

Global Agenda Council on Ageing

Technological Innovations for Health and Wealth for an Ageing Global Population



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Executive Summary

Remarkable gains in life expectancy and declines in fertility have led to an ageing global population. Life expectancy has increased to 70 years or more in many countries, and it is expected that children under the age of five will be outnumbered by individuals aged 60 or more by 2020. While the ageing of the global population presents both obstacles and opportunities, it is clear that adaptation to these changing circumstances will be required.

The ability to maintain a purposeful life in older age is influenced by health and wealth. Investment in physical and mental health and financial well-being during younger and middle years can enhance quality of life and prosperity in later years. Employers and governments may also supplement individual efforts to generate health and economic dividends.

The World Economic Forum contends that the world is at the cusp of the Fourth Industrial Revolution. Building on advances in mechanical and mass production, and the computer and digital revolutions, the Fourth Industrial Revolution will promote health and wealth among older adults through the use of sophisticated technologies. Wearables, connected devices, robotics and artificial intelligence will advance social connectivity and emotional health, cognitive ability and physical functioning.

Financial services organizations, including banks and insurance companies, are uniquely positioned to capitalize on technological advances in health and wealth among older adults. Bankers are introducing age-friendly banking services by leveraging advanced technologies, and are viewing demographic changes as opportunities for customers and investors. Insurers are incorporating technologies that promote physical and cognitive health into their offerings to promote well-being among policyholders. This is only the start of adaptations by the corporate world to the demands of an ageing population.

Global Agenda Council on Ageing: Executive Briefing

Over the past two years, the World Economic Forum's Global Agenda Council on Ageing has examined the nexus of health and wealth among older adults. This executive briefing explores and evaluates technological and social innovations for healthy ageing with applicability to the financial services industry. It builds on the contributions of the Global Agenda Council on Ageing. It is intended for business executives engaged in innovation for older populations, policy-makers involved in designing protocols and policies for older adults, non-profit leaders advocating for the well-being of elder individuals, and academic researchers building the evidence for new technologies for healthy ageing and financial security.

Conclusion: A Call to Action

The time is ripe for diverse stakeholders to collectively undertake actions to improve the health and wealth of older adults. This executive briefing develops the case for investment in, and integration of, innovative technologies for health and wealth by financial services institutions. It includes recommendations for collaboration across the public, private and social sectors to ensure the prosperity of current and future generations of older adults and peace of mind for their children.

“

Longevity is the defining challenge of our age. We need to make sure it's a blessing, not a curse.

”

Laurence Fink, Chairman and Chief Executive Officer, BlackRock, USA

Introduction

Increased longevity is among the most remarkable success stories in humanity. With the world positioned at the cusp of the Fourth Industrial Revolution, deliberate foresight by diverse stakeholders can usher in transformative technologies with the promise to build health and wealth among older adults.¹ Uncertainties will necessitate a delicate balance between promoting innovation and maintaining oversight frameworks that ensure financial protection and security.

In creating a collective vision for the future, the Global Agenda Council on Ageing focused on increasing action and investment towards healthy ageing using innovative technologies with applicability to the financial services sector. Under the leadership of Derek Yach, Chief Health Officer at Vitality, the work of the Global Agenda Council on Ageing was guided by a series of high-level global symposia and the New York City Ageing Alliance that provided input into this directive (see the Appendix for a full list of symposia, and the accompanying *Shaping the Global Agenda on Ageing: Meeting the Needs of Cognitive Decline report*, for details on the work of the Global Agenda Council on Ageing).²

This executive briefing supports the activities of the Global Agenda Council on Ageing by exploring and evaluating technological and social innovations for healthy ageing with applicability to the financial services industry. It is intended to provide value for executives of financial services institutions encountering an increasing number of clients with cognitive decline, policy-makers introducing regulatory frameworks that affect older adults and their finances, and academic researchers operating at the intersection of cognitive decline, innovative technology and financial gerontology.



Uniquely United: Ageing, Technology and Financial Services

Over the past century, gains in life expectancy have been unprecedented. A baby born in 1900 would not expect to live beyond 50 years of age.³ Today, life expectancy has risen to more than 70 years in many countries (see Figure 1).⁴

Remarkable achievements in lengthening life derive from a collection of scientific and behavioural advances. Early basic interventions to reduce maternal mortality in childbirth, childhood undernutrition and poor access to safe drinking water and sanitation were followed by epidemiologic developments in the role of modifiable prevention risk factors, such as engaging in regular physical activity, maintaining a healthy and nutritious diet, and avoiding tobacco.

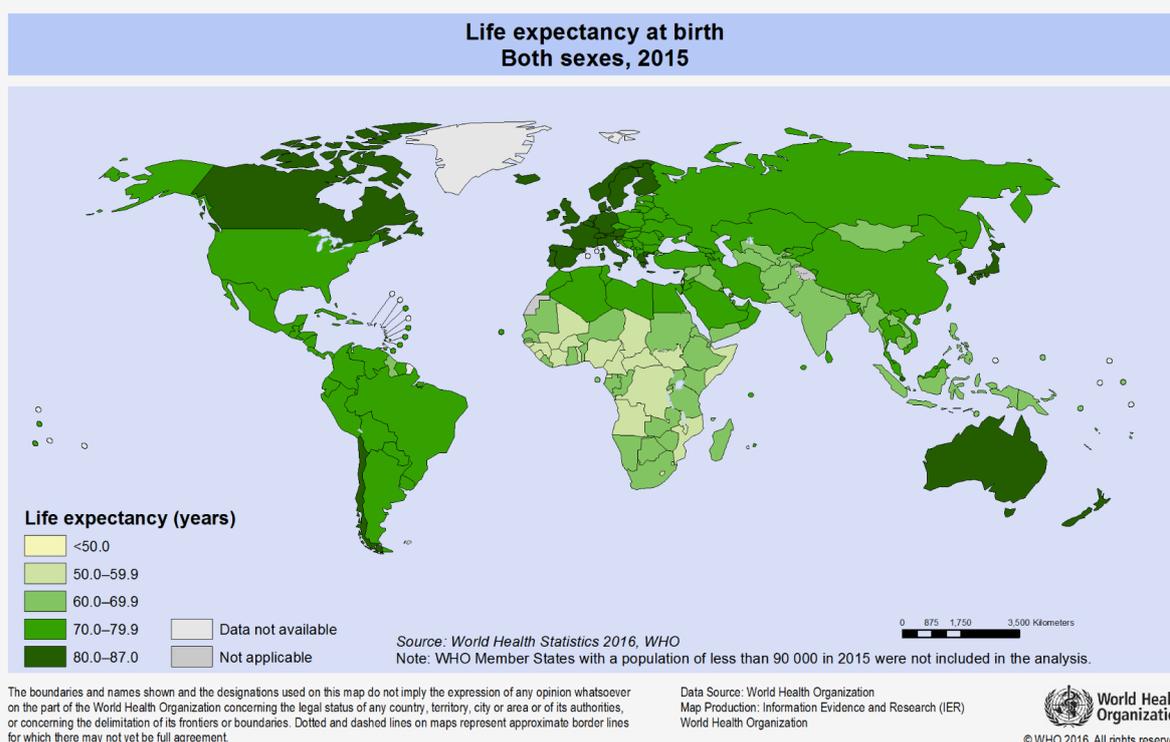
Discoveries in modern medicine, comprising pharmaceutical developments such as antibiotics and vaccines, along with better screening tools have yielded more recent health gains.

Increases in life expectancy among older adults combined with declining fertility rates among younger adults have led to an ageing global population. The number of people aged 60 or more will increase from 900 million in 2015 to 2 billion in 2050, a change from 12% to 22% of the global population.⁶ By 2020, individuals aged 60 or more will be more numerous than children under the age of five.⁷

Japan is the first country where the proportion of older adults already exceeds 30% and comparable proportions will appear in much of North America, Europe, China and Russia by 2050.⁸ By that year, an estimated 48 countries will have experienced the effects of a shrinking population.⁹ The numbers are striking.

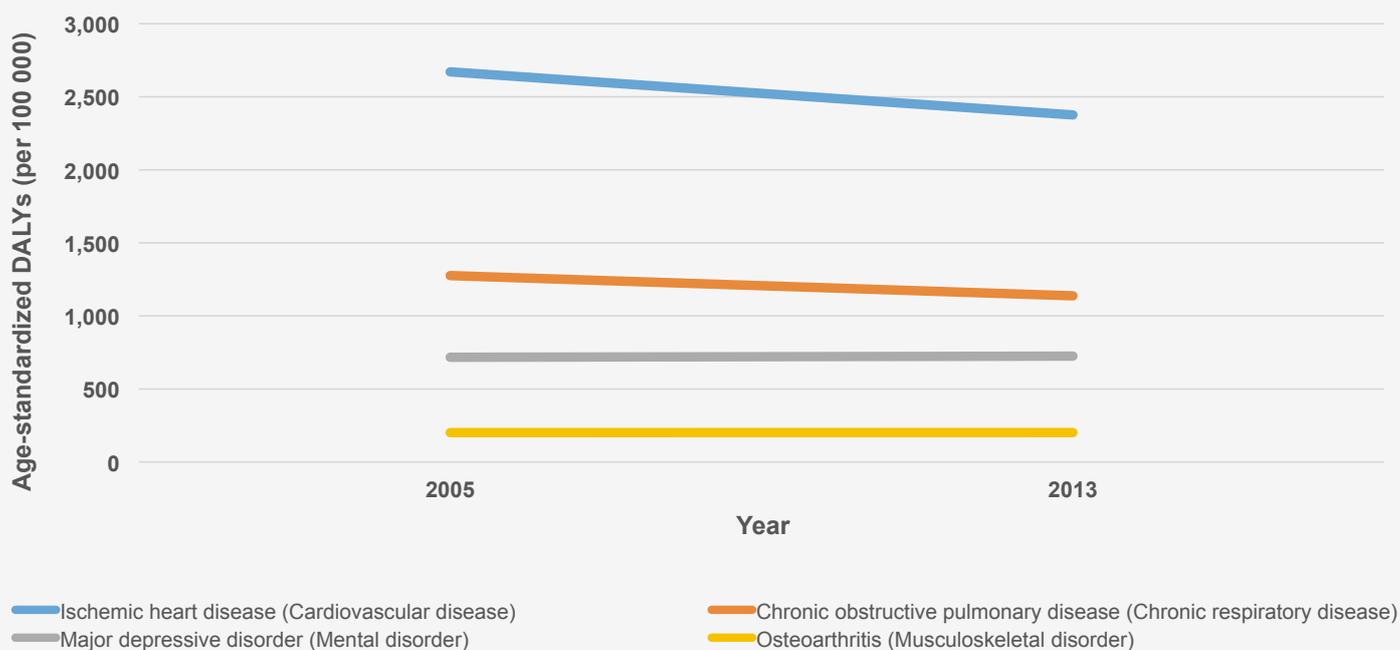
The ageing of populations has led to changes in the prevalence of disease and disability around the world. Global Burden of Disease data indicate that chronic diseases of long duration and slow progression, including cardiovascular and chronic respiratory diseases, are stabilizing (see Figure 2).¹⁰ In contrast, poor mental health and musculoskeletal disorders are rapidly increasing, leading to more people living their extra years of life in poor health with debilitating diseases and disabilities.¹¹

Figure 1: Life Expectancy at Birth (Both Sexes), 2015



Source: World Health Organization Statistics, 2016⁵

Figure 2: Global Trends in Chronic Disease Based on Age-Standardized Disability-Adjusted Life Years (DALYs), 2005-2013



Disease Category	Age-Standardized DALYs (per 100,000)		
	2005	2013	% change
Ischemic heart disease (cardiovascular disease)	2,670.7	2,375.9	-11.1
Chronic obstructive pulmonary disease (chronic respiratory disease)	1,276.2	1,137.9	-10.8
Major depressive disorder (mental disorder)	717.2	724.9	1.3
Osteoarthritis (musculoskeletal disorder)	201.3	201.7	0.2

Source: Adapted from Global Burden of Disease¹²

The extent to which individuals pursue desirable and meaningful activities in older age largely depends on two factors: their health and their wealth.¹³ Personal investments that start in early life - in health, by engaging in physical and mentally stimulating activities, and in wealth, by appropriately allocating funds for retirement – build reserves for later life.

Employer contributions complement individual efforts by investing in programmes that promote the physical, mental and financial well-being of employees and their families. Societal investments supplement individual and employer contributions by providing quality universal healthcare coverage for health and by mandating social security and saving schemes for wealth.

In a majority of OECD countries, life expectancy increases with the accumulation of wealth. The situation in the United States is no different, where the gap in life expectancy between the top and bottom 1% of income earners varies by approximately 15 years for men and 10 years for women.¹⁴ While wealth often declines with extra years

of age in poorer countries, the concerns associated with ageing for low- and middle-income countries are not explored in this briefing.

The Fourth Industrial Revolution is taking shape; it should fundamentally enhance the health and wealth of older adults.¹⁵ This transformation will usher in ubiquitous, mobile and personalized health technologies that should enable people to live longer with better physical, mental and financial well-being.

Regarding health, wearable sensors, cognitive analytics and ingestibles will produce real-time insights into human behaviour and vitals, connected pill bottles already help individuals better manage their medications and robotics will empower independence in homes.

Moreover, the advances in and growth of home care, as reflected through such organizations as Home Instead Senior Care, are seen as a critical driver in enhancing the management of ageing adults, including those with cognitive decline. The home care sector is engaged in the management of the financial, health and personal aspects of ageing.

Regarding wealth, simple modifications to banking algorithms are already detecting and preventing financial fraud, and insurers are launching products that promote cognitive maintenance among older adults. This is only the beginning.

The Industrial Revolutions¹⁶

- First Revolution (~1750): Mechanical production catalysed by the invention of railroads and the steam engine
- Second Revolution (~1900): Mass production enabled by the advent of electricity and the assembly line
- Third Revolution (~1960): Computer or digital progress led by developments in semiconductors, mainframe computing, personal computing and the internet
- Fourth Revolution (~2000): Building on the Third Revolution, more ubiquitous and mobile internet, smaller, more powerful and cheaper sensors, and cognitive computing, including artificial intelligence, predictive analytics and machine learning



Sketching the Landscape: Technological Innovations for Older Adults

Technologies for Healthy Ageing

While lifespan may be humans' most profound limitation, major private-sector technology donors are increasingly allocating funds to scientifically lengthen life and modify the ageing process. Google launched Calico (short for the California Life Company) as a moon-shot project to build the evidence underlying ageing and its associated diseases.

Joon Yun, the well-established Silicon Valley money manager, has created the Race Against Time Foundation and the Palo Alto Prize that will award \$1 million to a team that can show possible mitigations to ageing by extending a mammal's life by 50%. Oracle's founder, Larry Ellison, has allocated \$400 million through his Ellison Medical Foundation to longevity research. Paul Hogan, Chairman and Founder, Home Instead Senior Care, has made the organization's digital Alzheimer Training Module publicly available as a basis for better care management with technology innovation. The application delivers on-demand information on behaviour management.

In addition to private donors, the public sector is increasingly allocating funds to ageing research: Canada's AGE-WELL Network of Centres of Excellence and the US's National Institute on Aging are two leading examples. Ultimately, both private- and public-sector efforts are needed.

The first OECD Global Coalition on Ageing workshop, held on 1-2 September 2015 at Oxford University's Harris Manchester College, brought together leaders from a variety of sectors to discuss the relationship between innovative technology, big data and cognitive decline.*

In March 2016 in the United States, the President's Council of Advisors on Science and Technology released the second and final instalment of its work on technologies for graceful ageing.¹⁷ The committee identified three areas in which older adults can interact with technology: social connectivity and emotional health, cognitive ability and physical ability.

These three focus areas have the potential to lengthen longevity and delay the onset of ageing by promoting physical and mental well-being (see Table 1). The discussion in this section of the paper mirrors this classification and identifies leading technologies and trends under each category.

Social connectivity and emotional health

Technologies for social connectivity and emotional health promote mental well-being among older adults. Although poor mental health in later life, including anxiety and depression, can be prevalent as a result of genetics, stressful or traumatic life events, and social isolation, subjective indicators demonstrate that increased eudaemonic well-being (a sense of purpose and meaning in life) can lengthen longevity.¹⁸ Technologies that encourage or facilitate social interactions and emotional contact through in-person or virtual communities can operate to delay declines in mental well-being.

Technologies for social connectivity and emotional health focus on older adults' interactions with their broader community and their caregivers, whether in the form of paid professional assistance or unpaid family, friends or neighbours. These technologies may provide social engagement, employment or volunteer opportunities, or access to information and services.

Table 1: Healthy Ageing Targeted through Technology

Technology Focus Area	Impact on Healthy Ageing
Social connectivity and emotional health	Sense of purpose, meaning in life, emotional contact and overall mental well-being
Cognitive ability	Mental well-being (anxiety, depression), alcohol intake, nutrition and medication adherence
Physical ability	Mobility, musculoskeletal disorders and mental well-being (dementia, cognitive decline)

* OECD et al. (2015). Promoting Active Ageing in the Digital Economy: Inclusion, Adaptation and Innovation. Available at: http://www.oecd.org/sti/ieconomy/OECD_GCOA%20Report%202015.pdf.

Technology can promote community engagement in addition to improving health and reducing the risk of disability and death. Technologies to support social participation may include social media or virtual communities, real-time videoconferencing, interactive games, social support networks or blogging platforms. Innovations for employment or volunteer opportunities include professional development and training options, online job and volunteer boards, professional networking and remote working sites, as well as industry, salary and employer quality-review sites.

Emerging trends: Caregivers may ultimately emerge as the mediators between technology use and better social connectivity and emotional health. A majority of professional or unprofessional caregivers – family, friends or neighbours – may be users of technology who can teach older adults how to interact with it.

Unpaid caregivers provide an estimated 90% of long-term care and may bear the unintended consequences of caring for an older adult.¹⁹ Consequences such as increased loss in workforce productivity can be mitigated through the use of professional care services as unpaid caregivers may also suffer from a decline in financial wealth or cognitive or physical well-being. Realizing these concerns, the technology company IBM pioneered the Internet of Caring Things to support caregivers by developing a network of connected objects and cognitive systems that leverage unstructured data to provide insights for the active care of people in their homes.²⁰

Similarly, the non-profit AARP founded the Health Innovation@50+ Pitch Competition to fund a pipeline of innovations for caregiving.²¹ Many of these technologies, including the two winners (Penrose Senior Check-In Services and SingFit), focus on improving social connectivity and emotional health for the older adult and the caregiver alike.

Cognitive ability

Social, emotional and physical well-being are factors that affect cognitive ability. Stress can be an element in cognitive impairment, whereas a high purpose in life can protect against impairment.²² Harmful use of alcohol can often be co-morbid with deteriorating mental health in older adults and can be a cause of depression. Technologies that alleviate stress or monitor alcohol strength and intake can overcome cognitive concerns with ageing.

Other technologies, such as in-home sensing, wearable or remote patient monitoring and cognitive health technologies, target specific cognitive functions. Unobtrusive home monitoring sensors track activity patterns to detect changes or unusual patterns to indicate cognitive decline. Similarly, wearables, remote patient monitors and medication adherence tracking devices can be used to screen for wandering and falls, monitor vital signs and ensure appropriate consumption and refills of prescribed medication.

Emerging trends: Cognitive health technologies such as “brain training” applications have the potential to enhance cognition by improving memory, sustaining attention and facilitating dual-task performance. Cognitive assistive systems leverage advances in artificial intelligence and cognitive science to support independence among older adults.

Unlike technologies that promote social connectivity and emotional health or physical ability, evidence demonstrating the effectiveness of innovations for directly enhancing or maintaining cognitive abilities has been more inconclusive. The US National Academies of Sciences, Engineering, and Medicine (formerly the Institute of Medicine), the independent adviser to the nation on health, recently concluded that scientific literature on cognitive stimulation and training is promising, but future research on its effectiveness is needed.²³ Their report further reveals that older adults can benefit from cognitive training in terms of better memory, reasoning and speed of processing, although at a slower rate than younger adults, and that improvements can be sustained over time.

In contrast, the extent to which the benefits of cognitive training can be transferred to other tasks has seen mixed results. The scientific claims of companies engaged in developing cognitive products will require careful consideration by consumers and policy-makers regarding the effectiveness of their offerings.

Physical ability

Technologies that support physical ability focus on ensuring mobility among older adults. Regular exercise improves cardiovascular fitness, aerobic capacity and muscle retention, and reduces systemic inflammation. It can also help to prevent musculoskeletal disorders, dementia and cognitive decline.

Emerging trends: Technologies that encourage the measurement of regular balance and aerobic training promote physical ability in older life. As sensory capability declines, technologies that support maintaining sensory experiences can promote extended movement.

Technologies for promoting physical activity focus on sustaining mobility. They can help sustain mobility by improving access to healthcare services through telehealth, promoting universal design inside and outside the home, and ensuring fine-grained mobility in products for older adults. Sensory technologies that support hearing, vision and tactile functions are growing in use in addition to those that detect and prevent falls through the use of prosthetic devices and robotic assistants.

World Health Organization Priority Assistive Products List²⁴

The 69th World Health Assembly marked the launch of the World Health Organization's Priority Assistive Products List, an initiative that aims to improve global access to assistive products for everyone, everywhere. The list includes hearing and memory aids, wheelchairs, spectacles, artificial limbs and medication organizers to assist older adults in living a dignified life. It also incorporates guidance for procurement and reimbursement policies for these types of products.

World Health Organization and Technologies for Healthy Ageing

In October 2015, the WHO Centre for Health Development hosted the Second WHO Global Forum on Innovation for Ageing Populations in Kobe, Japan.³¹ With the theme of "Imagine Tomorrow", the meeting sought to catalyse innovations to transform communities and systems for ageing populations that are required to attain universal health coverage and the United Nations Sustainable Development Goals.

The five Ps of healthy ageing – people, person-centred services, places, products and policies – were identified, focusing on technological products. Meeting outputs noted that existing technologies can improve the quality of life for older adults but cannot replace the human touch of social interaction.

The WHO's September 2015 *World report on ageing and health* complements "Imagine Tomorrow" by focusing on the potential of assistive technologies to promote functional ability.³² The report provides some evidence on technological innovations for healthy ageing and the role of the private sector – in addition to the public sector – in harnessing action and support for facilitating ageing in place.

Technologies for Health and Wealth

Cognitive decline can impair an individual's ability to engage in financial decision-making. As a result, a growing collection of large multinationals and smaller start-ups are promoting technological solutions that target health and wealth.

This section summarizes the World Economic Forum's Global Agenda Council on Ageing symposium series and activities undertaken by the World Health Organization (WHO) on technologies for healthy ageing.

Global Agenda Council on Ageing: Symposium Series

The symposium series hosted by the Global Agenda Council on Ageing in prominent cities around the world identified multiple linkages between technologies for health and wealth for use by older adults.^{25,26} Although areas of use of technologies by financial services institutions overlap, this section explores technologies for health and wealth to be used by banks and insurers.

In the banking industry, new technologies allow older adults to more easily and conveniently engage in banking activities. Mobile applications that securely collect and store financial information can promote access and personalization of services for consumers. Cheque imaging conducted through a smartphone can simply deposit funds, and geolocation information can detect and prevent fraud by identifying consumers' location.

Banks are also adapting their card services by incorporating simple innovations to promote financial well-being among older adults, including directional arrows on bank cards, high contrast colours, and chip-and-signature cards for those who are unable to recall long passwords. Over time, bank transfers and payments will be conducted via wearables, with identification occurring through such biometrics as voice and face recognition.

The use of technology in banking requires trained front-line workers capable of providing assistance and navigation to older adults who may be suffering from cognitive decline. Front-line employees who interact directly with consumers, such as financial advisers, may be the first to recognize declines in cognitive functioning. Appropriate referrals to personnel and resource services based on cognitive and financial needs are necessary for effective client engagement with older adults.

The costs of fraud are estimated to be between \$3 billion and \$30 billion annually worldwide.^{27,28} Anti-fraud measures, including the examination of suspicious transactions using technology, can protect older adults. This may include granting professional and unprofessional caregivers and other third parties access to banking information with explicit consent from clients while simultaneously maintaining notifications of abuse. This already occurs in Japan, where the Japan Securities Dealers Association offers an adult guardianship system whereby family members can protect the administration of a customer's assets if the customer has insufficient decision-making capabilities.²⁹

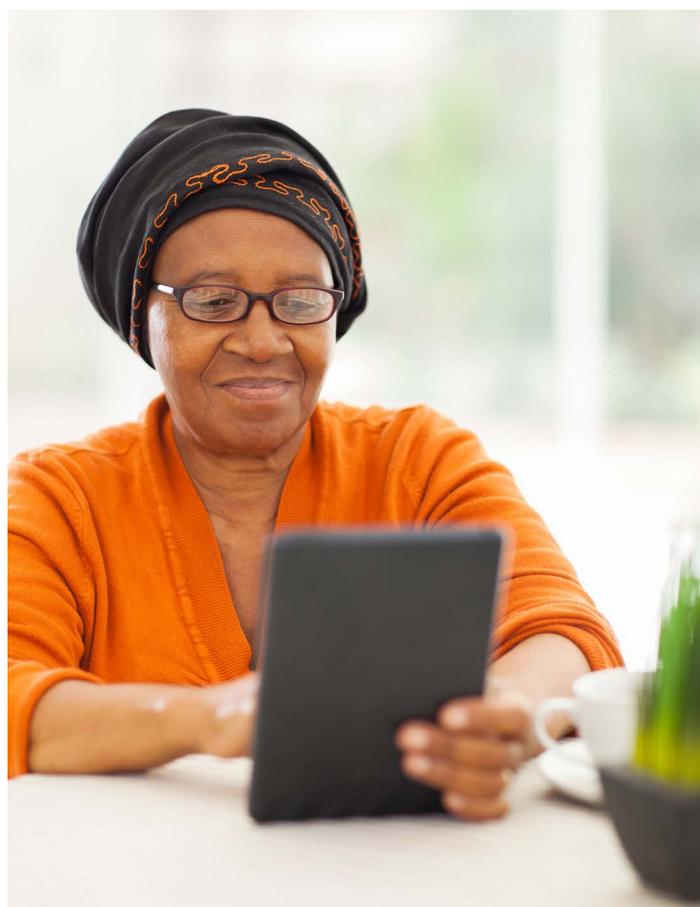
Prior to the onset of cognitive decline, customers can designate guardians to engage in financial decisions on their behalf. While regulations are emerging, the integration of technologies into the provision of banking services will create new possibilities for fraud prevention and greater oversight to ensure protection.

For insurance companies, technology-enabled products and services can be used to support a longer and healthier life for policyholders. Many global insurance companies offer policyholders wearable tracking devices to help monitor behaviour. Data from these devices are used to determine the status of health risks and associated insurance premiums for policyholders.

The intertwining of new technologies with the healthcare system can also increase independence and reduce claims costs by older adults. Remote technologies that diagnose life-threatening health conditions involving older adults or that confirm the intake of prescribed medications can lead to the early detection of an incident. In time, greater integration by insurers with telehealth, home aids and robots will support health service delivery while advancing business interests.

Although many insurers are incorporating personalized health technologies into their core offerings, the deluge of data now collected by insurers has generated privacy concerns. Products will be successful in generating measurable longevity gains only if data are used responsibly by insurers in ways that deliver tangible benefits to consumers. Increasingly, insurers are consulting the broader public to identify appropriate uses and the disclosure of data collected through programmes. In addition to complying with the law, these insights have been used to develop and adopt industry standards that ensure the appropriate use of data from new technologies.³⁰

Financial services institutions are bound by statutory regulation and conduct codes, yet a majority of individuals also contend that these institutions have an imperative to uphold a duty of care through the fair and inclusionary treatment of customers. Although many financial services providers uphold a duty of care, they cannot be the only stakeholders supporting older adults or those with cognitive decline. Partnerships across the public, private and social sectors, such as those led by the World Economic Forum, are essential for sustained progress.



Spotlight on Business Initiatives

EverSafe

Chief Executive Officer Howard Tischler created EverSafe after uncovering his mother's \$8,000 credit card bill. EverSafe is a technology-based service to address the financial abuse of older adults. The company monitors financial reports and sends timely alerts about suspicious banking activities directly to members. It detects abnormal spending patterns and credit card changes, unauthorized cash withdrawals and identity theft. EverSafe seeks to protect a lifetime of savings.

Honor

After realizing that his mother, who lived on the opposite coast of the US from him, was no longer an acceptable car driver, Chief Executive Officer Seth Sternberg founded Honor. The company connects caregivers, older adults and their families through a mobile health application to deliver caregiving services. Caregivers are screened and matched to older adults based on their expertise. Family members are provided electronic information on length of caregiver stay and services provided. This may include meal preparation, companionship, medication reminders and transportation to a grocery store or bank. Sternberg is creating the Uber for home care by facilitating caregiving on demand.

True Link Financial

After determining that his grandmother was writing more than 75 cheques to phony charities each month, Chief Executive Officer Kai Stinchcombe founded True Link Financial. True Link aims to protect older adults from financial abuse by providing services that can be self-managed or administered by family members or designated professionals. The company aspires to enable greater independence for older adults, and peace of mind for their family members. True Link also offers a prepaid debit card for older adults and their caregivers to promote safe spending through various controls, including spending limits, ATM withdrawals and real-time alerts.

Zwipe

It is widely believed that a "digital biometric handshake" will replace PINs and passwords. Zwipe has developed a unique biometric contactless payment card system that recognizes an individual's fingerprint to verify a person's identity. It deploys the fingerprint authentication technology in debit cards in an attempt to prevent financial fraud and the exploitation of older customers.

Discussion: Implications for Financial Services Institutions

The ageing of the global population straddles two trends that are shaping the future of businesses: global demographic shifts and technological transformations. Changing epidemiologic structures create potential longevity risks for various stakeholders (see Figure 3). Employers are increasingly focusing on work-related policies and investments in health and wealth during an employee's working life. Many employers are introducing inclusive policies that keep older adults in the workforce for longer, or are implementing technologies that enable employees and their families to become sophisticated investors in their physical, mental and financial health.³³ Governments are addressing longevity risks by modifying state pension schemes, retirement ages and long-term medical care.

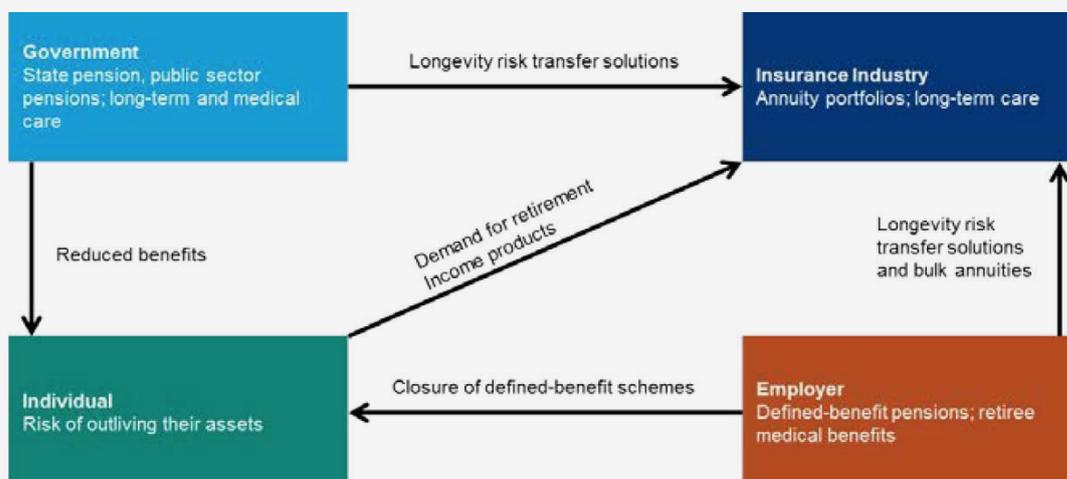
For financial services institutions, innovative technologies can facilitate change. New revenue sources can be uncovered by fulfilling the demands of older adults who aspire to manage their health and wealth and live independently in their homes. Opportunities exist for technologies to support and influence healthy ageing. This section discusses the implications of technological innovations for healthy ageing from the perspective of financial services institutions, including banking and insurance.

Implications for Banking

Research undertaken by Bank of America Merrill Lynch and Age Wave indicates that the number one ingredient of a happy retirement is good health.³⁴ This is followed by financial security. As financial skills are among the first affected by cognitive ageing and dementia, banks are in a unique position to support healthy ageing and financial well-being by intersecting health and wealth.

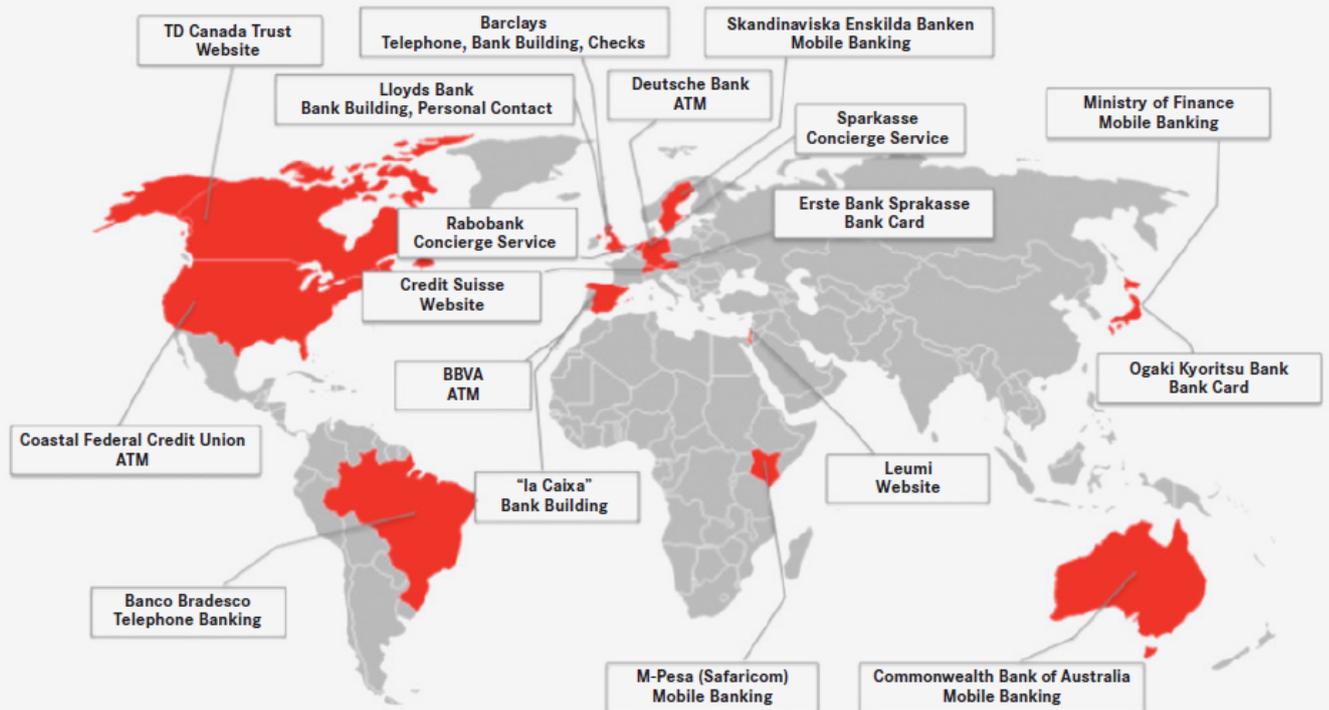
A majority of banks have adopted age-friendly policies to assist older adults with their banking. Many of these modifications are predicated on leveraging technology for seamless touch points with clients. This includes changes to the delivery of services through telephone and website/online banking, mobile banking, bank building, ATMs and bank cards. A majority of these touch points are digitized to offer services irrespective of bank hours and to collect user data for service improvement (see Figure 4).

Figure 3: The Holders of Longevity Risk



Source: Bank of America Merrill Lynch (2016). Thematic Investing: The Silver Dollar – longevity revolution primer

Figure 4: Map of Age-Friendly Banking Touch Points



Source: Nedopil, C. et al. (2014). Age Friendly Banking: A Global Overview of Best Practices. YOUSE & AARP

Five Principles for Age-Friendly Banking: YOUSE and AARP³⁵

1. Protect older people from financial abuse and fraud
2. Customize financial products and services to senior citizens' needs
3. Offer affordable financial management
4. Guarantee access to banking products for older people with critical income and facilitate ageing in communities
5. Improve accessibility, and create an age-friendly culture, in branches and across services, including for people living alone with restricted mobility or in remote areas

These principles can be complemented with the seven age-friendly business principles outlined in the World Economic Forum report on *How 21st-Century Longevity Can Create Markets and Drive Economic Growth*.

In improving the delivery of banking services for older adults, banks should work to analyse the needs, habits and desires of older customers and integrate findings into the design of new products. They should also include older adults in the ideation and evaluation processes to ensure that modifications are indeed beneficial for banking clients.

In partnership with non-profits and academics, banks should test new ways of identifying and supporting people with cognitive challenges through employee training and the application of technological advances and privacy protection.

In addition to improving banking services for older adults, many banks view demographic changes as an opportunity for investors.³⁶ Sector analysts are creating lists of global stocks with exposure to longevity-related themes and solutions. Many of the listed companies are successfully developing or leveraging advanced technologies – artificial intelligence, big data, telemedicine/telehealth, additive manufacturing, diagnostic services and wearables – for use by ageing populations in the longevity economy.

Implications for Insurance

Life insurance companies in the early 20th century aspired to promote health and prevent disease to extend life. The 1919 publication on *Prolonging Life as a Function of Life Insurance* notes: "It is logical and entirely consistent that there should be blended with this business of life insurance the element of health preservation, disease prevention and death postponement, especially as the inclusion of these functions in the activities of the business would operate both to popularize and financially strengthen the institution."³⁷

Since the turn of the last century, insurers have understood the central role of promoting health to advance business goals. Technological innovations will advance health and transform the insurance industry. This will alter how insurers underwrite risks, distribute products and communicate with customers. Underwriting will be revolutionized, from capturing health data at a single point in time on long application forms to using mobile applications that ask permission to access health data vaults controlled by the policyholder.

New data analysis techniques will allow for highly individualized risk assessment, which will improve risk prediction. Claims management will focus on risk prevention. Digital innovation can transform demographic changes into opportunities, turning ageing societies into booming economies. Insurers are set to benefit from this trend.

The journey towards the integration of new technologies into insurance is not without challenges. New and robust data and network infrastructure are necessary to receive, store and process incoming information. This requires substantial investment and new skills training. Partnerships between insurers and well-being companies or device manufacturers are being and will be formed to access the data. Importantly, data security must be ensured.

The challenges are not easy. Customers need to be educated on the benefits of new technologies and data ownership. Many insurers incentivize policyholders to share data and receive lower premiums. Pricing is based on policyholders' healthy activities. As a consequence, the healthy pay less than the unhealthy.

This type of risk underwriting could affect the social role of insurance, which in many markets plays a crucial role in social security. The question of how to use personal health data for underwriting and pricing must be answered by all the stakeholders and may deserve a political answer predicated on regulatory reform.

For innovative technologies to become mainstream within insurance, a robust regulatory framework is needed with clear guidance on how personal health data are stored, used and shared. Traditional privacy policies that share data only with the explicit consent and knowledge of policyholders must be reviewed to ensure protection while granting access to appropriate third parties, including caregivers, who have their own oversight by financial institutions. This will require new legislation to build an effective, coherent and innovation-friendly regulatory framework.



Conclusion: A Call to Action

At the first White House Conference on Aging in 1961, Robert Kennedy stated: “We have added years to life; it is time to think about how we add life to years.”³⁸ Population ageing is no longer deniable or unsuspected; it is occurring in nearly every country around the world (see Figure 5).

Population ageing is a global phenomenon that is challenging notions of getting old and the meaning of ageing. It will require agile governments and businesses to ideate and introduce inclusionary age-friendly regulations and policies that protect older adults.

The Fourth Industrial Revolution will bring new technologies that offer inroads to approaches to promoting health and wealth for the elderly. The widespread creation and adoption of these technologies for older adults and their professional and unprofessional caregivers will require effective, intuitive and affordable innovation.

Differences in education, income, culture and behaviour will need to be accounted for in technology design to promote inclusion and facilitate widespread adoption. If produced in partnership with older people, these technologies will have the broad potential to enhance independence, support ageing at home and reduce the costs of long-term care.

The European Union has become increasingly responsive to societal needs through its Caregiving and Ageing Reimagined for Europe (CARE) initiative. The CARE initiative aims to develop the ranks of professional caregivers and improve the quality of care by establishing a comprehensive

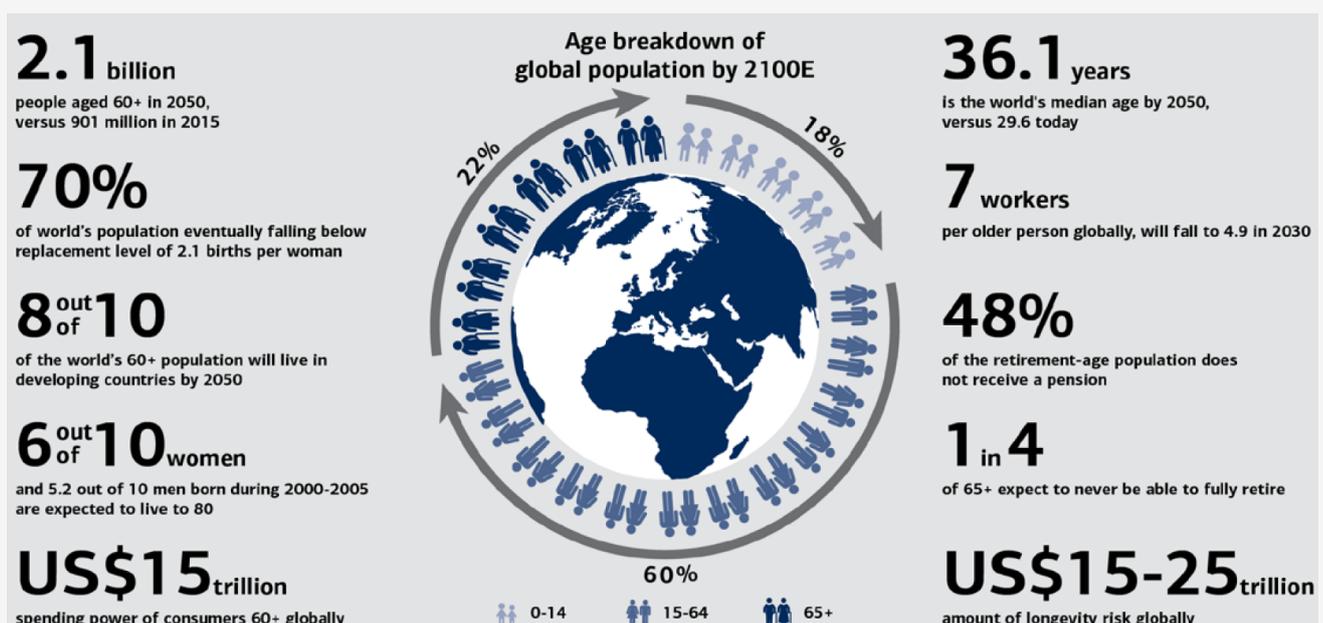
electronic learning curriculum and a set of standard protocols.

For banking and insurance institutions, global population ageing means increasing concerns about financial solvency and fiscal sustainability. With the convergence of demographic changes and technological advances, the magnitude of the challenge has propelled financial services institutions to introduce new technologies for older adults. Technologies that combine a variety of solutions and that maintain strong privacy and security safeguards will be those that prevail.

An ageing global population and technological advances will necessitate collective action by a variety of stakeholders. For funding agencies of academic research, greater investment in developing a robust evidence base that demonstrates the underlying effectiveness of technologies for cognition and financial well-being will be needed. For policy-makers, regulatory reform must entail laws that promote innovative technologies in addition to longevity. They will have to address the protection of privacy and confidentiality in addition to supporting banking and insurance laws.

It is no longer possible to wait for the silver tsunami to hit or for greying societies to take hold. Ageing must be reframed so that this time of life is one of productivity and prosperity. It is time to ensure that our grandparents, parents and selves live a long and fulfilling life.

Figure 5: Global Ageing Figures in a Snapshot



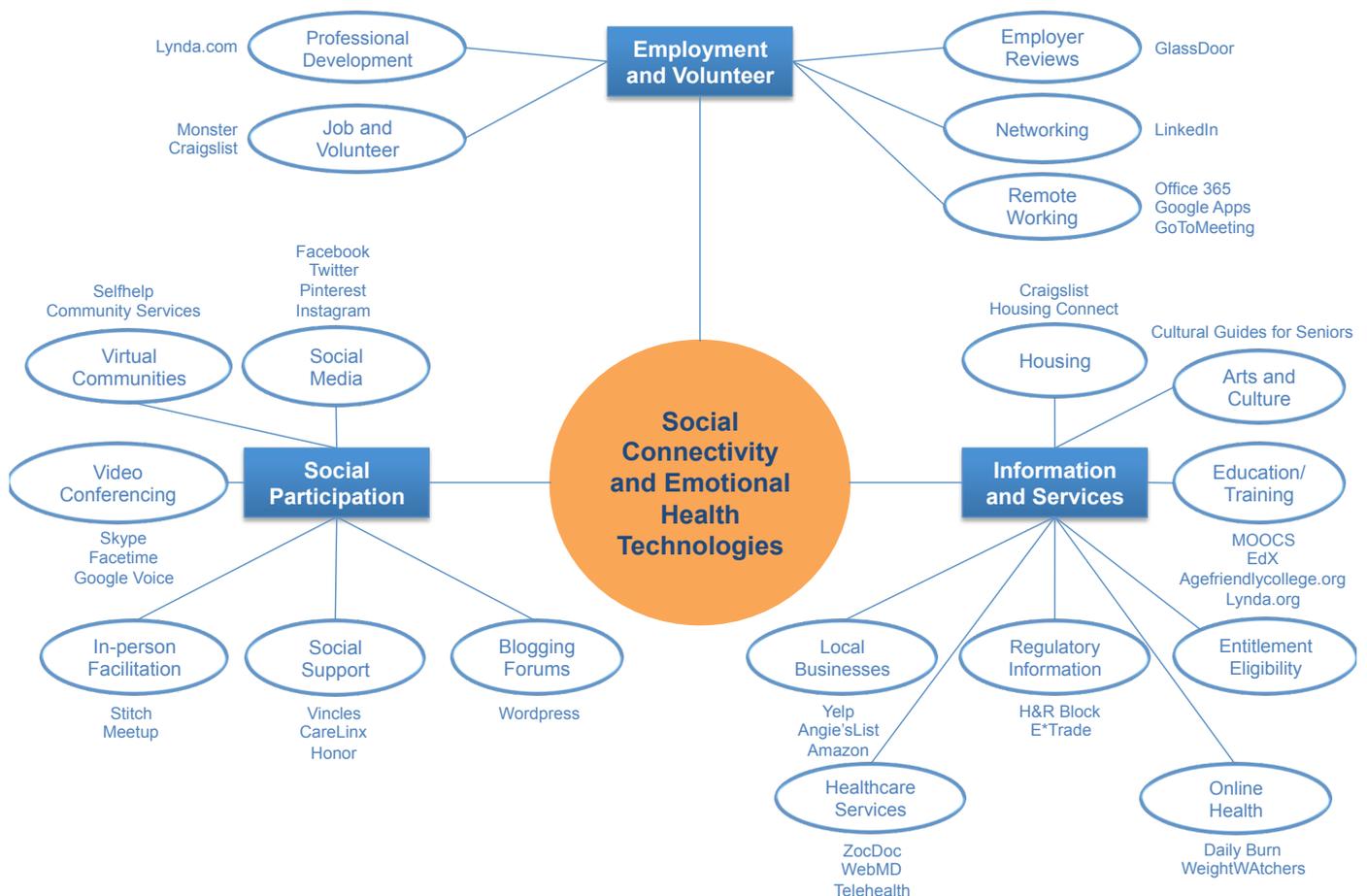
Source: Bank of America Merrill Lynch. (2016) Thematic Investing: The Silver Dollar – longevity revolution primer

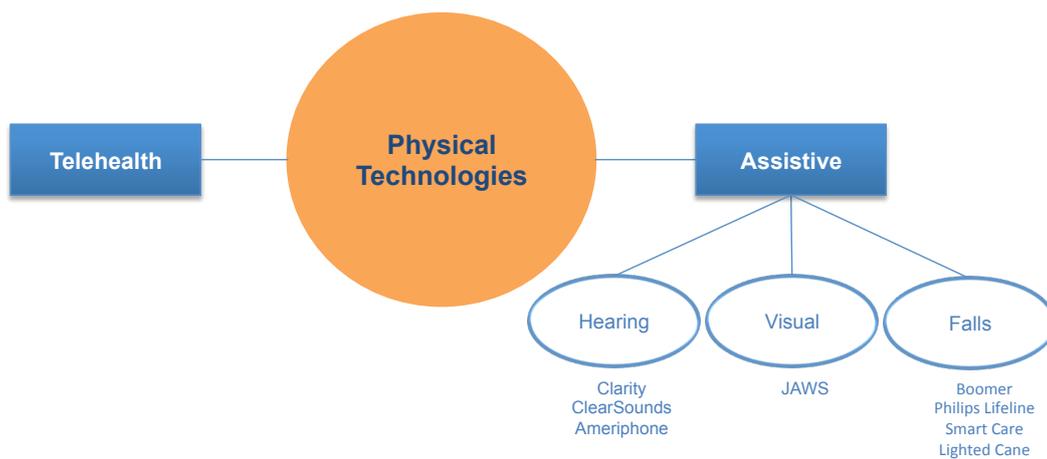
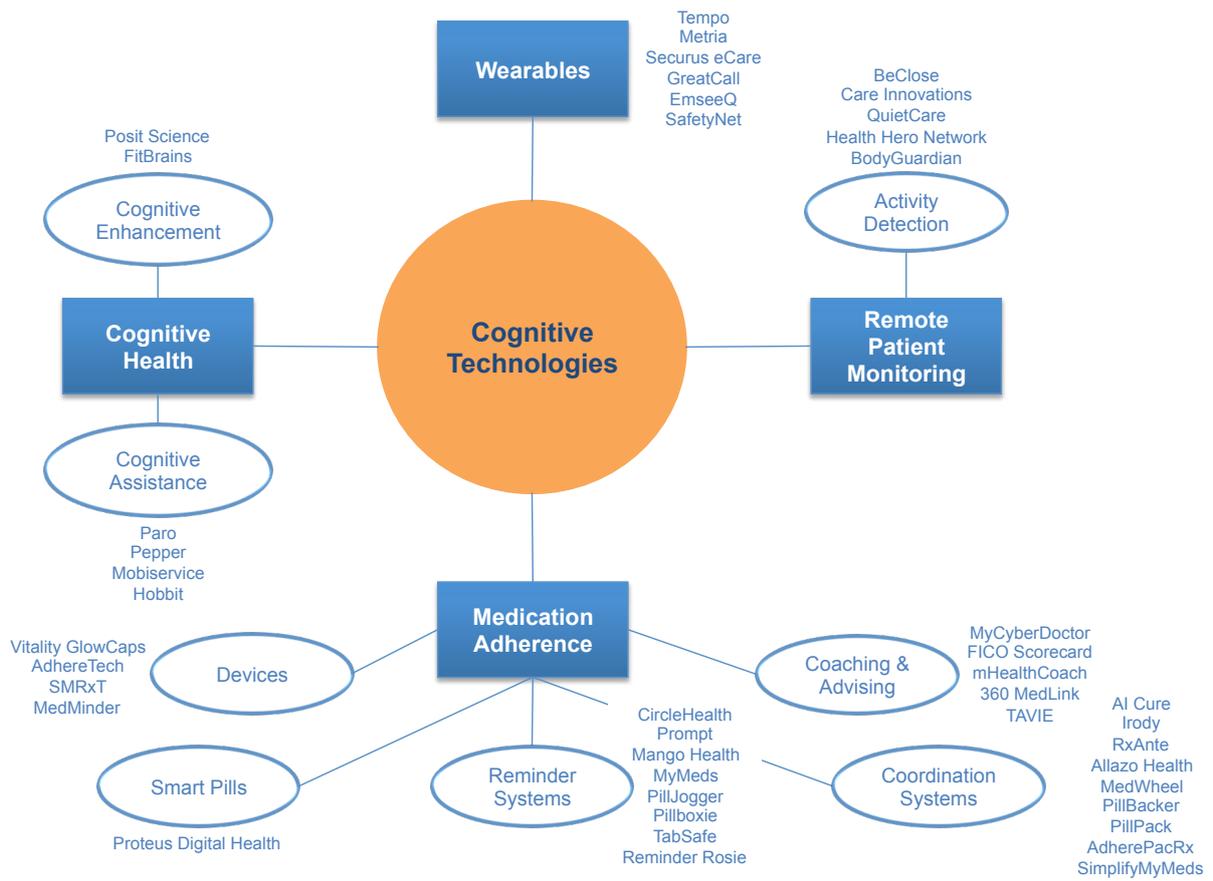
Appendix

Global Agenda Council on Ageing: Symposium Series

- Tokyo, Japan | Keio University | 5-6 October 2015
[International Conference on Cognitive Decline and its Economic Consequences](#)
 Explore medical aspects of cognitive decline and investigate its impact from the perspective of financial services institutions
- London, United Kingdom | Age UK | 4-5 January 2016
[Managing Ageing and Cognitive Decline: Challenges and Opportunities for Financial Services](#)
 Examine current policies, practical innovations and opportunities for governments, corporations and non-profit organizations to address age-related cognitive decline in financial services
- Toronto, Canada | International Federation on Ageing & the National Institute on Ageing at Ryerson University | 5 April 2016
[Technologies and Evidence for Healthy Ageing and Financial Services](#)
 Analyse existing evidence underlying intelligent assistive technologies to support persons experiencing cognitive decline in the context of the financial services sector
- Philadelphia, USA | University of Pennsylvania | 9-10 May 2016
[Ageing and Cognition: Maintaining Economic Security in Later Life](#)
 Assess future opportunities to draw on emerging technologies and knowledge to maintain economic security in later life

Landscape of Healthy Ageing Technologies for Older Adults





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