained computer touch screen that requires no keyboard or mouse. The challenge level is self adjusting and new content is downloaded and installed automatically each night. Diakon has found that the [m]Power is senior-friendly with an automated login and makes cognitive exercise a leisure activity. Diakon piloted six units over the last year at two of its campuses and recently installed 32 more units the first quarter of 2008.



Monitoring Activities of Daily Living

Diakon is partnering with GrandCare (www.grandcare.com), to pilot a new technology device called Como for assisting individuals to remain independent in the homes (no matter where their home is). GrandCare Como is an intelligent system that includes a suite of sensors to monitor the home of an elderly individual in a non-intrusive manner. The system sends non-visual information via the Internet about basic activity in the household of a senior. Diakon will host

a user-friendly webpage for both formal and informal caregivers to monitor activity and to send



communications directly to the senior's television screen. The caregivers can specify how they wish to be notified in the event of a household irregularity.

Using Internet technology, GrandCare also allows the family to stay in touch with their loved one from any location or time of day.

Lighting Technologies for The Aging Eye

Diakon is working with Lutron (www.lutron.com), a leading lighting control company and Diefenderfer, a local electrical contractor to provide lighting and controls to assist with the visual changes that occur to our eyes as we age. Diakon and Lutron are exploring ways to improve the quality of life of older adults by understanding how lighting compensates for the changes that commonly occur in aging eyes. As we age, our vision experiences many changes: sensitivity to glare; decreasing ability to react to changes in light levels; reduced ability to discern details; restricted field of vision and depth perception; and reduced sensitivity to contrast and color recognition. Lighting can make the difference between seeing and not seeing for older adults with deteriorating vision.

Diakon plans to change lighting environments to increase ambient light levels, increase task area lighting, minimize glare, increase contrast, balance luminance levels, improve color perception and provide gradual transitions between spaces in the common areas of its Luther Crest community. Other goals include minimizing hours of lighting operation in some areas by using lighting controllers, and the lighting power density by using energy efficient lighting products, while providing lighting that the residents find attractive and comfortable.

Some lighting control strategies currently being considered are wall box "single zone," scene, bedside, hand-held remote, occupancy, and astronomical time clock control. Diakon also is exploring technology that will provide daylight compensation, automated window shades, light-level tuning, central system control and/or integration, and energy monitoring that includes peak power demand monitoring and management as well as energy usage.

Resident Information and Communications

Diakon is piloting a resident information and communications product with TouchTown TV (www.touchtown.tv) that can be broadcast over existing cable television on a private channel and provides digital signage information located throughout the facility on flat panel TVs.

TouchTown TV+ and Resident Web Portal work together to unify the communication throughout retirement communities. TV+ is a passive system, delivering community information to viewers on televisions, websites and print. It gives communities the power to connect with residents, family members and prospective residents – even if those people are not physically in the building or campus. It lets a community create and deliver a professional quality channel automatically, generating the final result from a database of local information. The unique value of TV+ derives from its ability to unify communications throughout a retirement community. The *Resident Web Portal* is an interactive system, engaging residents in online activities such as email, discussion forums, signing up for activities, scheduling maintenance requests, dining menus, resident directories, etc. *Touchtown Digital Signage* sends community information to viewers via digital signage in public areas. The technology provides a multi-window, high definition display that combines multiple information sources: brand message, daily announcements, activity schedules, dining menus, transportation, time, date, weather, etc.

Donor Recognition / Diakon Information Kiosk Stations

Diakon will install a touch-screen kiosk based system for donor recognition, building directory and other Diakon information on each campus in conjunction with its reposition plan. Quality Attributes (www.qualityattributes.com) is the software company providing web based software to be presented on the touch screen kiosks. IBDonor, the donor and sponsor recognition management package, provides web-based administration of donors and allows up-to-date recognition of donors while reducing physical décor space commitments. iBDirectory, a visitor management tool, offers visitors and residents real time interaction with Diakon's information including building directories, waypoint findings, campus maps and event calendaring.

5.1.3 Keystone Home Health & Hospice

Keystone Home Health & Hospice, based in the greater Philadelphia region, provides private duty nursing, skilled home care, disease state management programs, telecare, palliative care, home hospice and residential hospice services.

As referenced above in the discussion of Pennsylvania's TeleCare Medicaid reimbursement program, Keystone has been an early leader in using innovative and low-cost technology to address the problem of the increasing number of individuals who are aging and live with chronic disease. Keystone pursued using technology because it recognized the significant challenges to maintaining the health of an older population, which is often a hardship for individuals and families. With the use of simple technology to monitor activity and ambient temperature in the living environment, track and dispense daily medication doses, and remotely monitor vital signs,

Keystone found it can alleviate some of the escalating costs and social pressures of maintaining the health and independence of the chronically ill and aging population.

Passive Monitoring System

Keystone developed the Keystone Telecare Program, combining clinical case management with the QuietCare passive monitoring system from Living Independently (www.quietcare.com), a motion detection system for the home that is specially designed to analyze patterns of activity surrounding an individual's normal daily routine. Individuals who are aging or who have chronic disease have continued and predictable episodes of change within the illness, related to lifestyle, living conditions, access to family, community support, and health care. Patterns of behavior can be cardinal signals of impending crisis within chronic illness and aging.

Five discreet wireless motion detectors collect and track an individual's normal daily routine as well as ambient temperature in the home. Information from the sensors is sent to a secure website where it is translated into functional status. A baseline analysis of the individual's safe independent status at home is recorded and subsequent information is compared to determine changes in activity. Installation of these sensors is cost-effective and importantly, non-obtrusive in the existing environment. Information generated by the passive monitoring system is viewed both on a daily basis and through trend analysis, to pinpoint changes in behavior that could indicate a problem before it becomes a crisis. Passive monitoring system includes a 24-hour emergency response button with oversight by ADT. The passive monitoring can be easily integrated into supportive housing or private residences to better manage the costs of care and is a simple and cost-effective platform for other technologies to enable individuals to remain at home.

Remote Monitoring of Vital Signs

Keystone utilizes low cost, FDA approved biometric tools (glucose meters, blood pressure cuff, incentive spirometer, digital scale, etc.) that can be linked to a wireless modem to send vital measurements over phone lines to the physician and home care nurse. These measurements create a longitudinal record for greater accuracy of disease state assessment. The frequent vitals monitoring at home affords constant trending and early intervention by a physician or nurse and can avert worsening health status. In-home monitoring devices connected to an adaptable modem can guide patients in the daily exchange of important clinical information such as blood sugar levels, blood pressure, weight, and lung functioning.

Medication Adherence

Keystone, along with other providers, found that failure to take medication because of cost, forgetfulness, confusion, or other reasons greatly undermines the success of treatment and increases the costs of care. Keystone has used the MD2 medication system for over three years with individuals who had been hospitalized due to non-adherence with medication that complicated other health related issues. Adherence in this group has been increased on average 20 percent, and for one individual, hospitalization was averted for more than a year.

Demonstrations and Research

For several years, Keystone has worked to advance adopting aging services technologies by demonstrating their value with various populations. The following is a brief summary of these efforts:

- Keystone Hospice was part of a study with Dr. Ellen Tedaldi at Temple Cancer Center to track medication adherence with the MD2 in individuals infected with HIV-1 who have a significant history of non-compliance. This study passed the Temple IRB (Institutional Review Board) in February 2004.
- Keystone Hospice received IRB approval in October 2005 from the City of Philadelphia, Department of Health, to begin a project with funding from the AIDS Activities Coordinating Office (AACO) to demonstrate the cost and care benefits of using these technologies to enhance care and improve clinical outcomes for individuals who are chronically ill with HIV/AIDS. This study is ongoing.
- In December 2005, Keystone received discretionary funding from the Pennsylvania Department of Aging to begin a six-month pilot project using the passive monitoring, medication adherence and remote vital signs monitoring technologies with home care nursing supervision, to demonstrate the benefits for the health and welfare of individuals who are aging in Montgomery County, Penn.
- In June 2006 Keystone received funding from The Chestnut Hill Health Care Foundation in support of the Telecare Program to offer telecare services to 12 chronically ill individuals in the zip codes surrounding Chestnut Hill Hospital.

After six months of piloting technologies with 12 frail elderly individuals near Chestnut Hill Hospital, Keystone provided an average of 119 days of care. Individuals were referred for care for fragile medical conditions and non-adherence to medication and were considered at risk for nursing home placement. The following are summary highlights:

- Demographics: average 76 years of age; 75 percent Caucasian; 66 percent female; 50 percent were physician referrals; and 50 percent were referred from the local Office on Aging. All individuals had multiple diagnoses including cancer, congestive heart failure, hypertension, and diabetes with 50 percent complicated by dementia, bi-polar disorder or depression.
- Eleven individuals used the medication dispensing technology between one week and six months. The average adherence rate for these individuals was 98.2 percent while 45 percent of individuals were adherent 100% of the time.
- Ten individuals were using the passive monitoring system.
- Three individuals with congestive heart failure and one with diabetes utilized remote vital signs monitoring.
- Two individuals were hospitalized during the six-month period for a total of six days; one for a fall, and one for a hematoma at the site of self-injection.
- No participants were placed into long-term care.

By keeping these individuals safely at home using low cost technology at approximately \$16 a day versus nursing home placement at \$180 a day, Keystone believed the cost and quality of life benefit was evident. One patient who had originally said that she ‘just wanted to die’ because of her illness (congestive heart failure) and had an unpredictable health status at home, enjoyed independence with the support of the passive monitors, a medication dispenser and a nurse remotely monitoring her vital signs daily. Several technology-informed interventions by the nurse have kept this patient well and without a crisis for the monitoring period.

5.1.4 NewCourtland Elder Services

The NewCourtland Elder Services network, founded on July 1, 1995, is a care provider for more than 2,000 people in the Philadelphia area. It owns and operates seven nursing homes, provides affordable senior housing cottages and apartments, operates a PACE (Program of All Inclusive Care for the Elderly) program called “**LIFE**” in Pennsylvania (Living Independently For Elders), and provides homecare services through Courtland at Home, its certified home health agency. It uses an innovative and individualized approach to providing healthcare and social services in fulfilling its mission to care for those in need. Courtland at Home provides skilled nursing, home health aide, and skilled rehabilitative services. NewCourtland distinguishes itself by uniquely blending the compassion of a highly-trained, dependable, and friendly staff with the innovation of easy-to-use assistive technology.

NewCourtland leadership – whose mission is to provide the best quality of care – recognized a confluence of factors including a nursing and worker shortage and a rapidly growing older population and decided a large part of the answer was to adopt whatever technologies were needed to enable care giving excellence. The challenge was to bring technology to every level of operations and care in an arena where people are not generally familiar with technology (both staff and older adults). In 2000 when the search began for advanced aging services technologies there was limited availability. But leadership was determined to find ways to maximize the technology that did exist to meet its goals and charged ahead. As evidenced below, NewCourtland has never looked back.

Clinical Systems and Resident Account Management

Unlike most long-term care providers, NewCourtland in 1998 began its use of technology with a clinical information package before it implemented an electronic resident census and billing management system in July of 2006. For both of these systems NewCourtland used VistaKeane, by Keanecare (<http://www.keanecare.com>), an integrated clinical and financial software that is tailored specifically for long-term care. The VistaKeane suite of software allows for accurate real-time census, electronic resident assessments and accurate resident funds and billing management.

Point-of-Care System

In June 2005, NewCourtland changed its nursing home clinical system to the CareTracker point-of-care system by Resource Systems (*as discussed in section 5.1.1 above*) in their seven skilled nursing facilities (<http://www.resourcesystems.net/caretracker.htm>). Using touch based kiosks, CareTracker makes it easy for nurses and other care staff to quickly and accurately document resident care and observations. NewCourtland found that using CareTracker led to better resident care and more accurate MDS submissions. Staff reported that the biggest benefit is ability to spend more time with residents and less time completing charting and other paperwork. NewCourtland's implementation plan was staggered, beginning with two facilities and then placing it in one facility every other month. A multi-disciplinary team approach to implementation was critical to success and included an IT program manager, clinical leadership, operations, and actual users for each nursing home.

Homecare Clinical and Financial System

In July 2008, NewCourtland implemented Horizon Homecare, a suite of home care documentation applications by McKesson (<http://www.mckesson.com>), which integrates clinical, financial and administrative data in its homecare agency. NewCourtland believes it has helped to improve quality, manage clinical costs and other resources, and coordinate care.

Electronic Nurse Call System

NewCourtland recently installed Cornell Cumula Nurse Call Systems (www.cornell.com) in each



of its skilled nursing facilities. The Cumula Nurse Call System is a programmable, PC based, addressable call system equipped with Cornell's AURA Monitoring Software. In addition to serving the classical function of the nurse call system, it can monitor all types of "alert" devices, equipment and systems and, in an emergency, send a message via cell phone, pager, email, message board or two-way radio to the appropriate personnel. All monitoring and alert

activity is stored in a historical reporting system that provides accountability, staff management and recordkeeping

Time and Attendance Technology

In an effort to develop a culture where all staff become familiar with using technology on a day-to-day basis, NewCourtland implemented the Kronos automated time and attendance software in 2006. Kronos (www.kronos.com) utilizes advanced biometric-enabled time clocks to improve accuracy and manage labor resources in real-time. A touch identification terminal verifies employees' identity using biometric finger scanning, not fingerprints, for increased accuracy. The package allowed NewCourtland to automate business processes and eliminate many administrative tasks as well as monitor labor activities in real time for better informed labor decisions. Moreover, it further enabled the culture change NewCourtland was seeking and allowed staff to spend more time with residents rather than manually completing tedious time sheets and forms.



Infrastructure Enhancements and Electronic Record Systems

By October 2007 all seven of NewCourtland's nursing homes and operational buildings were converted to 100 percent wireless connections and tools (laptops/handheld devices/kiosks), with a robust information technology backbone to link all facilities. The network infrastructure utilizes state of the art hardware and quality of service (QOS) based routing to ensure data is delivered to end-users in the most efficient and timely way possible.

EMR System

In March 2007, NewCourtland adopted a fully electronic medical record system created specifically to support its LIFE/PACE program. After searching unsuccessfully for what it deemed a suitable system, NewCourtland teamed with Mediture (<http://www.mediture.com/lifeconnect.html>) and another PACE provider in Boston to develop a customized solution to

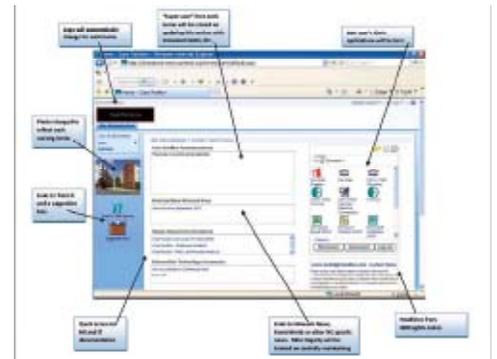
meet the unique medical records challenges that face PACE programs. Through this partnership “TruChart LIFEConnect” was developed to unify the various and complex components of PACE programs. This software allowed NewCourtland to open and maintain a 100 percent paperless environment in its LIFE Center. As a fully integrated solution, the software covers end-to-end needs including assessments, interdisciplinary care plans, authorizations, billing, scheduling, order entry and transportation. NewCourtland currently is doing a full systems review to determine whether this system could be implemented across its other programs and services.

eMAR System

Also in 2007, NewCourtland implemented a fully integrated electronic medication administration record (eMAR) system that provides medication management and delivery in its nursing homes. Millennium MPSRx (<http://www.mpsrx.com>) is a wireless web-based system that allows NewCourtland’s nurses to deliver bar-coded medications via cart-based laptops. A taskforce was used to involve a large user group and management planned the roll-out. To implement, NewCourtland trained staffing agency nurses who helped roll it out in each building. The approach was so successful that Millennium utilized the trained agency nurses to complete roll-outs in other long-term care communities. NewCourtland has realized improved efficiencies and reduced medication errors as a result of this paperless system.

SharePoint Dashboard and Resources

In April 2008, NewCourtland deployed Microsoft SharePoint homes pages for employees across all locations, providing a single integrated location where employees can find organizational resources, manage electronic forms and workflow, and have access to dashboards and reports of key clinical and operational metrics. Any NewCourtland employee logging onto the Internet encounters a start page that includes: the user’s facility logo; announcements specific to the user’s facility or program; a list of recent NewCourtland news and publications; human resource documents; and relevant quality measures.



Telehealth Technologies

NewCourtland also has been an early adopter of various telehealth technologies. Several years ago it piloted wired telehealth devices that were connected to phone jacks and wired to biometric tools. The organization determined that the devices were too expensive and would not enable the development of an affordable and comprehensive set of telehealth tools.

Telehealth Sensor Technologies

Beginning in July 2006, NewCourtland began using advanced technologies from HealthSense (www.healthsense.com) and other vendors in resident's homes. These include bed sensors,



refrigerator/stove sensors and general motion detectors. Currently the HealthSense eNeighbor technology is in place at several of the NewCourtland LIFE and affordable senior housing units and has allowed NewCourtland technicians to be proactive in monitoring care by providing accurate alerts of key activities of daily living. Thirty-three telehealth sensor systems were originally deployed in the affordable senior housing residences. While management found that they could hardly “give away” the first 33 units, they couldn’t get the next 33 quick enough. Demand spread by word of mouth because older adults using the technology felt safer and more connected to their neighbors and their community than they

did without it. The LIFE community also was an early adopter of the technology, with half of the 80 members using telehealth sensors.

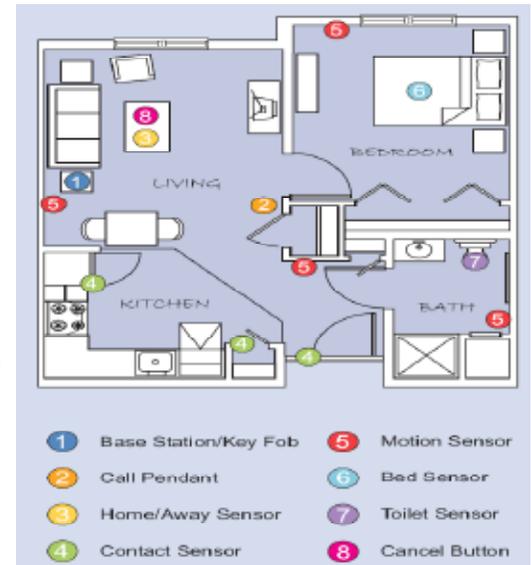
NewCourtland found that the technology enabled them to provide high quality care cost-effectively. While they have not yet formally quantified the cost effectiveness, it has become self-evident over the past two years. Lessons learned include making sure there is a champion at each site (housing community manager, service coordinator, etc.) and seeking the trust of older adults. They found that once residents’ trust is earned, acceptance of the technology quickly grows across the community.

One of the patients, a 77 year old retired pharmacy technician, had lost her leg to diabetes. She moved into the senior housing community because she could no longer maneuver the stairs in her family home. In her apartment, she checks her blood pressure with a cuff that automatically and wirelessly sends the reading to the monitoring center, which notifies her and her doctor of any troubling change. Sensors placed in each room keep track of her movements and ADLs, and she has a button to summon assistance, which she used in April when she fell. In an interview with a major newspaper she stated that “I’m alone but I know I’m not all by myself,” and added, “And I really like my independence.”

Research released by Healthsense and NewCourtland concludes that seniors who rely on remote monitoring technology to help them remain secure and independent adapt well to living with the technology and do not see it as intrusive or impersonal. Conducted by an independent research

consulting firm at four locations within the NewCourtland Network, the study measured the effectiveness of Healthsense's eNeighbor remote monitoring technology and captured the perceptions of residents, family members and staff employing it.

Participants in the survey reported an overwhelmingly positive attitude toward the eNeighbor System. Seniors, some of whom have lived with the technology in their residences for more than two years, unanimously agreed that the system makes them feel safer and more secure while enabling them to live independently for longer. Of those surveyed, only one elderly resident reported a concern about intrusiveness. Staff members interviewed for the study unanimously agreed that the eNeighbor System allows them to better assess the care needed by residents, helps them provide the appropriate level of care, and improves the quality of care overall that residents receive.



NewCourtland's leadership thought that adapting to the technology might be a major issue for their residents, but clearly it was not. Rather, the results of the survey demonstrate that even seniors with little or no prior exposure to this technology can readily adapt to it once they realize the improved quality of life it offers.

Telehealth Biometric Technologies

In October 2006, NewCourtland began implementing biometric tools as an additional enhancement to the sensor program. Biometric devices were deployed to remotely monitor key vitals such as weight, blood pressure and glucose, etc. NewCourtland now is beginning a large demonstration in cooperation with health insurance companies, continuing care retirement communities and other home health agencies, installing biometric monitoring devices in up to 1,000 residences over the next six months. They are partnering with the University of Pennsylvania to conduct evaluative research for the pilot.

Cognitive Fitness

Since June 2008, the Dakim [m]Power system (see section 5.1.2) has been used at NewCourtland LIFE. As discussed above, [m]Power is an electronic cognitive fitness system for older adults. The system employs touch screen technology to display original content with memory-invoking images, movies, music and sounds of the past. NewCourtland has 30 system users and a survey

found a 90 percent user satisfaction rate. Plans now call for implementing the system in its nursing homes, and the new “home module” of the system is being considered for other senior living settings.

Videoconferencing for Hi-Tech Staff Training, Telemedicine and Resident Socialization

With the assistance of grant funding, NewCourtland in 2004 opened a high-tech 41,000 square foot training center equipped with wireless connectivity and wired high-speed video conferencing equipment in all rooms. The training center is part of the provider’s commitment to staff training and technology use. NewCourtland also has outfitted its seven nursing facilities with state of the art video conference rooms. Furthermore, NewCourtland is pilot testing “Upstairs Solutions” (www.upstairssolutions.com), a comprehensive, interactive online web-based training and compliance system for nurses and senior care professionals. It allows for collaborate distance learning and multicasting of NewCourtland events. The videoconferencing technology also has enabled NewCourtland to begin a pilot program with physicians to remotely interact with patients in nursing homes.

NewCourtland has used the teleconferencing equipment in one of its socialization programs, called Comfort & Joy™. In a multi-year project with the Multicultural Youth Exchange (MYX), older residents are paired with local students to create quilts based on their shared life experiences. Each pair crafts a patch of quilt and records thoughts and feelings on their creation via videoconference. Patches from each NewCourtland Network nursing home will be sewn together to create seven different quilts, which in turn will be sewn into one large quilt. A web page also will be created containing a picture of each quilt’s patch and a link to the recorded message from the elder and student artists that stitched it. Plans also are in the works to create quilts via videoconference with other intergenerational groups overseas within the next two years.

5.1.5 VNA of Western Pennsylvania

Based in rural Butler, Pennsylvania, the VNA Family of Services consists of five divisions including VNA, Western Pennsylvania, VNA Hospice, VNA Complete Care, VNA Medical Equipment and Supplies, and VNA HomeTech. Specialized areas within the VNA Family of Services include home health care, hospice, personal care, private duty, health and wellness services, home medical equipment and home telemonitoring. VNA of Western Penn. is another example of a homecare’s early adoption of technology to enhance services to older adults.

Home Telemonitoring:

Since 2002 the VNA of Western Penn. has been utilizing Honeywell's HomMed home telemonitoring technology (www.hommed.com). With the help of a US Department of Agriculture (USDA) grant of \$500,000 over several years, the VNA was able to purchase telemonitoring equipment and create a robust telemonitoring program for its service area. Most of its telemonitoring patients are Medicare Fee-for-Service, while several receive reimbursement through a Medicaid Managed Care insurer, Gateway Health Plan. To date, the VNA has one patient in the PDA 60+ Waiver TeleCare program through the Butler County Area Agency on Aging, but hopes to increase that number significantly over the next couple of years.

On average, 200 of the VNA's patients are getting a check-up every day in their own homes.

With the HomMed system, they are able to gather clinical data regarding trends in individuals' health status. The units are individually programmed for patients according to parameters established by their personal physicians. The VNA's technicians set up the unit and teach the patient how to use it. At the same time



each day, a voice prompt will instruct the patient to take vital signs such as weight, blood pressure, pulse, oxygen saturation and temperature. The voice guides the patient step-by-step through the process of pushing one of three color-coded buttons that enable the system to collect vital signs data. Data is collected each day and transmitted to the VNA where trained staff reviews the results. If any vital signs fall outside of the readings the physician has recommended, the unit will signal clinicians and alert them to the patient's condition. The problem can then be identified and treated before it becomes serious. The VNA also provides physicians with weekly or monthly graphs of each patient's vital signs. These reports allow physicians to see subtle changes in conditions and schedule follow-up office visits accordingly.

The VNA of Western Penn. is careful to inform patients that the telemonitoring system is not meant to replace, but rather to complement visits by the VNA home care professional. The system allows them to monitor how the patient has been doing on a daily basis even if they aren't visiting the home every day. The VNA focused its use of telemonitoring mostly on diagnosis groups such as chronic heart failure, diabetes and COPD, where they have found the greatest reduction in rehospitalization rates because of the technology. They are further focused on preventing hospitalization for those individuals who are in the earlier stages of living with chronic conditions.

Typically, the VNA of Western Penn. phases telemonitoring technology into a person's care plan. When beginning a patient on telemonitoring, the agency will maintain a two or three in-person

visits per week. Once the patient has adjusted to using the equipment and vitals are being read and transmitted accurately, the VNA will typically reduce its in-person visits to one per week but with daily vitals monitoring and frequent phone contact.

The VNA found that telemonitoring for health vitals is a win-win-win for patients, providers and payers. It provides the patient with constant monitoring that offers minimal interference with their daily activities and has proven an effective measure for preventing hospital re-admittance and controlling health care costs. It offers the patient's family peace of mind knowing that their loved one is being closely monitored in the home by health care professionals on a consistent basis. And lastly, it allows primary care nurses and physicians to focus on treating the patient's condition rather than the details of diagnostic testing. In addition, the VNA found that the technology helps patients to directly see the result of their personal decisions and lifestyle actions (e.g., dietary) and empowers them to make more healthy daily lifestyle decisions.

In one example, telemonitoring technology was successfully used with an older man who had been in and out of the hospital two or more times a month for six months. He was bedfast with multiple exacerbations from heart failure. Through the VNA's service model made possible with telemonitoring, this gentleman stayed out of the hospital for a period exceeding six months, when he was discharged from the agency since he was no longer homebound. He reportedly was able to again enjoy his favorite hobby of fishing. In another example, an older man still working in his own company, uses the monitoring equipment every Monday, Wednesday and Friday. If the monitor identifies a problem the VNA will call him. As a result, he is again able to get up every day at six a.m. and work a six to ten hour day, five days a week. He stated in an interview with news media in a story about the technology that "my life is better because of the VNA; they've helped me keep on living."

Medication Compliance and Monitoring



The VNA of Western Penn. also has utilized medication compliance and monitoring systems with its clients, including the MD.2™, Honeywell's MedPartner and most recently the MedReady (www.medreadyinc.com). The VNA believes such devices are an integral part of an in-home care model and plans to incorporate them into its services wherever appropriate. They have found the MedReady device particularly affordable, easy to use and compact.

5.1.6 Provider Record Systems Integration

Some aging services providers integrated point of care (POC) systems, electronic health record systems and pharmacy systems with each other and with other health care providers to improve managing and utilizing key resident health information and provide better quality of care. A few of these are briefly highlighted below.

Integration of Electronic Health Records with Health Care Systems

PHI Retirement and Senior Care Services, based in Dillsburg, Penn. is the parent company of Presbyterian Homes, Inc. and employs 2400 people in 14 communities. PHI is implementing major technology initiatives including a wireless infrastructure, an electronic medication delivery system, an electronic point-of-care system and integrated security and wandering systems. Its philosophy regarding technology has been to avoid the “cutting edge” but stay on the “leading force” of technology adoption.

PHI is on the leading edge of integrating its electronic health records with regional health systems. One initiative in the Lehigh Valley is with Saint Luke’s Health System. PHI now is able to receive the electronic records of up to 700 residents from four hospitals in the health system. It is currently developing its capacity to exchange electronic health records from its long-term care communities to the four hospitals.

In a larger regional initiative, PHI is likely to be the “beta” long-term care participant in the Keystone Health Information Exchange (www.keyhie.org). Led by Geisinger Health System, the KeyHIE™ formed in 2005 and now involves several health systems and physician groups in rural North central Pennsylvania. Under the planned initiative, PHI’s six long-term care communities will be linked to all participating health care facilities and physicians to exchange complete health records information. This will provide the “full continuum” of health care in the regional health information exchange demonstration.

Point of Care Systems Integration with Health Care Providers

Phoebe Ministries, which has 16 communities throughout eastern and central Penn. offering long-term care, short-term rehabilitation, respite care and programs for those with cognitive impairment, is working to take its POC system to the next level. It is currently implementing the PointClickCare electronic medical record-like POC system (www.pointclickcare.com).

PointClickCare allows caregivers to track vital statistics, record care plans and do all recordkeeping on wireless touch-screen tablets or laptop computers.



It also has certain electronic medical record and electronic medication administration record capabilities. Phoebe Ministries is in the process of making sure the system meets the health record information needs of residents' physicians. To do so, Phoebe has partnered with a physician who provides medical care to residents living at its Allentown campus to be closely involved in the implementation rollout of the POC system. Phoebe Ministries also is seeking to tie the PointClickCare system with information from acute care referrals. Its goal is to begin the process of gaining the buy-in of physicians and hospitals with the POC system they are now implementing in order to position themselves to more readily take advantage of the benefits of a full electronic medical system when it becomes available.

Multiple Systems Integration

Wesley Enhanced Living (WEL), an aging services provider based in Southeastern Penn. with seven senior living communities, is actively engaged in integrating technology at several levels.

"We are an information-driven business and we have no information. Essential information is everywhere but not together in one place where we can press a button and get what we need."

– Ken Franiak, CFO, Wesley Enhanced Living

Among its key platforms are AccuNurse by Vocollect Healthcare Systems (<http://healthcare.vocollect.com>), PointClickCare (discussed above), and an external pharmacy system used by Synergy Pharmaceuticals. Ken Franiak, WEL's CFO, when speaking about the need for technology integration in aging services, stated that "we are an information-driven business and

we have no information. Essential information is everywhere but not together in one place where we can press a button and get what we need."

AccuNurse is a voice-driven communications, care management and documentation tool that opens a two-way dialogue between care staff and the resident care plan information. With simple voice requests, staff can hear plan of care details and document activities as they are completed. Providers have found the system to lower operating costs (e.g., higher staffing efficiency) while providing better quality of care. At first WEL leadership found that nurse aides did not want to use the AccuNurse technology and felt it was imposed upon them. Once the purpose and usefulness of the system was better understood and care staff became more comfortable with the system, they found it to be an invaluable tool in providing care to residents.



Wesley Enhanced Living applied what it learned about the importance of seeking care staff buy-in at the outset of technology selection to its search for a robust point of care and electronic records system. In this case, executive staff had one system in mind but gave the choice to care staff who favored PointClickCare.

WEL works diligently with all its technology vendors and partners, including its partner pharmacy network, to efficiently interface its multiple systems with one another. It believes taking the integration approach from the beginning of major system adoption, such as PointClickCare, is crucial to successful integration. WEL's point of care and electronic records system supports the pharmacy system's inventory tracking, eRx orders and posting of charges.

5.2 Public Aging Services Programs

Pennsylvania's network of 52 Area Agencies on Aging (AAAs) is a vital link to aging services for many older Pennsylvanians, particularly low-income seniors. The aging network has been increasingly focused on ways to leverage various technologies to better serve this population and reach more people with limited public resources. As discussed in section 4.1.2 AAAs have been involved in shaping the Commonwealth's Medicaid Waiver TeleCare Program, and will be solely responsible for developing contracts with providers to channel reimbursements for technology use in the program. Also discussed above in section 4.1.3, the network is currently implementing a videoconference equipment and training initiative.

In recent years the state Department of Aging changed its electronic care planning and assessment system to a new in-house web-based interface named "Agenet" for the Social Assistance Management System (SAMS) (www.harmonyis.com). Care managers at AAAs use laptops to conduct electronic consumer needs assessments in the field.

Many AAAs have been involved in planning or implementing various aging services technology initiatives, some of which are highlighted in a few examples below.

5.2.1 Allegheny County Area Agency on Aging

The Allegheny County Area Agency on Aging, based in Pittsburgh, is a proactive advocate for incorporating technology into care for older adults. While the agency to date has mostly provided only those technology-enabled services that have been reimbursed through the prior Aging Waiver, including personal emergency response systems (PERS) and medication dispensers (see table below), it is preparing to move ahead with the broader array of aging services technologies to be reimbursed in the new Medicaid Waiver TeleCare program as well as with the use of discretionary funds for telehealth technology.

Allegheny County leadership asserted that several operational challenges with the draft Medicaid TeleCare policy are being addressed in the revised policy in the new waiver. They believe there are two possible reasons why aging services technologies have not yet experienced greater growth with its target population: there seems to be greater resistance or less receptivity to these technologies by lower-income older adults; and the area's housing stock is among the oldest

in the nation which presents certain technical challenges. To overcome these challenges they emphasize the need for thorough training of staff and consumers. For staff and provider training they believe it will be important to demonstrate how the various technologies can be used in the home. While there will be a learning curve, the agency does not anticipate significant barriers. In terms of consumer orientation and training, the agency anticipates it will need to monitor the comfort of consumers very closely and gradually change the work flow (number of visits) according to consumers' level of comfort with the technology and the new model of care.

Allegheny County AAA TeleCare Activities (prior to new expanded TeleCare reimbursement program)			
Program	Service Delivery June 2008 (Unduplicated consumers)	Service Delivery FY 07 – 08	Annual Cost FY 07 – 08
Options Program (non Medicaid)			
Options PERS monthly monitoring fee	528	715	\$154,345
Medicaid Waiver Program			
Waiver Program PERS monthly monitoring fee	653	854	\$194,393
Medication Set-up by Pharmacist (Service cost is only for monthly medication dispenser)	46	60	\$ 20,765
Med Dispenser Home Health–LPN*	30	-	\$ 46,644
Med Dispenser Home Health–RN* Skilled Nursing	5	-	\$ 8,316
Total costs			\$424,463
<i>*Most RN and LPN prescription visits involve multiple services and are not solely made for the purpose of filling med dispenser. For example, checking vital signs or changing a dressing could also be included.</i>			

Four-Year Agency Plan Focused on Aging Services Technologies

One of Allegheny County's five goals detailed in its recent four-year plan is to implement assistive technology and telecare services in support of in-home services. This is an excellent example of how a public aging services program can be intentional about incorporating the use of technology into its regular process of providing care management and into its expectations for care providers.

The first objective of this goal is to make current and emerging technologies available to consumers by developing and implementing an ongoing cost-benefit and evaluation process based on objective factors such as equipment, training, personnel and alternative placement costs, and subjective factors such as consumer input. Its strategies to accomplish this objective are:

- Create a technology team including AAA staff, providers, community experts and consumers to advance and evaluate implementing assistive and telecare technology resources. Coordinate with the Carnegie Mellon University and University of Pittsburgh Quality of Life Center, and the Telerehabilitation Research Center at the University of Pittsburgh.
- Correlate technologies to service areas including health status measuring and monitoring, activity and sensor monitoring, and personal emergency systems.
- Adjust utilization of assistive and telecare technology systems based on their effectiveness in maintaining quality of life and safe consumer independence.

The second strategic objective set forth by the agency is to establish a strong network of providers to fully implement these innovative services so that they will complement traditional home care services. To accomplish this objective the agency plans to identify and put in place providers with the resources and expertise to effectively provide assistive technology and telecare services to consumers.

Allegheny County's third strategic objective is to educate AAA and provider staff, especially care managers and nurses, to fully understand the potential and applications of assistive and telecare technologies used to support consumers seeking to remain independent. To accomplish this, the agency plans to train staff and develop implementation guidelines for assistive technology and telecare services including the specific criteria for appropriate consumer utilization.

The outcomes the agency is seeking from these strategic actions are:

- Consumers will have access to appropriate assistive telecare technology services to help sustain and promote their independence, and facilitate early identification and intervention regarding health problems.
- Use of assistive and telecare technology services will conserve personal resources of consumers in helping them to maintain their quality of life.
- New assistive and telecare technologies will continue to be developed and made available for consumer use.

5.2.2 Bradford, Sullivan, Susquehanna and Tioga Area Agency on Aging

While the B/S/S/T AAA has been involved in exploring technologies on a variety of levels, what most stands out is its role as a beta site for the Pennsylvania Department of Aging (PDA) virtual care management pilot program dubbed “PDAVirtual” (see section 4.1.8). The B/S/S/T AAA reports it is facing a sharp rise in demand for its services while funding has seen only had modest increases. According to projections developed by the PDA, the number of adults age 85 and older in the B/S/S/T AAA four-county service area grew from 2,949 in 2000 to 3,534 in 2006, a 20 percent increase.

As part of the “PDAVirtual” pilot project funded by the state, five affordable housing and/or senior center locations in the towns of Sayre, Dushore, Westfield, Mansfield and Lanesboro will soon become sites where senior citizens will be able to use high-tech equipment to interact with social workers and be connected to the services they need. The Sayre location will be at Keystone Manor, an affordable housing community owned by the Pennsylvania Housing Authority. The Westfield, Lansboro and Dushore locations are all affordable senior housing communities and senior centers.

Using technology and a service package by AgeServe Communications (www.familyvirtualvisits.com) including flat-screen television sets, Internet-controlled computers, and echo-canceling microphones, camcorders and speakers, older adults will be able to apply for medical assistance, PACE, property tax rebates (and other entitlement programs) with the help of the AAA’s social workers from four office locations in Towanda, Montrose, Laporte and Wellsboro. The virtual visits will reduce travel time by both social workers and older adults, because they will not have to travel to see each other, and will save on gas costs.

The same technology will allow older adults attending the centers to visit with family members for free. Participating family members need access to basic technology including a personal computer, a high-speed Internet connection, a web cam, and a microphone to have a virtual visit. Visits can be scheduled online and the older adult will only need to be present at the scheduled time and the technology will automatically turn on.

B/S/S/T AAA leadership plans to install the technology at other locations, if positive consumer results are forthcoming from the first five locations and if funding is available. The agency is also working with North Penn Legal Services to conduct video senior legal counseling services through the virtual centers.

5.2.3 Clearfield County Area Agency on Aging

Clearfield County AAA is a very rural agency in central Pennsylvania. As such, effective use and proliferation of aging services technologies offers tremendous value to isolated older adults in rural areas and permits them to remain safely in their homes. In its recent four-year plan, the agency states that technology is a “necessity” and declares its intent to “use technology to its fullest.” The agency was among the first AAAs to take advantage of the state’s Medicaid waiver TeleCare demonstration program.

Clearfield played a key role in beta testing the Department’s new centralized web-based assessment and care management system. Staff training on specific, appropriate job components led to acceptance by staff and was considered successful. A key feature is the “always on” functionality for the adult protective service program that operates 24/7. On-call staff can pull up a client’s care management records and triage the care need to appropriate service providers. Clearfield County also is one of the few AAAs to use the BeaconIR electronic information and referral system (www.synergysw.com) and hopes to upgrade to the BeaconWeb web-based system for 24/7 capability.

The agency began utilizing the new Medicaid waiver TeleCare program in April 2008 year using QuiteCare (www.quietcare.com), and currently has four consumer homes outfitted with the motion sensor telemonitoring system. Alerts regarding abnormalities in ADLs typically go first to the AAA-contracted provider agency but also to the AAA care management staff. The Agency has set protocols for response time by providers, uniquely determined for each individual older consumer. Depending on an older adult’s support network, family may be the first contact, then care providers.

The Clearfield AAA has not yet begun using vital signs monitoring tools, but is presently examining opportunities and intends to skip pilot testing and proceed with full adoption as appropriate for its consumers’ needs. The agency feels it is not a question of if the technology works or has benefit, but rather is a matter of “hitting a stride with it,” or learning in which care environments it works the best to meet consumers’ needs and where it is not as effective. Clearfield has been using medication management for a couple of years through the Medicaid waiver. While it has found the technology benefits many consumers, it also found that it does not work for everyone (i.e., those who are not cognitively able to respond to the automated cues).

6. UNIVERSITY AGING SERVICES TECHNOLOGY RESEARCH INITIATIVES AND PROVIDER PARTNERSHIPS

The work of research universities is critical to assessing the state of technology of aging services in Pennsylvania. CAST believes that robust research in partnership with aging services providers in a “living test bed” approach is crucial to effective proliferation of these technologies. Pennsylvania clearly has that kind of research community as discussed below.

6.1 Carnegie Mellon and University of Pittsburgh Quality of Life Technology Center

Very much in line with the CAST “Center of Excellence” model, the Quality of Life Technology (QoLT) Center (www.qolt.org), a partnership between Carnegie Mellon University (CMU) and the University of Pittsburgh, is a National Science Foundation Engineering Research Center (ERC). Its mission is to transform the lives of people with reduced functional capabilities due to aging or disability. The QoLT brings together a cross-disciplinary team of technologists, clinicians, aging services providers, industry partners, end users (i.e., older adults), and other stakeholders to create revolutionary technologies that improve and sustain the quality of life for all people. Its four primary goals are to:



In the CareMedia project, QoLT is developing machine perception for tracking individuals and measuring activities of daily living

- Enable people who are aging and persons with disabilities to independently participate in the community
- Assist professional and informal caregivers
- Delay or prevent the manifestation of functional impairment
- Empower all people to contribute to society and the economy

The Center believes that by integrating information technologies and biomedical innovations, the resulting systems allow people to independently perform valued and necessary activities of daily living so that they can more fully participate in society. Future compassionate and intelligent QoLT systems ranging from individual devices to technology-rich environments will monitor and communicate with people, understand their needs and provide safe, reliable and welcome assistance by compensating or substituting for diminished natural human capabilities. Technologies developed by the QoLT Center are aimed at enabling people to live more independently, pursue individual goals and more fully participate in society.

Research Partnerships with Aging Services Providers

QoLT is combining sensing, perception, robotics, machine learning, communications and miniaturization technologies with advances in rehabilitation and geriatrics to develop new capabilities that improve lives. Most importantly, the Center is creating a new scientific and engineering knowledge base that enables systematic development of human-centered intelligent systems. To do so, the QoLT pairs its knowledge resources in robotics, rehabilitation engineering and related clinical areas with real-world testbed provider partners including independent living programs, nursing homes, vocational rehabilitation centers and other living environments. As mentioned above (see section 5.2.1) the Allegheny County Area Agency on Aging is actively planning a collaboration with the QoLT to be the research partner on its technology team including AAA staff, providers, community experts and consumers to advance and evaluate the implementation of assistive and telecare technology resources. Another provider partnership is with the Community Life - Living Independently for Elders, a PACE Program in Western Penn.. The QoLT will work with the Life program to introduce and evaluate emerging technologies for those living independently but receiving remote services (e.g., Medicare/Medicaid) as an alternative to nursing home care.

Through these partnerships, the QoLT works to examine the impact of quality of life technologies on individuals, healthcare enterprises and society as a whole.

Education

The Center's education goal is to facilitate a growing community of engineers, scientists, practitioners and consumers who are intellectually prepared and motivated to create, assess and apply technology that benefits people with disabilities and older adults. Its education activities target the full spectrum of population groups: K-12, undergraduate, graduate, postgraduate, industry, end-users and the general public. QoLT participates in and produces workshops and conferences on QoLT-related themes for a wide audience, particularly prospective end users and support providers. These activities serve to increase awareness of quality of life technologies among those stakeholders and to inform its research about their needs and requirements.



The Nursebot, evaluated with the help of partner Presbyterian SeniorCare, is a prototype personal robot assistant

Technology Partnerships

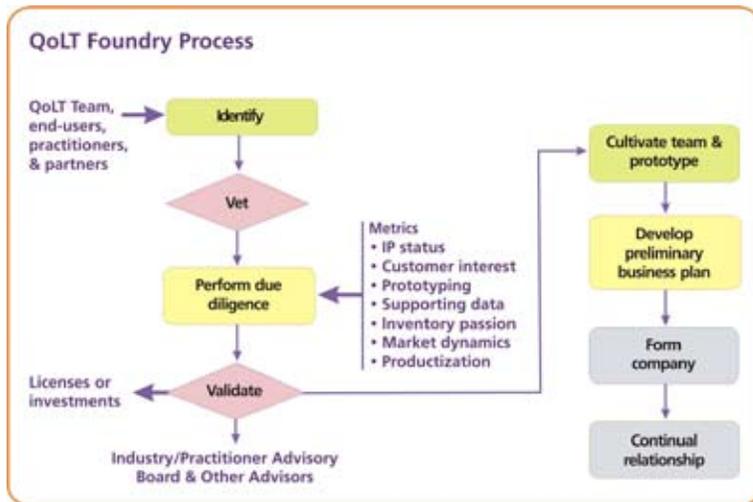


With partner Blueroof Technologies, QoLT is creating intelligent homes and neighborhoods that support independent living

The QoLT also has formed a consortium of technology companies who share its vision of technology enabling older adults and people with disabilities. Current members are engaged in assistive technology, medical goods and devices, information technology, robotics, consumer electronics and appliances, health care products, and health services. The QoLT Center is a vehicle for corporate interaction both across and within those markets, providing opportunities for companies to share information while protecting confidentiality. Consortium members actively participate in the center, helping shape both the long and near-term research agendas. They enjoy facilitated access to the Center's faculty, students, test sites and end-users. Through unique licensing programs, members at higher grades can quickly translate the center's research results into practice.

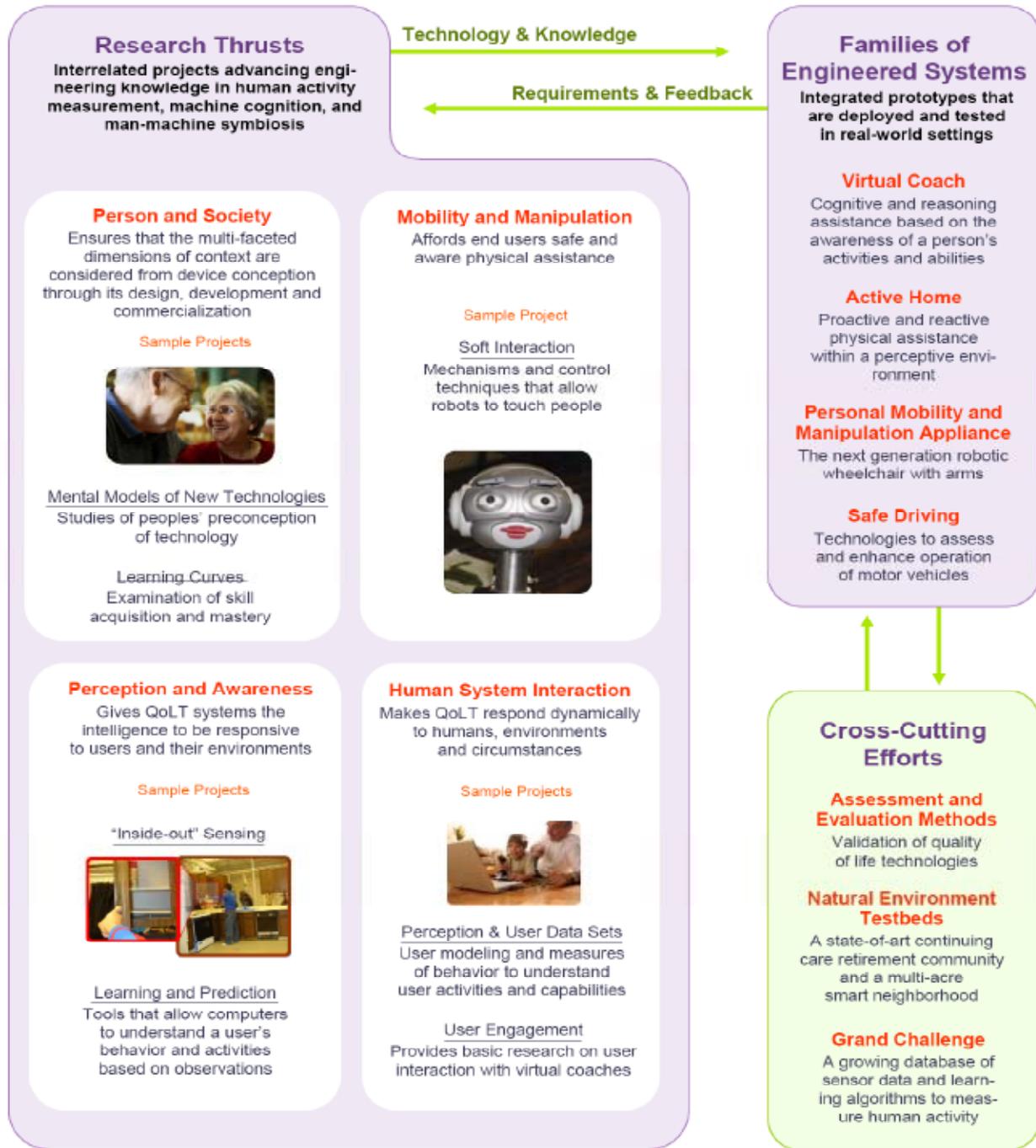
QoLT Foundry – Commercialization and Start-Up Companies for ASTs

With a grant from the Benedum Foundation and initial financial support of CMU's Vice President for Research, the "QoLT Foundry" was established in March 2008 as a pilot program to accelerate



the *commercialization* of research projects associated with QoLT and to advance the proliferation of aging services technologies and technology companies. The Foundry is led by an executive-in-residence with experience as a founder of a technology start-up and has held management roles in the medical device industry. Students in the MBA, law, engineering technology innovation, healthcare policy, and biotechnology management programs at Carnegie Mellon and the University of Pittsburgh assist him.

The first objective is to rigorously qualify new product concepts in terms of their genuine market potential. This process will take several factors into account. Technical feasibility and development time will be assessed by groups of researchers with aggregate expertise in the requisite technologies; market potential, size and availability of



Carnegie Mellon and University of Pittsburgh Quality of Life Technology Center's Illustrated Research Model

competing products will be gauged by partner service providers; and time-to-market will be estimated by business experts including the Industrial Advisory Board and other key opinion leaders. The product concepts will be put through due diligence: intellectual property evaluation and market analysis, price point analysis and preliminary business model development. Then the projects are evaluated by an advisory group comprised of executives in industry, investors and representatives of local technology-based economic development organizations. The foundry will work with each Center to identify and create an Industrial and Practitioner Advisory Board (IPAB) and other Key Opinion Leaders.

The purpose of the screening phases described above is to evaluate opportunities to create start-up companies. The QoLT Foundry's second objective is to *form companies that actually pursue the identified opportunities*. The challenges of that step will be dramatically reduced by the visibility and transparency of this program to the technologists, entrepreneurs and economic developers who actively participate in the program, as well as others in the community, all of whom will share firsthand knowledge of these qualified business opportunities. The QoLT Foundry team will reach out to them to match people with products.

The Foundry has established working relationships with regional entrepreneurs, investors and technology-based economic development organizations that provide capital and seed funding, business expertise, and other vital resources to start-up companies. In June 2008, several QoLT near-term commercialization opportunities were presented to a group of more than 30 organizations.

The QoLT Foundry will facilitate the commercialization process by providing support through business plan creation, prototype development, establishing strategic relationships, building qualified and experienced management teams, and obtaining seed monies. Currently in progress are spin-off companies based on QoLT virtual coaches and perception/awareness technologies.

Initiatives with the University of Pittsburgh Medical Center (UPMC)

QoLT is closely associated with the \$7.3 billion UPMC Health System as part of its commitment to partnering with health care and home and community based service delivery systems. The UPMC Health System is one of the largest academically affiliated medical centers in the world, with its network of 19 integrated hospitals and major clinics, and 400 outpatient sites and doctor's offices. Furthermore, the UPMC Health system initiated a 10 year agreement in 2002 with Highmark Inc. the region's largest commercial insurer and is itself a commercial insurer with over 400,000 members. UPMC has one of the most sophisticated electronic records and data management systems of any healthcare system in the world and currently has a \$400 million eight-year agreement with IBM for information technology infrastructure to enhance innovation and adaptability.

The impending agewave of older adults inspired the UPMC Health System to establish or acquire 17 free standing retirement and long-term care facilities caring for approximately 40,000 people. Several QoLT researchers have established research collaborations with UPMC's long-term care communities and community-based programs.

UPMC is exploring a number of approaches to use telehealth in the care of older adults. UPMC Senior Living, together with the Pitt School of Nursing, Pitt/UPMC Institute on Aging and the Rand Corporation, is piloting the use of telemedicine kiosks in high rise apartment buildings occupied primarily by low-income seniors. The initial implementation uses Viterion 100 telehealth stations (www.viterion.com) with blood pressure and body weight peripherals. With one-touch implementation and voice prompts, the Viterion 100 TeleHealth Monitor guides the patient through its functions including measuring blood pressure, blood oxygen, blood sugar, weight, temperature and peak flow (lung capacity).



Since the beginning of the pilot, participation has increased from eight percent to nearly 40 percent of the residents. UPMC also is using telemedicine to manage congestive heart failure patients.

In UPMC-managed skilled nursing facilities, new informatics techniques are being developed and applied to predict adverse events such as adverse drug reactions and interactions. Currently the system taps pharmacy and laboratory data with clinical event monitors: software that generates alerts in response to detected conditions. Furthermore, a process is underway to extend the system to help detect and signal elevated risk of falling.

6.2 University of Pennsylvania

The University of Pennsylvania (UPenn) School of Nursing has been a leader in research, testing and evaluation of technologies to serve older adults, primarily in telehealth. Among colleges of nursing, Penn Nursing consistently ranks near the top of those receiving funding from the National Institutes of Health (NIH), enabling Penn researchers to affect the course of illness throughout the lifespan, promote health and increase disease prevention, enhance the quality of life, eliminate health disparities, and set direction for end-of-life care. To do so, faculty members have adopted and adapted new technologies, including telehomecare. In several of its evaluative research initiatives, UPenn has partnered with the Penn State University Department of Health Policy and Administration and with several aging services providers, mostly home care.

For example, from 1998 to 2000, UPenn researchers and clinicians from the Visiting Nurse Association of Greater Philadelphia (VNA) developed expertise in telehomecare through several research projects conducted at the VNA. The first project was sponsored by the Department of



Commerce's Telecommunication Information Infrastructure Assistance Program now known as the [Technology Opportunities Program](#). This project, led by a Penn State University researcher, studied the use of telehomecare with elderly diabetics. UPenn provided the clinical coordination for the project and went on to lead two additional pilot projects to expand the use of the technology to congestive heart failure patients and to test the effectiveness and efficiency of a variety of treatment patterns for elderly homebound patients requiring frequent monitoring of their chronic conditions.

UPenn has utilized several different devices for its telehomecare research and pilot studies,



including HomMed (www.hommed.com) (see section 5.1.5),

AmericanTelecare (www.americantelecare.com) and CareMatrix (www.carematrix.com).

It is currently piloting the CareMatrix system. The core product is a wireless monitoring system for vitals like blood pressure, pulse, temperature, weight, etc. The system consists of RF enabled devices that communicate with a hub located somewhere in the home. The hub interfaces wirelessly with multiple peripherals to guide patients through seamless vital sign

retrieval. Once the hub receives the reading, it is pushed via a phone/PC to the Internet server where it is added to the users chart. The user or care giver can now track the relevant data, graph it, monitor trends, annotate it for variances, set alert criteria and receive alerts. Users or caregivers can easily monitor the basic wellness parameters like blood pressure, pulse, temperature, weight and sugar level.

Continuing with the theme to use IT to improve the care of older adults, UPenn utilized its telehealth equipment in a project with chronic heart failure (CHF) patients in a partnership with Penn Home Care & Hospice, a University of Pennsylvania homecare agency and funding from the NIH. They are currently in their fourth year of clinical trials with older adults who have been recently discharged from the hospital. Four video interactions are required to count as one episode of homecare. To date, 160 patients are enrolled in the program. Enrollments will continue as appropriate until July, 2009. UPenn has seen a significant reduction in hospital and emergency room use for participants as well as an increase in consumer knowledge and awareness of how to manage their chronic health conditions. However, trying to make cost effective change patterns of home care has proved very challenging.

In a study funded by the Center for Disease Control (CDC) and in collaboration with the Pennsylvania Homecare Association, UPenn sought to test evidence-based practice guidelines for homecare agencies using telehealth for chronic disease management service to older adults with

CHF or diabetes. 303 older adults participated in the study. UPenn conducted an incremental-intervention analysis, comparing standard homecare services to homecare with phone follow-up and to homecare with telehealth follow-up.

UPenn researchers went to the various homecare agencies and taught nurses when/how to use telehealth equipment according to the guidelines. Because the guidelines required regular contact with participant's practitioners, the researchers found that communication was a major impediment to smooth implementation. Nurses had to relay messages to physicians through office staff, which was often a very inefficient process. This revealed just how helpful an electronic record and electronic transmission of the record from home health nurses to physicians and visa versa would be, rather than playing medical phone tag.



Nurse monitoring a patient's progress at the central station

Due to the highly managed nature of the participants selected for the study, researchers were unable to find a significant reduction in re-hospitalization rates due to the use of telehealth. Existing re-hospitalization rates for the study group was low, at 17 percent. However, in another study of CHF patients served by 10 different home care agencies, UPenn researchers found significant reduction in re-hospitalization and an increase in consumer confidence from the use of both video and non-video telehealth services.

Beginning late this year, UPenn will be partnering with NewCourtland Elder Services (*see section 5.1.4*) on an evaluation of a large telehealth and telemonitoring pilot with up to 1000 older adult participants. The study will begin with evaluating the health and quality of life benefits of telehealth biometric technology, and potentially to include the use of activity/wellness monitoring. As discussed above, the project also will involve physician groups and is likely to involve insurance agencies.

In a large electronic health records pilot project funded by Medicare, UPenn will conduct a study of the impact on health outcomes by using standardized language in electronic records for 200 patients insured by Aetna Insurance in Pennsylvania, 200 insured by Blue Cross in Penn. and 300 patients insured by Kaiser Permanente in California. The pilot will seek to standardize the terminology used by nurses to describe the care they provide as well as patients' conditions.

Finally, UPenn is currently developing research on the use of a common mass-market device, the iPhone, together with telehealth biometric tools for cancer patients at the Memorial Sloan-Kettering Cancer Center in New York City. One reason for the pilot is to find a better care management model to avoid unnecessary and frustrating appointments for patients. For example, when cancer patients go to the hospital for their chemotherapy appointment, sometimes they



learn that they are unable to go ahead with their treatment because of insufficient blood cell counts. In the study, care providers will use the iPhone and telehealth devices to monitor patients' health at home.

Overall, as a result of changes in the reimbursement structure from per visit to episodic reimbursement, UPenn researchers believe that the financial benefits of telehealth will continue to ensure its growth, particularly with the current nursing shortage. They also see a great value of the technology is that by using the telehealth equipment, patients take more responsibility for their care and learn to understand their health vitals. In addition, nurses can see more patients in a day, some studies report as many as 20 per day using telehomecare versus only four-six traditional in-person home visits. The savings in nurse time, travel, and prevention of hospitalizations; along with closer monitoring, all add up to equal or better outcomes at less cost.

7. AGING SERVICES TECHNOLOGY RESOURCES IN PENNSYLVANIA

The following is a brief highlight of resources for providers, consumers and technology companies.

7.1 PA Medicaid Waiver TeleCare Program

As discussed above in section 4.1.6, the Pennsylvania government-funded TeleCare program is among the only and most thorough public aging services technology reimbursement programs in the nation. By partnering with home care organizations, technology companies and durable medical equipment providers or becoming a certified home health agency in Penn., aging services providers have a unique opportunity to fulfill their missions to serve all older adults, including those with limited means. By taking advantage of this ground-breaking public program, providers can offer the care enhancements afforded by technology to persons who are low-income and with significant care needs that have heretofore been largely unable to realize the benefits of technology. To participate, providers must contact their local Area Agency on Aging and develop a provider contract agreement.

7.2 HUD Financing for Technologies in Affordable Senior Housing

HUD Neighborhood Networks funding is available for select aging services technologies in affordable senior housing communities on a case-by-case basis. This program, created in 1995, was originally focused only on installing computer labs in congregate HUD and Federal Housing Administration (FHA)-insured and assisted communities. The program has now begun to reimburse providers for installation costs and monthly fees of video-interaction technology, such as Family Virtual Visits (FVV) and similar technologies (see section 5.2.2).

www.hud.gov/offices/hsg/mfh/nnw/nnwaboutnn.cfm

Schwenkfeld Manor, a nonprofit aging services provider in Southeastern Penn., operates a total of 225 units across three HUD-subsidized senior properties. It was the first provider to pioneer reimbursement for using the FVV technology through the HUD Neighborhood Networks program. HUD believes this type of technology fits well with the program's purpose to promote self-sufficiency and provide technology access to residents. Older residents currently use the technology to visit with friends and family around the world, which has become very popular.

Furthermore, as discussed above, this kind of technology also can be used to provide "virtual care management" or other services such as senior legal services, mental health services, and service coordination. In fact, HUD also will pair the reimbursement of the technology and monthly service fees with its service coordinator program reimbursement. Many small affordable senior housing communities are too small to be able to afford a full-time social service coordinator. HUD will provide service coordination reimbursement of \$15 per resident per month that could be provided to owners of several communities. This amount, when pooled together can be used to hire a service coordinator to serve the communities virtually through the video technology.

HUD's Neighborhood Networks website also lists many private organizations who have funding available to help centers develop and improve programs and services.

<http://www.hud.gov/offices/hsg/mfh/nnw/fundingopps/midatlantic.cfm>

7.3 Economic Development Programs for Aging Services Technology Companies in PA

The Pittsburgh Life Sciences Greenhouse (PLSG) is a public/private partnership that invests in and supports the growth of biosciences companies in western Pennsylvania. The PLSG has investment and business growth programs targeted at both local start-ups and relocated businesses. Since its inception in 2001, PLSG has focused on biotechnology tools, diagnostics, healthcare IT, medical devices, and therapeutics. It has made \$12 million in direct investments in 50 companies in those areas, resulting in over \$375 million of additional fundraising.

PLSG support of the aging services technology sector includes a seed grant to Carnegie Mellon and the University of Pittsburgh for Quality of Life Technology and support of two start-up companies, CartesiaDx and Syncrate LLC. The greenhouse is incubating companies with products aimed at chronic diseases that are most prevalent in older adults, including Parkinson's and Alzheimer's.

Pennsylvania's Ben Franklin Technology Partners (BFTP) is somewhat analogous to PLSG, operating four centers across the Commonwealth that provide seed capital and management support services to technology-based start-up companies. Though it also supports some life sciences, its portfolio is predominantly electronics, robotics software, and other IT. A third state-wide program is the

Technology Collaborative (TTC). Both BFTP and TTC are investing in companies in the eldercare space.

www.pittsburghlifesciences.com

www.benfranklin.org

www.techcollaborative.org

7.4 Grants and Financing for Consumers' Purchase of Aging Services Technologies

The **Pennsylvania Assistive Technology Foundation (PATF)** is a non-profit organization that provides low-interest loans and grants to people with disabilities and older adults so that they can buy the assistive technology devices and services they need. Assistive technology, or “AT,” is defined as any device that helps a person with a disability achieve a more independent and productive life. *Assistive technology services* are those services that help with the selection, acquisition or use of an assistive technology device. Services may include evaluating the needs of an older adult or person with a disability, training to use a particular device, maintaining and repairing a device, designing and building a device, or providing technical assistance for family members, personal care attendants or employers. Many people with disabilities and older Pennsylvanians need to make modifications to their homes or buy some equipment, including the full range of aging services technologies (telehealth biometric and activity/wellness monitoring, cognitive fitness, safe lighting technologies, etc.) but cannot afford it.

PATF provides people with low-interest loans, or in some cases grants, so people can afford these devices and services that will help improve the quality of their lives. PATF has two loan programs, one for loan amounts up to \$1,000; and a second for loan amounts greater than \$1,000. PATF may be able to offer a *mini-grant* of up to 50% of the loan request *if* the borrower meets the grant eligibility guidelines. Guidelines include the requirement that the borrower must exhaust all other funding options, and must have a *household* income that is no greater than 150% of the federal poverty guidelines.

Perhaps equally as valuable as the loan and grant programs is the assistance that PATF provides to individuals to find any and all available state and private resources to help them achieve the technology needs and goals to remain independent in their homes. For example, PATF will assist older adults in knowing about the new Pennsylvania TeleCare program if they are Medicaid eligible, or work with other state departments and programs to find applicable resources. They also are familiar with what insurers will and will not cover and will help individuals find eligible reimbursements. PATF is happy to collaborate with aging services providers as well, but is designed to provide assistance directly to consumers.

www.patf.org

8. CALL FOR ACTION

The state of technology in aging services in Pennsylvania is significantly further advanced than in many states. Therefore, an appropriate call to action is one that petitions providers to seize a plethora of opportunities, encourages government to “stay the course” in fleshing out and ramping up a robust Medicaid Telecare program, challenges long-term care insurers to step up to provide reimbursement similar to what the state has done, and urges technology companies to continue seeking interoperability of its technology solutions with others. CAST can serve as a facilitator and change advocate in this process with the various parties involved. Among other efforts, CAST will support PANPHA in holding an aging services technology demonstration in the state capitol to educate state policy makers on available technology and potential benefits.

8.1 Aging Services Providers

Providers are called to take advantage of opportunities, both public and private, to incorporate technology-enabled services as demonstrated by early adopters above. Others already have charted the newest ground, now is the time to engage and fully adopt aging services technologies into your care models.

Providers should pursue resources to plan and execute additional outcome-oriented field pilots and large-scale demonstration projects. This is paramount in showing how technology can improve quality of care, consumer satisfaction and well being, staff efficiency, etc., with various populations of older adults in different care settings. Such findings can lead the way for insurers to change traditional reimbursement policies and program structures to achieve these mutual goals.

Early adopters should raise awareness among policy makers about “best practices” of how providers have made strategic investments in technology to improve care as well as what remaining barriers they face to achieve sustained business models and broad deployment of aging services technologies. Critical to success is the need to address organizational integration and adopt new work-flow strategies, develop innovative business models to sustain operations, and provide technical support personnel to manage new processes. Private aging services providers who are primarily funded by private-pay consumers are uniquely positioned to modify operating practices and service delivery because they are not dependent upon government or other payer sources.

Providers also should commit executive staff resources to pursue possible opportunities and resources such as those outlined above. For example, providers could seek participation in the state’s Medicaid Telecare program as a way of fulfilling their missions to serve older adults in need.

Finally, providers should advocate for and be proactive collaborators to ensure that long-term care settings are included in HIT legislation and state-wide programs including planning and implementation grants, such as in SB 8 discussed in Section 4.2 above.

8.2 Government and Private Payers

The Commonwealth of Pennsylvania has “stepped up” to the plate in a big way. CAST commends the departments of Aging, Public Welfare and the Office of Long-term Living for being among the very first states in the nation to put forward a thorough Medicaid reimbursement program for aging services technologies in its TeleCare program (see section 4.1.2). It takes a great deal of foresight to be on the leading edge of Medicaid policy, especially in a relatively uncharted public-funding domain such as telecare. The state is encouraged to keep its commitment to maintain the independence of older Pennsylvanians to the greatest extent possible with technology as it ramps up a robust Medicaid telecare program.

Legislators are urged to specifically include long-term care settings in HIT legislation, including planning and implementation grants, such as in SB 8 discussed in Section 4.2 above. The cost-effectiveness potential for HIT is especially high for the older population due to interaction with and transition between multiple providers and settings in the health care continuum, including long-term care providers.

Private health plans are a critical participant in this call for action. Because of their ability to tailor a package of services to meet the needs of consumers within a certain amount of reimbursement (e.g., capitated payment), they are uniquely positioned to change traditional service and payment models. Gateway Health Plan is one of the very few health plans in Pennsylvania that provides reimbursement for telecare services to home care agencies for its participants with chronic heart failure. Insurance companies, including long-term care insurers, are urged to “step up” to provide reimbursement similar to what the state has done.

Health plans also should seek partnerships with aging services providers and technology companies to further quantify the value of technology-enabled care and demonstrate economic and non-economic benefits for their plan’s benefit populations. Because the care needs of the plans’ beneficiaries are often comparable to those of public fee-for-service program consumers, the state’s experience through the TeleCare program could be especially informative for insurers.

8.3 Technology Companies

Technology companies are urged to continue to enhance the technical capabilities of their technologies to realize the technology-enabled care vision. Important steps include achieving interconnectivity between different and disparate clinical information technology systems, which

is needed to guarantee completeness and continuity of information between the home and long-term care settings and assuring continuity of care. Technology companies may wish to craft a common standard of practice to provide adequate technical support to ensure that emerging tools are dependable for consumers and care providers for on-going service operations. Companies also should address acceptance and usability of technology by end-users. This might be achieved by taking a systematic approach to research and development that involves the participation of seniors, caregivers and providers in the products' design and development cycle.³

9. CONCLUSION

The state of technology in aging services in Pennsylvania is strong. This strength is due to an innovative government “TeleCare” reimbursement program, the leadership of home care agencies in adopting telehealth and related technologies, robust research and development work by universities, and a host of “early adopter” aging services organizations who are enthusiastically taking advantage of technology in every aspect of what they do.

By focusing on the common goal of providing effective and efficient care for older adults, more interests can align, including those of insurers. Through this process, new ideas will emerge and additional opportunities to harness the value of technology can be found. Further successes will require all parties involved to take action. CAST can be both a catalyst and bridge to help bring about this change.

³ Alwan and Nobel, CAST “State of Technology in Aging Services According to Field Experts and Thought Leaders” February, 2008.

ABOUT CAST

The Center for Aging Services Technologies (CAST) is leading the charge to expedite the development, evaluation and adoption of emerging technologies that will transform the aging experience.

CAST four focus areas:

- 1. Driving a global vision of how technologies can improve the quality of life for seniors while reducing health care costs;**
- 2. Accelerating technology research and development through pilot evaluations with seniors;**
- 3. Advocating to remove barriers to the rapid commercialization of proven solutions; and**
- 4. Promoting dialogue about standards to ensure interoperability and widespread access to aging-services technologies.**

CAST is now an international coalition of more than 400 technology companies, aging-services organizations, businesses, research universities and government representatives working together under the auspices of the American Association of Homes and Services for the Aging (www.aahsa.org). The members of AAHSA help millions of individuals and their families every day through mission-driven, not-for-profit organizations dedicated to providing the services that people need, when they need them, in the place they call home.

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