THE NEW MAP of LIFE

A Report from **The Stanford Center on Longevity**

Align Health Spans to Life Spans

Prepare to Be Amazed by the Future of Aging

SCENIC OVERLOOK

Invest in Future Centenarians to Deliver Big Returns

Make the Most of the 100-year Opportunity

Life Transitions Are a Feature, Not a Bug

Learn Throughout Life

ROUTE 100

100 Years To Thrive

Build Financial Security From the Start

Age Diversity is a Net Positive for Societies — and the Bottom Line

Work More Years, with More Flexibility

SHARE ROAD

Build Longevity-Ready Communities

The Road Ahead

100 Years to Thrive

By the middle of this century, living to the age of 100 will become commonplace, continuing a remarkable trend that saw human life expectancies double between 1900 and 2000, increasing more in a single century than across all prior millennia of human evolution combined.

Longevity is one of the greatest achievements in human history, brought about by reductions in infant mortality, advances in sanitation and medicine, public education, and rising standards of living. Despite the grievous toll of the COVID-19 pandemic, the trajectory will continue its rise during the current century as well. Yet the dramatic acceleration in life expectancy during the 20th century happened so quickly that the social institutions, economic policies, and social norms that evolved when people lived for half as long are no longer up to the task.

We see a huge opportunity. In 2018, the Stanford Center on Longevity launched an initiative we called The New Map of Life, believing that one of the most profound transformations of the human experience calls for equally momentous and creative changes in the ways we lead these longer lives. We make a clear distinction between *aging*, the biological process, and *longevity*, the measure of long life. The Center's goal is not to advocate for longer life—a phenomenon that is well underway—rather, it is to identify ways to enhance the *quality* of those century-long lives, so that people experience good health for more years, as well as a sense of belonging, purpose, and worth at all ages and stages.

The advent of 100-year lives coincides with declining birth rates, and these two defining demographic trends are often conflated into a crisis narrative about an aging society about to be engulfed by a "gray tsunami." In this scenario, older adults are presumed to be a burden to society, and the presumed antidote to old people is more babies—who, by historical standards, are becoming scarce. This crisis mindset assumes that people will age in the future as they did in the past, that financing 100-year lives is an insurmountable challenge, and that additional mechanisms for saving, investing and supplementing income are beyond reach.

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A static view of what it means to age distorts our perspectives about longevity in the future, and our measure of the true costs and benefits. It also overlooks opportunities to change the trajectory of aging and the associated costs , by starting now to redesign institutions, practices, and norms so that they align with new realities, rather than those of the last century.

We designed The New Map of Life to guide us from the world we inhabit now to a world in which future centenarians will thrive. It offers greater flexibility, additional options for learning and earning and financing longer lives, new models for delivering healthcare, technologies to extend health and functional independence, and pathways for intergenerational connection, so that people can be cared for, productive and socially engaged at every age and stage of their lives.

To plot new options for the life course and its many variables, we created a postdoctoral training program and appointed an interdisciplinary team of talented fellows, each paired with a faculty mentor with expertise in one of nine domains that are core to longevity: early childhood, education, work, financial security, built environment, climate, health and technology, lifestyle and fitness, and intergenerational relationships.

We challenged the fellows to question the conventions and assumptions that are so baked into our age-defined culture we may not even recognize them—or the ways in which they have limited our vision. We find powerful evidence that longevity holds even greater opportunities for growth than we thought possible when we launched our initiative. And we believe that the very real and substantial challenges that longevity creates for our economic and social order can be met—but only if we take action.

Guided by the principles below, we can start laying the groundwork now for a society that is healthier, more equitable, and longevity-ready:

1. Make the Most of the 100-Year Opportunity

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We are optimists– not dreamers. The New Map of life is rigorously grounded in science, driven by pragmatism and seasoned with imagination. A demographic shift unparalleled in human history has brought us to this uncharted place: the question is how adroitly we can adjust to our new circumstances and which strategies we deploy to rapidly transform our economy, and adapt social institutions, cultural norms and public policies to meet current needs. This means assessing the true costs as well as recognizing and efficiently distributing the hidden dividends of longevity. It's a tall order and we feel confident that we collectively are up to it.



The good news is that this new world holds the promise to deliver greater benefits and opportunities for more people at every age and stage of life, starting at birth. A longevity-ready society creates the conditions people of *all* ages need to reach their full potential: access childcare and preschool, neighborhoods with playgrounds and green space, clean air, water and nutritious food, healthcare, safe housing and transportation, ample educational and economic opportunities, meaningful social connections, ways to remain independent, productive and financially secure as they age, within a culture that recognizes caregiving as an economic –and a human–necessity.

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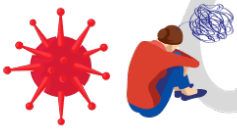




New Map Of Life Key Principle: The promise of longevity must include everybody

A longevity-ready society creates the conditions **people of *all* ages** need to reach their full potential



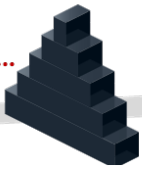


The pandemic cracked open deep fault lines but presents a forced opportunity to build a new foundation for a society that is both longevity-ready and inclusive

Shift from a deficit mindset
Need to assess the true economic and social contributions of older adults



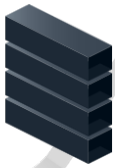
Rather than an age pyramid…



The economic contributions of the 50-plus age group **are on track to triple by 2050**



…we now have a population rectangle, with nearly equal distribution of people in most decades of life…



Adults 50 and older are a dominant force in the U.S. economy and are the fastest growing segment of the workforce

Changing the trajectory and costs associated with aging will prove many of our current assumptions outdated



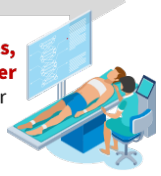
Many people experience good health and functional independence **well into their 70s and 80s**



Huge implications for **knowledge workers**



Urgent need for reskilling opportunities for people in dangerous or physically demanding occupations



New healthcare technologies, medical treatments and other advances hold the promise for preventing and slowing age-related diseases

A core principle of our work is that the promise of longevity must include everybody. Creating a longevity-ready society depends on developing and utilizing the talents of all, and it is incumbent on us to take on the deep disparities that prevent so many Americans from experiencing health, safety and economic security. The pandemic cracked open deep fault lines etched by race, gender and geography, and presents a forced opportunity to build a new foundation for a society that is both longevity-ready and inclusive.

The New Map of Life also calls on us to shift from a deficit mindset that laments the losses now associated with aging—whether to health, mobility, financial security, independence, or social engagement—and to assess the economic and social contributions of older adults so that we can get a true accounting of net costs and benefits of our current population structure.

Rather than an age pyramid, we now have a population rectangle, with comparable distributions of people in each age group. We dispense with the outdated assumption that older adults drag down productivity and drain social resources, and start by identifying and measuring the significant ways that older adults contribute to the social good and to GDP.

The AARP Longevity Economy Outlook finds clear evidence that adults 50 and older are a dominant force in the U.S. economy, owning 83 percent of assets (driven by home ownership),[1] accounting for 56 percent of consumer spending,[2] and comprising the fastest growing segment of the workforce. The study projects that economic contributions of the 50-plus age group are on track to triple, from $8.3 trillion in 2018 to $28.2 trillion in 2050. If the combined economic activity of adults 50+ in the U.S. were measured like that of a nation – in assets, wages and salaries generated, jobs created, taxes paid, the market value of time spent volunteering and caregiving – it would rank as the third largest GDP in the world, second only to the United States and China. Understanding these implications and unlocking the business opportunities of longevity are the focus of a popular course we co-launched at the Stanford Graduate School of Business.



The New Map of Life is our blueprint for a world that will allow future centenarians to thrive. This is the longevity-ready future within our power to design, finance and build. Starting now.

Filling out the blank revenue side of the ledger is one piece of the longevity economy puzzle. Another is changing the trajectory and costs associated with aging. Here too, there is ample evidence that many of our assumptions are outdated: many people experience good health and functional independence well into their 70s and 80s,[3] and cognitive trajectories vary widely,[4] suggesting that the potential for longer working lives is linked more clearly to ability, desire and need, rather than chronological age. These findings have huge implications for knowledge workers, and clarifies the urgent need for reskilling opportunities for people in risky or physically demanding occupations so that these workers also have options for paid work over a longer time, should they need or want it. Policy makers can use this data as a guide for policy changes to incentivize longer working lives without sacrificing age-based benefits such as Social Security and Medicare.

Other methods of bending the cost curve are available–or well within reach. New healthcare technologies and medical treatments make the aging process more malleable than it has ever been, holding the promise for preventing and slowing age-related diseases. And fantastic advances in diagnostics and wearable technologies hold the promise of extending functional independence for millions. The New Map of Life is our blueprint for a world that can allow future centenarians to thrive. This is the longevity-ready future within our power to design, finance and build. Starting now.

2. Invest in Future Centenarians to Deliver Big Returns

"Aging Society" narratives portray the later decades of life as a period of prolonged overtime, marked by vulnerability and dependence. A longevity perspective regards the 30 extra years of life we've been gifted instead as a dividend that can be strategically distributed across all stages of life.



Milestones, expectations, and social norms will shift as a result. Why compel children to begin to prepare for college in preschool? Must young people graduate from high school by 18 and hurtle across the educational finish line, diploma in hand by their early or mid 20s, to achieve success over a 100-year life? Why not have learning be a lifelong pursuit that is just as likely to take place outside a real or virtual classroom as in one? At a time of labor shortages, why do we expect 65-year-old knowledge workers to leave the workforce, just as many achieve peak wisdom? Is a chronological number even the best way to define "age" when science offers new and more relevant tools to assess vitality and health?

The New Map of Life adjusts the cadence of life's milestones to make the most of those 30 extra years. There is more time to savor the benefits of childhood, to establish stable personal and professional pillars during early adulthood, to have flexibility for parenting and caregiving as those responsibilities arise, and to reset the course as needed or desired during middle age through upskilling, reskilling, and career changes. These options for thriving throughout the earlier stages of life contribute cumulatively to the likelihood of feeling engaged and valued, and being healthy and financially secure in later adulthood.

This whole-of-life approach is about optimizing each stage of life, so that benefits can compound for decades, while at the same time allowing for more time to recover from disadvantages and setbacks. Investing in future centenarians starts with access to high-quality childcare and early childhood education, delivering double benefits to families. Children develop foundational skills for future success and well-being, while parents can pursue adult education, employment, and higher income.[5] Increasing social mobility for families helps decrease children's exposure to adverse experiences (e.g., violence, neglect, and family dysfunction). High-quality childcare has also been found to improve math and reading ability, increase the likelihood of graduating from college, and decrease the likelihood of receiving public assistance and coming into contact with the justice system.[6] Despite these benefits, fewer than half of children in the U.S. age 3 or younger are currently enrolled in childcare.[7] While caring for children

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…children to develop foundational skills for future success and well-being and…



…parents to pursue adult education, employment, and higher incomes

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Evidence is mounting that…

…fully developing each child's potential is greatly enhanced by preschool geared toward the natural strengths of the youngest children…

…whose **brains are primed** to discover their worlds through play, creativity, and physical activity



…**replacing playtime with academic tasks** so that 5-year-olds can read is counterproductive.



Comprehensive, high-quality early education and childcare programs are excellent public investments…

…delivering a lifetime return on investment of **13%** each year.

and yet…

Fewer than half of young children get the recommended 60 minutes of physical activity a day. Physical education has slipped as a priority…

$460 per school year



A new emotional tool kit for longevity…

People who learn these traits in early childhood have more time to practice and hone them…

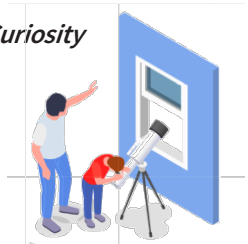
Resilience



Self-efficacy



Curiosity



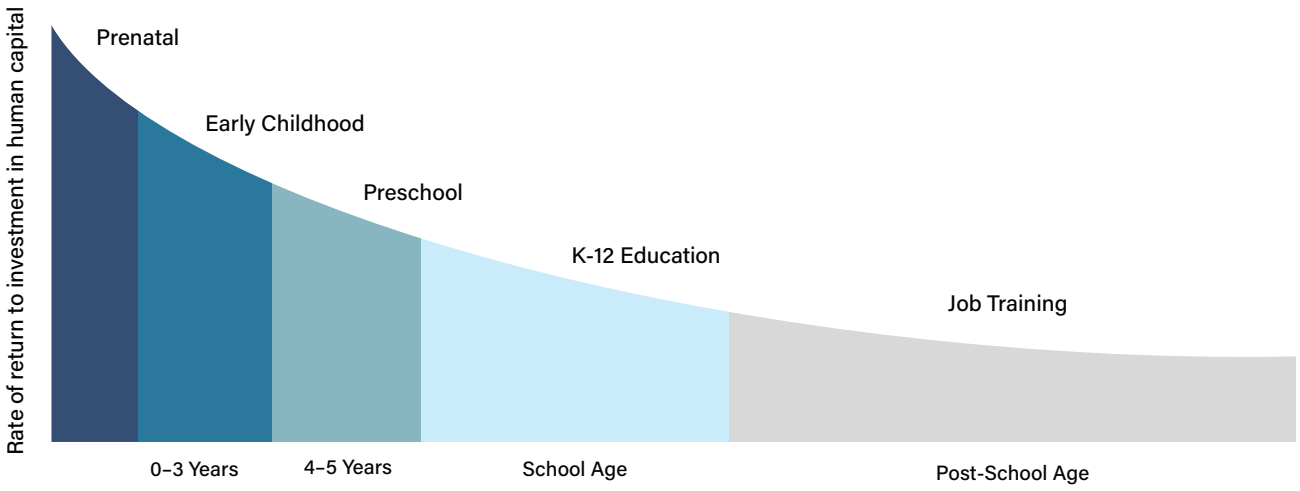
at home will continue to be the choice for many, providing childcare options increases the odds of success for those who need it.

Fully developing each child's potential is greatly enhanced by preschool geared to the natural strengths of the youngest children, whose brains are primed to discover their worlds through play, creativity, and physical activity. Adequate time in early childhood for these activities enhances later academic skills. There is no need to sacrifice one for the other, and evidence is mounting that replacing playtime with academic tasks so that 5-year-olds can read is counterproductive.

The pivotal years between birth and kindergarten are also the optimal time for children to acquire many of the cognitive, emotional, and social skills needed for a healthy, happy, and long life. Creating opportunities for that process to unfold, rather than pressuring the youngest children into becoming small facsimiles of older learners, not only makes childhood better, it lays the foundation for learning, collaboration, and productivity over a long life. Economic models suggest that comprehensive, high-quality early education and childcare programs are excellent public investments, delivering a lifetime return on investment of 13 percent each year.[8] Programs that target the earliest years of childhood provide even stronger rates of return to investment in human capital than do programs that start at preschool ages or later.

These investments yield other meaningful returns over 100-year lives. As people live longer and the roles and social norms associated with age become more fluid and self-defined, less uniform and regimented, qualities such as resilience, self-efficacy (a belief in one's own abilities to shape outcomes), and curiosity rather than dread when confronted with change, will become the emotional toolkit for longevity. People who learn these traits in early childhood have more time to practice and hone them during adolescence and early adulthood, and they are then better equipped to navigate the challenging passages that can be brought on by illness, disability, job loss, career change, divorce, or financial setbacks later in life.

Investing Early in Life Yields High ROI (Heckman, 2006)



3. Align Health Spans to Life Spans

While median life expectancies have increased dramatically over the past century, the years in which people are healthy, mobile, mentally sharp, and free of pain—defined as *health span*—have not kept pace.

Bringing health and life spans into sync starts at birth, as investments in early childhood cost less and deliver higher returns than those later in life.

A key principle of The New Map of Life is that healthy aging requires investments in health at *every* life stage, and that the process begins in childhood, when access to healthcare services from newborn screenings to childhood vaccinations, and programs to provide adequate nutrition, are essential to ensure that children are set early in life on the trajectory for longevity.

Early childhood is a critical time for establishing healthy behaviors that contribute to disease prevention and that are foundational for lifelong engagement in physical activities.[9] Current guidelines recommend that young children engage in at least 60 minutes of moderate to vigorous physical activity every day,[10] yet nearly half of children do not meet these guidelines.[11] Physical activity starts to decline when children enter school[12] and are required to spend more time sitting in a classroom. Physical education has slipped as a priority—the median physical education budget for elementary schools is only $460 per school year.[13]

In the full context of 100-year lives, lifestyle modifications have the potential to create meaningful, enriching years with increased well-being and resilience. Physical activity, nutrition, sleep, stress management, social connection,



and access to preventative healthcare are all factors that impact well-being throughout life. These behaviors can impact one another, and they are also associated with race, socioeconomic status, and other variables, giving rise to an unlimited number of lifestyle paths people can take starting in early childhood.

Tracing lifestyle behaviors through a 100-year life highlights strong opportunities in three key areas: fitness, nutrition, and sedentary behavior. Outdoor play and connection to nature in early childhood are associated with the development of autonomy and independence, whereas television viewing time is associated with the development of obesity and increased risk of cardiovascular disease later in life.[14,15] Simple interventions like providing more time for recess and creating opportunities for children to safely walk or ride their bikes to school can influence lifestyle habits from a young age. Research shows that lack of regular access to green space can slow a child's cognitive development by up to 12 months.[16] Access to green spaces also corresponds with beneficial behaviors such as exercise routines and social interaction, while lack of access

Health Span, *a new longevity metric…*



…captures the quality of life that life span cannot, measuring multiple dimensions of wellness

The full promise of longevity can only be realized…

…through expanded investments in public health so that more people have access to basic care, starting in childhood



Screening and vaccination

Nutrition



Influencing lifestyle habits from a young age is critical…



…simple interventions like creating opportunities for children to safely walk or ride their bikes to school



Access to green spaces corresponds with exercise and better mental health while lack of access corresponds to adverse health outcomes

Research shows a lack of regular access to green space can slow a child's cognitive development by **up to 12 months**



Many low-income communities are **"food deserts,"** lacking supermarkets, gardens, or other sources of healthy food

Discrimination and poverty



Addressing societal health disparities…

…means addressing the systems that produce them…

A clearer focus on health span will also help in…

…expanding access to healthcare through telemedicine is vital for older adults and people in low-income and rural communities



Environmental damage

…and importantly…



…access to high speed internet becomes a healthcare essential

corresponds to adverse health outcomes, including cardiovascular and respiratory diseases, impaired brain and nerve functioning, obesity, stress, and higher body-mass index.[17,18,19]

As children advance into their adolescent years, screen time and social media take a toll on self-esteem and self-efficacy.[20] As adolescents transition into young adults and working-age adults, substance use and stress become key considerations.

Along with sedentary behavior, obesity rates are affected by eating habits, nutrition quality, and food access that impact health starting at a young age. It is common to attribute healthier outcomes to lifestyle choices and virtues such as willpower and self-discipline, but the physical environments and institutional constraints that impoverished children and adults contend with mean that the choices taken for granted in more affluent communities may not exist. Many low-income communities are "food deserts," lacking supermarkets, gardens, or other sources of healthy food; improving access to affordable, fresh, and nutritious food for all is essential to improving health. Addressing health disparities means addressing the systems that produce them—investing not only in better access to healthcare, but in the health of all communities, especially those affected by poverty, discrimination, and environmental damage.

The potential for healthier aging is within reach, but a major challenge remains in making the benefits of better health available to all. The full promise of longevity can only be realized if advances in individualized therapies are complemented by a much expanded investment in population-level delivery of prevention and health promotion by the public health system. Otherwise, medical innovations will widen the already profound health disparities in the U.S., excluding those who cannot pay and lack access to even basic healthcare.

Expanding and modernizing public health into a true national system can improve access to healthcare for all. Interventions at the community level to address obesity, stress-related diseases and certain mental health needs that benefit entire populations can be more beneficial, cost-effective, and conducive to longevity than interventions for individuals. The same is true for preventing other diseases and conditions associated with aging. Preparing for longevity demands that we identify and prioritize investments in public health and medical and technological innovations that will extend the health span of the greatest number of people, allowing them to remain in the workforce and driving down the aggregate cost of care.

Between 1900 and 2000, advances in public health such as sanitation, vaccination campaigns, better prenatal care, and reductions in infant mortality contributed to the dramatic extension of average life spans in the U.S., albeit with tremendous disparities due to race and income, and similar disparities evident in the delivery of healthcare at the individual level. By contrast, Costa Rica, with much lower per capita income and per capita healthcare expenditure, has surpassed the U.S. in life expectancy by making investments in public health, and the prevention of chronic diseases associated with aging, central to the delivery of medical care through its national health system.

We can use health span as a public health objective that gives healthcare providers as well as policymakers a more detailed and relevant picture of the conditions, needs, and disparities that contribute directly to longevity differences among populations. "Extended health span" should become a new metric for determining how, when, and where public health funding can be most effectively directed. Expanding access to healthcare through telemedicine is vital for older adults and people in low-income and rural communities, which in turn makes access to universal high-speed internet a healthcare essential.[21]

These services, which saw a sweeping uptake during the pandemic, include virtual visits, specialty care and specialist interpretation, and health dashboards. Aided by data from wearable smart devices, the delivery of precision, personalized medicine can alert the wearer to abnormal metabolic variations that signal illness, as well as exposure to infection, allowing for earlier and less costly intervention. It can also connect wearers to public health alerts. All of these technologies must, of course, be designed and implemented in ways that preserve the privacy of individuals and prevent personal data from falling into the wrong hands.

4. Prepare to Be Amazed by the Future of Aging

Today's 5-year-olds will benefit from an astonishing array of medical advances and emerging technologies that will make their experience of aging far different from that of today's older adults.



As they age, these future centenarians might have electronic tattoos functioning as "smart skin" to monitor heart, brain, and muscle function for abnormal activity or disease. These bio-integrated electronic devices, thinner than a human hair and as supple as skin, could supplant today's wearable technologies (smart watches, Fitbits, and the like) and be capable of preventing an epilepsy attack, resetting an irregular heartbeat, or sending biometric data to be analyzed by a doctor for early intervention. Heart attacks and strokes could be diagnosed remotely in their earliest moments, possibly reducing severe organ damage and death.

In the future, older adults will be able to remain mobile longer than they do now, with the help of thin, wearable exoskeletons or exosuits that let them walk and run with enhanced strength, much as e-bike riders power uphill without huffing and puffing. (As a bonus, the energy generated during a workout with a wearable exoskeleton battery can be used to charge a phone or download a map.) Unlike wheelchairs, these devices can be tuned to provide enough support to maintain normal normal activities while still allowing muscles to exercise to their capacity, preserving muscle mass. Some exoskeletons will be capable of sending electronic impulses to help injured muscles heal, and in the case of paralysis, reversing some of the effects. Therapeutic robots tiny enough to float in the bloodstream will be able to deliver precision payloads of medicine to malignant cells.

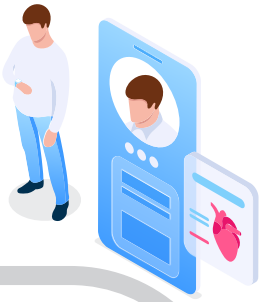
As they reach middle age and beyond, today's kindergarteners will find products to ease their journey that go well beyond multivitamins and hearing aids. In youth sports, 3D-printed braces and pads, customized to each athlete, will help prevent injury. Sleep may be enhanced by unobtrusive monitors that sense disturbances and adjust temperature and light. Later in life, how we learn, earn, and achieve financial security; how

Precision and personalized medicine

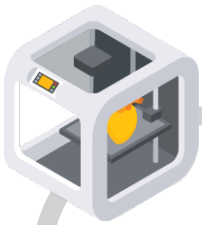
Future centenarians might deploy technology functioning as **"smart skin"** to monitor heart, brain, and muscle function for abnormal activity or disease



Bio-integrated electronic devices could be capable of preventing an epilepsy attack, resetting an irregular heartbeat, or sending biometric data to be analyzed by a doctor for early intervention



3D-printed braces and pads, customized to the individual, will help prevent injury





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Remedies for age-related issues will be **built into clothing, cars, and homes**

Sleep may be enhanced by unobtrusive monitors that sense disturbances and adjust temperature and light.





Geroscience offers advanced interventions at the cellular or genetic level that can slow, stop, or even reverse processes that drive multiple age-related diseases

The emerging field of geroscience

These advances promise to alter the future of aging. They can delay or prevent the onset of age-related diseases and conditions, improve early detection of disease, and help to reduce the cost of delivering healthcare as people age



remedies for chronic issues will be built into clothing, cars, and homes, much as driver-assist technologies are already making cars safer with blind spot indicators and automatic braking. For example, the ABEO Smartsystem shoe, developed by Stanford professor Tom Andriacchi, a member of the faculty steering committee of the Stanford Center on Longevity, helps alleviate osteoarthritis pain in the knee with a specially designed sole.

The goal of The New Map of Life is not for people to live forever, but have what they need to enjoy the longest possible health span over the course of their longer lives...

These are just some of the technologies already in development or in the marketplace today. While we cannot know what breakthroughs will come next, we can count on the pace of innovation to accelerate, as an ever larger segment of the population seeks products and treatments to improve health and functioning as they age.

And while there is no way to stop the process of aging, there is strong evidence that the biology of aging is malleable. The emerging field of geroscience has the potential to transform how we age, by seeking to identify—and "reprogram"—the genetic, molecular, and cellular mechanisms that make age the dominant risk factor for certain diseases and degenerative conditions. Rather than treating individual diseases or conditions related to age as medicine does now, as they emerge, one after the other, geroscience offers advanced interventions at the cellular or genetic level that can slow, stop, or even reverse processes that drive multiple age-related diseases. These include many forms of cancer, hypertension, diabetes, Alzheimer's and other forms of dementia, as well as degenerative conditions such as arthritis, osteopenia, sarcopenia, and frailty.

Whether longer health spans are realized through investments in early childhood healthcare, public health and telemedicine, geroscience, precision, personalized medicine –or all of the above– these advances promise to alter the future of aging. They can delay or prevent the onset of age-related diseases and conditions, improve early detection of health risks, and help to bend the cost curve of delivering healthcare as people age. These increased opportunities for healthy aging have the potential to redefine old age from a period associated with illness, frailty, and dependence into yet another life stage with potential for vitality, independence, and continued contributions to society.

A clearer awareness of health span can also contribute to a cultural shift around dying, giving people more control over the end-of-life care they receive. When their health span can no longer be reasonably extended, many older or terminally ill people may choose palliative care over spending their final days or weeks in a hospital intensive care unit, without the suffering and expense that are so often incurred. A longevity-ready society also offers scenarios for dignified and comfortable death. The goal of The New Map of Life is not for people to live forever, but have what they need to enjoy the longest possible health span over the course of their longer lives, doing the things that matter to them, for as long as possible, with minimal suffering or loss of function until the time their lives ultimately do come to a natural end.

5. Life Transitions Are a Feature, Not a Bug

While the conventional life course is a one-way road through prescripted stages, The New Map of Life offers multiple routes connecting the roles, opportunities, and obligations that 100-year lives will bring and it's expected that people will reset the GPS often.

There are intersections, cloverleafs, curves, on-ramps, and off-ramps to and from the decades of life dedicated to paid work, providing more opportunities for informal learning and lifelong learning, and for intergenerational partnerships that improve the flow of knowledge, support, and care in all directions. This isn't evidence of chaos; it is an accurate reflection of the many choice points people face along the course of life. There are also ample opportunities to correct course when the inevitable bumps, curves, and roadblocks knock us off our stride—or when we see new opportunities.

Flexibility is the mantra, and course corrections are the norm. Rather than fixed chapters that span 70 years and focus consecutively on education, work, and retirement, we envision several shorter, flexible intervals dedicated to learning, working, caregiving, and leisure that are woven as needed into the course of 100-year lives, with working intervals likely to include more than one primary career.

Those who must veer at one point or make a U-turn at another deserve support for their resilience in the aftermath of a mistake, miscalculation, or misfortune. Adversity may be inevitable in life, but a central design feature in The New Map of Life is that it need not be irreversible. And sometimes transitions feel like adversities because they are experienced in isolation and lack the social rituals that otherwise ease major life changes. Rather than associating the second half of life principally with menopause, retirement, and death, we can create social observances around meaningful milestones such as volunteering and mentoring, returning to work, launching an encore career or a new business, downsizing a home, or getting back into the game after illness or injury with physical limitations. Understanding that transitions are the norm and worthy of social acceptance, even celebration, will make us stronger as individuals and as a society.



Rather than associating the second half of life principally with menopause, retirement, and death, we can create social observances around meaningful milestones such as volunteering and mentoring, returning to work, launching an encore career or a new business, downsizing a home, or getting back into the game after illness or injury with physical limitations.


Fluidity in the timing of life's milestones creates options for thriving throughout all stages of life
The whole-of-life approach is about optimizing each stage of life
Ample opportunities to change course when the inevitable bumps and roadblocks knock us off our stride
Opportunities for informal learning and for working learners
Shorter, flexible intervals dedicated to learning, working, caregiving, and leisure that are woven as needed into the course of 100-year lives
Savor **the benefits of childhood**
Reset the course as needed or desired during middle age through upskilling, reskilling, and career changes
Feel engaged and valued, healthy and financially secure in later adulthood

6. Learn Throughout Life

As shifting gears and navigating crossroads become common experiences over our longer lives, we will need new ways to prepare for them.

Job changes, career changes, health changes, family changes, economic changes, changes in aptitude and ability will be accompanied by the need for new skills, perspectives and training.

Given the strong links between education, health, and longevity, The New Map of Life calls for innovation and more flexible options in our education system so that more people can develop their potential, remaining productive and engaged throughout their longer lives. A useful place to start is with the distinction between *learning*, the process of acquiring knowledge or modifying existing knowledge and skills and *education*, providing systematic instruction. Learning and education are often conflated, with education assumed to entail a cognitive task of limited duration, within the confines of a formal institution, which children enter at kindergarten and emerge from after high school or college, presumably prepared to enter the workforce.

And rather than front-loading formal education into the first two decades of life, The New Map of Life lays out new options for learning outside the confines of formal education, with people of all ages able to acquire the knowledge they need at each stage of their lives and to access it in ways that fit their needs, interests, abilities, schedules, and budgets. Lifelong learning provides not only economic opportunities but also measurable health benefits, especially for older adults. Maintaining stimulating activities improves cognitive and physical health.[22] The state of Georgia, for example, has made tuition free at all state universities and colleges for residents 62 and older, whether senior scholars are enrolling for credit toward a degree or auditing.



If children are to be truly educated for the challenges and opportunities that their longer lives will bring, we must undertake two simultaneous and challenging changes. First, we must close the pervasive opportunity gaps in the current educational system that prevent so many children from fulfilling their potential due to racial or socioeconomic barriers, such as living in unsafe, unhealthy neighborhoods, attending poorly resourced schools, or being the first in their families to try to attend college. Second, we must create new pathways for learning that are less tethered to formal institutions, along with credentials for the resulting skills that are recognized by employers and society more broadly.

We have to rethink the four-year college degree as the golden ticket to economic advancement. Two-thirds of Americans do not obtain a four-year degree, and even for those who can afford it, college need not be the only path to the middle class or the sole credential for employability. Workers of all ages and educational levels need ways to qualify for jobs that pay a living wage. These options include apprenticeships and other

Learning



…acquiring or modifying existing knowledge and skills

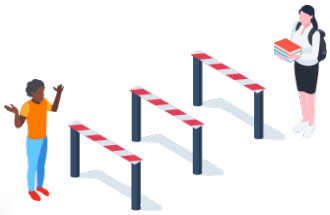
…are often conflated



Education

…providing systematic instruction

Close the pervasive opportunity gaps in K-12 education



Two simultaneous challenges

Create new learning and credentials pathways less tethered to formal institutions





Lifelong learning provides economic opportunities and measurable health benefits, especially for older adults



College need not be the only path to the middle class or the sole credential for employability



Two-thirds of Americans do not obtain a four-year degree and need pathways to advancement

Upskilling through community colleges





Workers of all ages and educational levels need ways to qualify for jobs that pay a living wage

Trade apprenticeships





Online education micro-degrees

"Post-traditional learners"

More than 60 percent of undergraduates are now over the age of 25, working full-time, meeting family responsibilities, or enrolled in the military



Working learners need online or hybrid formats to move at their own pace

employer-based training and certifications, online education micro-degrees, and retraining and upskilling through community colleges.

Institutions must also adapt to the realities of students' lives. More than 60 percent of undergraduates are now classified as "post-traditional learners," meaning they are over the age of 25, working full-time, meeting family responsibilities, or enrolled in the military.[23]

These students need to access education online or in a hybrid format that lets them move at their own pace and integrate learning into their other daily responsibilities. The same holds true for hybrid learning at the K-12 level. Rather than teaching all children the same curriculum at the same time, AI-driven programs can identify a student's strengths, challenges, and interests, and customize lessons to meet them.

7. Work More Years, With More Flexibility

Over the course of 100-year lives, we can expect to work 60 years or more.

But we won't work as we do now, cramming 40-hour weeks and 50 work weeks a year (for those who can afford vacation) into lives impossibly packed from morning till night with parenting, family, caregiving, schooling, and other obligations. Rather than muddling through this time famine familiar to working parents, imagine instead a longevity buffet with heaping, delectable servings of time—time to build a career, to start and raise a family, tend a marriage, care for aging parents, volunteer at the kids' school and for other forms of civic engagement, time to exercise, sleep, to make and see friends, to cook a meal every now and again, to acquire new skills or take a midlife sabbatical, time to explore new careers or to travel. For those who find buffets overwhelming, think of The New Map of Life this way: Rather than 30 years of work being the main course of a 70-year life span, for centenarians, *life* will be the main course and work a series of side dishes, served over the course of many decades.

This doesn't mean we don't need or like to work. Work provides many benefits aside from the obvious contributions to financial well-being.



Workers are healthier and more socially engaged than nonworkers. They live in more stimulating worlds. Workers spend more and pay more taxes than nonworkers, producing benefits for individuals and society. But to be sustainable, even enjoyable, these extra decades in the workplace must offer greater flexibility through midlife internships and gap years, and other intervals that will space out earning and non-earning years to accommodate child-rearing, eldercare, health needs, upskilling, reskilling, and leisure.

It means that we must work in ways that are more humane and sustainable—and more productive in



Less pressure to pack each stage of a longer life…

The New Map of Life envisions on-ramps and off-ramps allowing workers to extend their working lives over many decades

Imagine more flexible, less sequential routes through all the roles, opportunities, and obligations of life



The Pandemic
…made clear the desperate need for greater workplace flexibility to meet the needs of working parents

Disproportionate childcare burdens weigh on women in the workplace





Older workers will continue to grow as a portion of the workforce

This means taking on **ageist stereotypes** and policies…

From…
…age determined retirement "cliff"?



Incentivizing retired workers to return to the workplace

Consulting or gig work

Work-from-home options

Flexible schedules

"Return-ships"



To…

"Glide paths" to retirement?



For younger workers, an **"open loop"** can relieve pressure at other life stages



Cultural and policy changes are needed…

Employment and tax policies

Medicare

Social Security policy

New financial products that protect income in non-working years

the long run. The COVID-19 pandemic cracked open fault lines that were already long and deep in Americans' working lives. It raised uncomfortable questions about what it means to be an "essential" worker (and to whom), the deep economic and racial inequities that often demanded the greatest risks and costs be carried by those least able to afford them, and the disproportionate childcare burdens on women in the workplace. It also made clear the desperate need for greater workplace flexibility to accommodate the needs of working parents in a society with no paid parental leave and piecemeal childcare options that convey choices and benefits to the most advantaged. An AARP survey found that during the pandemic nearly half (more than two in five) of mid-career and older women were either caring for an adult family member, friend, child or grandchild, limiting for many the hours available for paid work.

In place of the traditional life course consisting of three distinct stages—education, work, and retirement—each profoundly influenced by a person's socioeconomic place in life, we envision more flexible, less sequential routes through all of the roles, opportunities, and obligations that life brings.

The pandemic also prompted soul-searching for many about the centrality and meaning of work in American culture, along with a renewed quest to achieve the elusive work-life balance. Collectively, these seismic shifts signal an opportune time to develop big solutions for how employers and policymakers might respond at this juncture for the benefit of employees and families, and in the interests of a post-pandemic society that is also longevity-ready. Initial efforts are underway: the California legislature is considering a bill that would reduce the work week to four days for companies with 500 or more employees;[24] a similar bill has been introduced at the federal level. While it is unlikely such proposals will soon become law, they mark an important pivot away from long-held beliefs that full-time work rests on 40 hour work weeks. Many employers are responding to the labor shortages of the pandemic era by offering 32-hour work weeks to attract and retain workers.

In place of the traditional life course consisting of three distinct stages—education, work, and retirement—each profoundly influenced by a person's socioeconomic place in life, we envision more flexible, less sequential routes through all of the roles, opportunities, and obligations that life brings. We can start by replacing the traditional one-way street from education to work to retirement with more flexible routes in and out of the workplace, including paid and unpaid intervals for caregiving, health needs, lifelong learning, and other transitions to be expected over century-long lives.

Because The New Map of Life includes on-ramps and off-ramps allowing workers to extend their working lives over many decades, older workers will continue to grow as a portion of the workforce. And this means taking on ageist stereotypes and policies. The conventional wisdom that older adults represent a net drain on resources is based on an inaccurate view that equates aging with a loss of productivity. Measuring and assigning value to the contributions of older adults is one way to counter ageism in the workplace. London Business School professor Andrew Scott, an early collaborator on The New Map of Life, has proposed a 3-Dimensional Longevity Dividend, which takes an expansive view of productivity that includes the paid labor, volunteer time, and caregiving hours of workers over the age of 65. Older people who work spend more money and pay more taxes; whether they remain engaged through paid or volunteer work, older workers are healthier and have greater mental agility than those who do not.

Rather than plunging over a retirement "cliff" at a time predetermined by age, workers can choose a "glide path" to retirement over the course of several years, allowing them to gradually reduce working hours while remaining in the workforce. Some companies are also experimenting with

"returnships" that incentivize retired workers to come back to the workplace to share their expertise and alleviate skilled labor shortages.

While all workers value flexibility, studies show that older workers are more likely to opt for a flexible schedule over promotions or pay increases, drawing many to consulting or gig work, and creating incentives for employers to offer part-time jobs and work-from-home options. For younger workers, an "open loop" can relieve pressure at other life stages—for example, at the outset of parenthood, when the demands of peak career-building years collide with the time demands of starting families, especially for women. For new parents, who show the lowest levels of job satisfaction, the key to retention and higher future productivity is childcare.

Allowing—and encouraging—workers to move in and out of the workplace will require cultural change, as well as changes to employment and tax policies that now drive older adults seeking a respite from paid work into early or forced retirement, when they face illness or caregiving responsibilities. Unplanned or unwanted retirements deprive individuals of income, employers of productivity, and governments of income and payroll taxes. Changes to Social Security policy would allow retirees who want to resume paid work to do so, without being penalized by reductions in benefits. Allowing Medicare to cover the full employee health costs of workers over the age of 65 would remove a key barrier for employers concerned that retaining or hiring an older worker would increase their healthcare costs.

Older people who work spend more money and pay more taxes; whether they remain engaged through paid or volunteer work, older workers are healthier and have greater mental agility than those who do not.

These changes will give workers of all ages and life stages a more sustainable and financially secure approach to their 100-year lives.

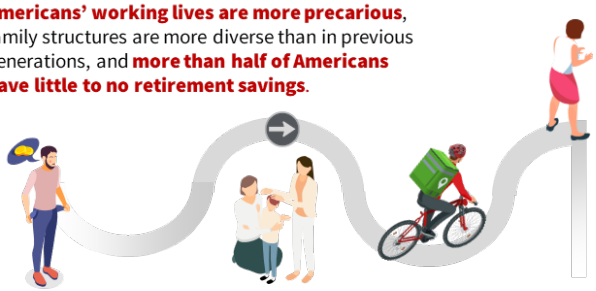
8. Build Financial Security from The Start

Financing 100-year lives requires new pathways for working, saving, and retiring.

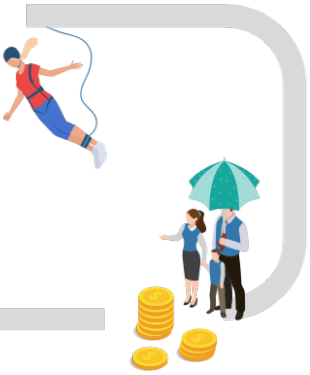
It also calls for new policies that are responsive to current economic realities: Americans' working lives are more precarious, family structures are more diverse than in previous generations, and more than half of Americans have little to no retirement savings. Without the safety net of Medicare and Social Security, one-third of older adults would live below the poverty line. The need for private long-term care or in-home care services can impose crushing financial burdens on families.



Americans' working lives are more precarious, family structures are more diverse than in previous generations, and **more than half of Americans have little to no retirement savings**.



Without the safety net of Medicare and Social Security, **one-third of older adults would live below the poverty line**



Longevity compels us to rethink how we finance *all* the stages of life, not only retirement – and to develop new tools, policies, incentives and norms that underlie savings and investment behavior.

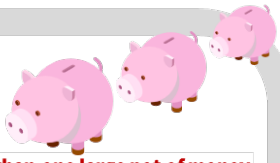


Our need for new financial infrastructure is every bit as urgent as the need to renew our social and physical infrastructure

Workers of all ages need new savings options. These needs call for changes in institutional and government policies



The New Map of Life unfolds more as an Easter egg hunt with financial reserves stashed along the garden path…



Rather than one large pot of money we need new financial products targeting educational sabbaticals and renewal sabbaticals, as well as emergency funds…



Financial education for midlife and older workers is just as important as it is for students



Workers need to better **understand the benefits of working longer** and how to **optimize Social Security claiming strategies**.



A single parent whose paycheck can cover rent or daycare but not both will tend to prioritize surviving in the moment over saving and planning for the future.

…and revealed the caregiving crisis at the heart of the financial insecurity so many Americans experience,



The pandemic magnified the deep racial inequities that often demanded the greatest risks and costs be carried by those least able to afford them…





The New Map of Life seeks to create more opportunities and position toeholds for building financial security that will allow people to not only finance retirement, but to build financial resilience throughout life.

The portrayal of aging gig workers in an Amazon warehouse in the film "Nomadland" speaks to the experiences –and the fears– of significant numbers of Americans, yet the cultural narrative is shaped by advertisements featuring affluent couples as they review their retirement accounts and ponder their dreams. The financial circumstances of most Americans lie between these extremes. We must address these economic realities and build greater financial opportunities and resilience throughout life, not only because people are living longer, but because our need for new financial infrastructure is every bit as urgent as the need to renew our social and physical infrastructure, so that more people have greater opportunity to participate in the economy, to achieve financial security for themselves and their families, and to generate societal returns through taxes and spending.

Longevity compels us to rethink how we finance *all* the stages of life, not only retirement – and to develop new tools, policies, incentives and norms that underlie savings and investment behavior. The whole of life approach applies to financial health, just as it does to setting the trajectory at birth for better physical, emotional and social health throughout life, and to investing in early childhood education as a key lever to improve earning potential decades later in a person's life.

While the conventional life model conditions us to save money during our working years and collect a pot of gold at the end of the rainbow as we retire, the New Map of Life unfolds more as an Easter egg hunt, with financial reserves stashed along the garden path, that can be used to pay for the learning, upskilling, reskilling, caregiving and recharging intervals that will be woven throughout the earning years of longer lives. These needs call for changes in institutional and government policies, along with new financial products that protect income streams during life transitions, illness, or disability. This may well require government guarantees or risk pooling.



The New Map of Life seeks to create more opportunities and position toeholds for building financial security, understanding that the actions of individuals are shaped within a wider social and economic context.

Workers of all ages need new savings options. Rather than one large fund of money saved for retirement or a child's college education, we need new financial products targeting educational sabbaticals and renewal sabbaticals, as well as emergency funds that reduce the risk of chronic stress from worrying about job loss, and tax policies that support the development and consumer acceptance of these products. Financial education for midlife and older workers is just as important as it is for students. In planning and approaching retirement, workers need to better understand the benefits of working longer and how to optimize Social Security claiming strategies. With appropriate employer and tax incentives, more workers can take a glide path and avoid the negative financial and health consequences that often come from going over the retirement cliff.

In a society where disparities in economic opportunity at birth are pervasive and compound throughout life, we must recognize that individual behavior is only one piece of building financial security. A single parent whose paycheck can cover a car repair or daycare but not both, or a worker compelled to leave her paid job to care for a family member, will tend to prioritize surviving in the moment over saving and planning for the future. The stress of living in poverty or scrambling at its edge is all-consuming and precludes choices people in the middle class take for granted. Finding an apartment in a better school district for the kids, coming up with tuition and carving out time to earn credentials and degrees may feel more like a mirage than attainable steps on the path to upward mobility.

The New Map of Life seeks to create more opportunities and position toeholds for building financial security, understanding that the actions of individuals are shaped within a wider social and economic context. The pandemic magnified the deep racial inequities that often demanded the greatest risks and costs be carried by those least able to afford them, the disproportionate childcare burdens on women in the workplace, and the desperate need for greater workplace flexibility to accommodate the needs of working parents in a society with no paid parental leave and piecemeal childcare options that convey choices and benefits to the most advantaged.

Above all, it revealed the caregiving crisis at the heart of the financial insecurity so many Americans experience, and forced a fast-forward view of what life could be like in a society in which people live much longer, yet that has failed to transform itself and become longevity-ready. The New Map of Life shows us not only how to avert this scenario, it points to steps we can take out of this current impasse, to innovate financial products, design policies and create opportunities that will allow people to not only finance retirement, but to build financial resilience and security throughout life.

9. Age Diversity Is a Net Positive for Societies — and the Bottom Line

Never before in human history have so many generations been alive at the same time, creating opportunities for intergenerational connection that have until now been impossible.



With life expectancy hovering around 30 years as recently as the 1800s, for much of human existence people had just enough time to pass on their genes and provide basic sustenance during their children's early years. Even by 1900, when life expectancy reached 47 years, only 6 percent of American children had four living grandparents; by 2000, that figure had risen to 40 percent. In 1900, about four in ten people were under the age of 20, while only 6 percent were over the age of 60. Today, there are comparable numbers of people in every age group, from birth through their 70s, with increasing numbers in their 80s and 90s.

This era of unprecedented age diversity means society benefits from a complementarity of skills and abilities that people develop over their lives. The speed, strength, and zest for discovery common in younger people, combined with the emotional intelligence and wisdom prevalent among older people, create possibilities for families, communities, and workplaces that haven't existed before. Having more older people means that children can receive more attention from grandparents or other caring adults.

Multigenerational families can share financial and social resources, including housing and caregiving, deepening social responsibility and engagement across generations.

A 2021 survey by the nonprofit organization Generations United found that one in four Americans were living in a household with three or more generations, and that multigenerational living has nearly quadrupled in the past decade.

Much of that surge can be attributed to the economic pressures of the pandemic: Nearly six in ten of those surveyed say they doubled or tripled up with family members due to a change in financial circumstances caused by the pandemic. Perhaps most interesting though, 72 percent of respondents say they plan to continue living in multigenerational households for the long term, citing benefits that include enhanced family bonds, greater ease of meeting the care needs of family members, improved mental and/or physical health, and improved finances or more time to continue school or job training.

Age diversity brings profound implications for the workforce as well. While stereotypes portray older workers as less healthy, productive, and tech-savvy than their younger counterparts, the evidence suggests that older workers in knowledge jobs are superior in attendance, judgment, and mentoring skills, and fully capable of mastering the technology requirements of their jobs. As with other aspects of diversity, age-diverse work teams are often more productive, are more likely to help colleagues, and have lower turnover than those that are less age-diverse.

Workers over the age of 55 are the fastest-growing cohort, now comprising 25 percent of the U.S. workforce. While older knowledge workers tend to have higher salaries than their younger counterparts, they are less likely to change jobs or be absent due to illness, less likely to make costly mistakes than their younger counterparts, and more able and willing to work collaboratively, rather than competing with colleagues for future advantages. As people age, their need to be personally recognized for achievements, whether at work or in other environments, tends to decline. Meanwhile, older workers develop an increased sense of competence, and they become motivated to use their vast repertoire of skills to help others. All of these factors serve to improve workplace climate and reduce turnover among workers of all ages, lowering costs for employers.[25,26]

As people age, there are also cognitive and emotional benefits—for example, in honing skills derived from experience, such as solving social dilemmas.[27] Compared to older adults in the past, older adults today are healthier and more likely to work or volunteer in their communities. While there are great variations in abilities and needs among people 65 and older, these variations tend to go unmeasured, which means that the 65+ demographic—all 52 million of them—are often still lumped by marketers, media, and policymakers into a monolith assumed to represent a drain on society, rather than an enormous, untapped source of human capital.

Changing the narrative to value age diversity along with other forms of diversity is more than an exercise in semantics; it is essential if we are to make use of the immense reserves of knowledge, experience, and skills in older adults who want to remain productive through paid work, volunteering or mentoring, so that we can deploy them across the country at a time of tremendous need. Misguided assumptions drive misguided employment policies, practices and ageism. (think of the “old-age dependency ratio” and compulsory retirement ages). Rather than dwelling so anxiously on the costs incurred by an “aging” society, through the lens of longevity we can reframe the conversation around measuring and reaping the remarkable dividends of a society that is in fact age-diverse.

Nearly **30 years** were added to lifespans in the U.S. and other wealthy nations in the 20th century



Life Expectancy

77 years
2000

47 years
1900

30 years
1800

Children can receive more attention from grandparents and other caring adults in their lives



One in four Americans living in a household with three or more generations



Cited benefits

Multigenerational families can share financial and social resources…



Greater ease of meeting the care needs of family members



Improved mental and/or physical health



Improved finances

Enhanced family bonds

More time to continue school or job training

Workers over the age of 55 are the fastest-growing cohort, now comprising **25 percent** of the U.S. workforce.

Age Diversity Brings Profound Implications For The Workforce

Older Worker Redundant Stereotypes

Myth	Reality
Less productive	Older workers in knowledge jobs are superior in judgment, reliability, and mentoring skills
Less healthy	Older people today are in better functional health than past generations
Less tech savvy	Older workers are capable of mastering the technology requirements of their jobs.

Older workers apply their vast repertoire of skills to help co-workers improving workplace climate, thus lowering costs for employers



Multigenerational workforces provide an array of benefits.[28]

Becoming a longevity-ready society presents an imperative to undo the age segregation that took hold in American society over the past century, as young people left family farms in search of higher-paying jobs and the population became concentrated in cities and suburbs designed for nuclear families. Modernity and economic progress succeeded in delivering longer lives, but along the way, many Americans lost chances to share wisdom, joy, and everyday moments with extended family. Meanwhile, working parents struggle with stress-inducing gaps in caregiving, emotional support, and financial security. A key challenge ahead is to intentionally foster meaningful and supportive connections among different generations, to take full advantage of social capital that humans have never before had available. Making the most of this unprecedented opportunity is both an imperative and a gift of longevity.

10. Build Longevity-Ready Communities

Becoming longevity-ready means changing how we set the course for healthy and productive aging at *all* ages

and stages of life; how we learn, earn, and achieve financial security; how we value, give, and receive care; how we design the places and spaces that shape our longer lives; and how we live with a changing climate, while doing less with more. None of this can happen without dismantling barriers that have constrained life choices and chances for people, based on race, income, or location.

As a nation, we must start now to design and build neighborhoods that are longevity-ready. Transforming our built environment is within our control in more ways than we let ourselves believe. As Americans debate whether to invest trillions of dollars in an expansive view of infrastructure that includes closing the digital divide, as well as advance human potential, including universal preschool and publicly funded community college, it is important to assess potential value through the lens of longevity: Which investments will produce the highest returns for the greatest number of people over the course of a century?

By this standard, closing the digital divide will deliver returns for lifelong learners of all ages, increased labor productivity, access to healthcare, and greater equity for low-income and rural communities. In low-income communities, existing assets such as libraries and schools can become community centers, offering nutritious food, vaccinations, internet access, English lessons, and job training for adults. More broadly, we see the opportunity for an "infrastructure triple play" to meet three overlapping sets of needs:



1. Making investments to advance human potential, especially for Americans who have been held back by racism or poverty, creating conditions for a healthier, more productive, and economically competitive population.

2. Reengineering U.S. infrastructure in preparation for longer human lives, with built environments that are more walkable and provide access to mass transit, healthcare, and opportunities for lifelong learning, and that foster intergenerational connections.

3. Investing to help communities adapt and protect their residents from the increasingly severe effects of climate change.

Governments at all levels can score proposals and award infrastructure contracts based on the bidding company's ability to deliver simultaneously on greater resistance to climate change, economic equity, and the needs of a longevity-ready society. Such an approach can incentivize designs with greater access to public

green space, through the construction of parks and walkways and the removal of urban freeways, delivering all of the desired dividends.

To promote energy efficiency without compromising quality of life, governments at the local, state, and federal levels can offer incentives through loans, rebates, and tax policies to reduce consumption and increase use of renewables. We can make doing more with less more profitable. Similar incentives can be applied to encourage construction with new technologies such as cool pavements, cool roofs, and cool walls that counter urban heat-island effects, and employing design principles such as green/blue infrastructure that leverage the natural protective and cooling qualities of vegetation and water features in urban environments.

The physical environment in the places children grow up and adults grow old sets us on trajectories that determine the quality and length of our lives. Whether air and water are clean or toxic, whether housing has lead in pipes or paint, whether fresh, nutritious food is available, or there are safe places to play and exercise outdoors, whether a neighborhood offers quality schools, economic opportunities, access to healthcare, and other needed social supports—these are critical factors underlying longevity.

The impacts of the physical environment begin before birth, with advantages and disadvantages accumulating over the entire course of life. This is especially true for Americans living in poverty, who experience significant disparities in life expectancy that can be traced directly to the conditions where they live. The effects of the environment are evidenced in a study conducted in 2010, where researchers measured and compared the gene expression of a large sample of Americans across the country. Fifty percent of the differentially expressed genes were attributed to living in urban versus rural areas, while only 5 percent were attributed to ancestry and gender.[29]

Safe and flexible housing for an age-diverse population is one area of unmet need—and tremendous opportunity. Over the next 20 years, according to the Joint Center for Housing Studies at Harvard, households led by people in their 80s will be the fastest-growing age group. In 2011, the most recent year for which data is available, fewer than 4 percent of U.S. households had basic disability access features. The shortage of age-friendly and multigenerational housing will require concerted action by policymakers and homebuilders in the public and private sectors. We also need “grandfamily” housing for the increasing number of grandparents who are raising their grandchildren on their own.

The U.S. will require a wide range of solutions on a national scale that are feasible not only in cities, but also in suburbs and rural areas. It may be most cost-effective in cities to change zoning policies to encourage more multigenerational housing as well as places for on-site caregivers to live. But in rural areas, the greater need might be access to telemedicine via better broadband, or transportation options for adults no longer able to drive. We have to develop and apply the right solutions in the right places.

We are living in a unique and challenging era that demands systemic change on several fronts at once. Most immediate is the social and economic restructuring driven by the pandemic that places greater emphasis on equity, flexibility for workers, and accurately measuring the foundational value of the care economy that underlies all other economic activity—and rewarding providers appropriately. Second are the investments and policies needed to protect communities against the increasing dangers of climate change and to transition our economy to renewable sources of energy. This requires innovation in housing, transportation, and how we design our built environment to make better use of the buffering and health-promoting benefits of nature. Intersecting with both of these deep shifts are the

The opportunity for an "infrastructure triple play"

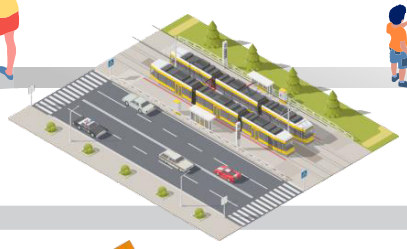
1. **Investments to advance human potential**, especially for Americans who have been held back by racism or poverty.

The impacts of physical environment begin before birth, with advantages and disadvantages accumulating over the entire course of life





2. **Reengineer U.S. infrastructure** in preparation for longer human lives.



3. Adapt and protect communities from **the effects of climate change**.



Critical factors underlying longevity

Neighborhoods that offer quality schools, economic opportunities, access to healthcare

Safe places to play and exercise outdoors

Clean air and water

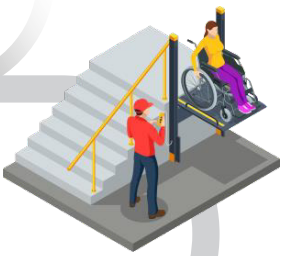
Fresh, nutritious food availability

Safe and flexible housing for an age-diverse population...

an unmet need and tremendous opportunity

Households led by people in their 80s will be the fastest-growing segment by age group

In 2011, **fewer than 4 percent of U.S. households** had basic disability access feature









Solutions on a national scale must be feasible not only in cities, **but also in suburbs and rural areas**

We must develop and apply the right solutions in the right places

Zoning and planning decisions are up to local governments, state and federal policies can incentivize the development of climate-resistant, livable, walkable communities



investments, institutions, and policies that can at the same time transform our society to make the most of longevity's promise.

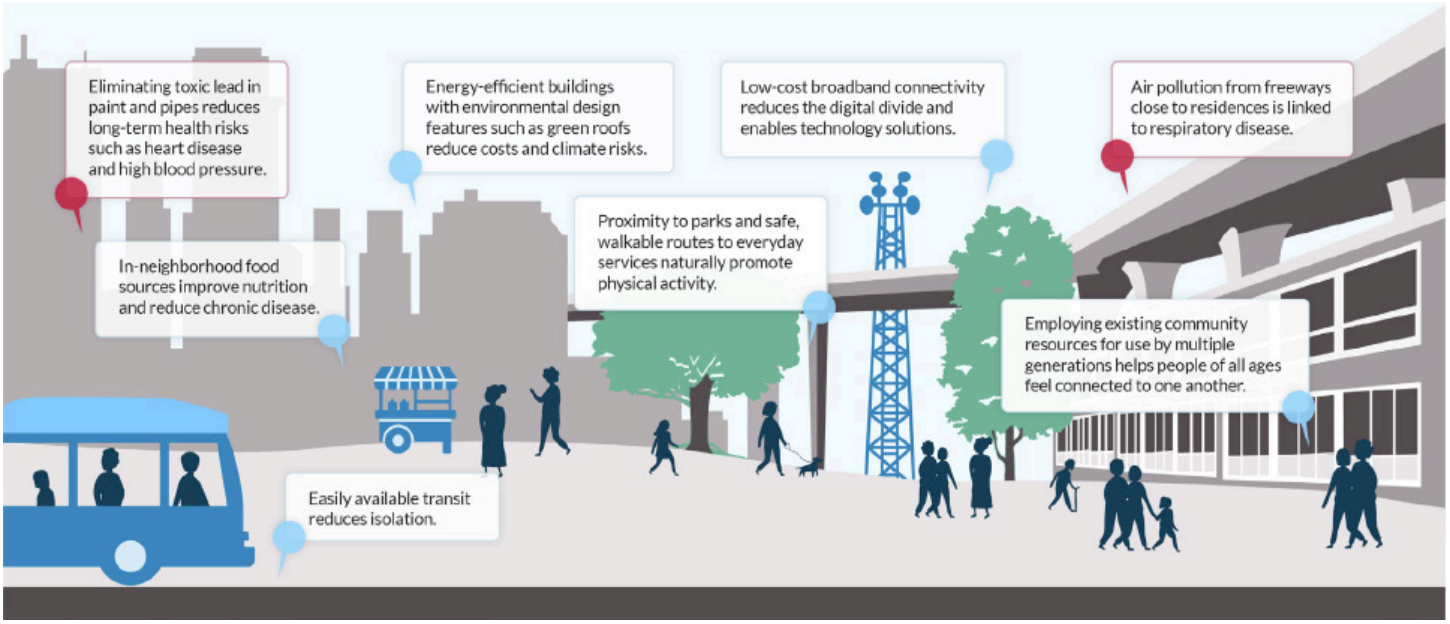
*Air pollution costs the U.S. roughly **5 percent of its yearly GDP** in damages ($790 billion in 2014). The highest costs come from early deaths due to fine particle exposure.*[30]

Longevity-Ready Communities

The homes and neighborhoods where we live shape our lives in myriad ways, and the impacts cannot be overstated. Built environments encompass risk factors and potential benefits starting in childhood, including how likely an individual is to be physically active, whether they are isolated or socially engaged, how likely they are to develop respiratory, cardiovascular, or neurodegenerative disease, and even cognitive development. The graphic below illustrates the breadth of impact that built-environment choices can have on life at all ages.

While zoning and planning decisions are up to local governments, state and federal policies can incentivize the development of climate-resistant, livable, walkable communities that promote the well-being and safety of people of all ages. The up-front costs of energy-efficient construction and green/blue design may in some instances be higher than conventional methods, but there are multiple returns on investment that make such structures cost-effective over time—whether measured in lower energy consumption and maintenance expenses, in reduced insurance costs through greater resilience against catastrophic weather events, or in the well-being and lower healthcare costs of residents of all ages.

Built environment choices can improve long lives





The Road Ahead

Creating a longevity-ready world is an all-hands, all-sector undertaking, requiring innovation at scale from the private sector, government, medicine, academia, and philanthropy. The challenges are too complex to be the sole responsibility of government, healthcare providers, insurance companies, employers or educators, families, individuals or communities. Our collective challenge is to develop social innovations that will help people remain healthy and productive over the course of longer lives. It isn't enough to reimagine or rethink our longevity-ready future; we intend to build it, and fast. The policies and investments we undertake today will influence how the current young will become the future old, and whether we make the most of the 30 extra years of life that have been handed to us.

Acknowledgements

The New Map of Life reflects the input of world class scientists, dedicated philanthropists, business leaders, and community organizers. It reflects the guidance of a remarkable Advisory Council that kept the initiative focused on societal impacts every step along the way.

We owe special thanks to the present and past leadership of the Advisory Council. Russ Hill, Chairman of the Stanford Center on Longevity Advisory Council sparked ideas, provided foundational support, and offered critical guidance at every stage of the project. Advisory Council Vice-Chair, Linda Tarplin, contributed policy expertise and a critical eye that informed and balanced the effort. John (Jack) Rowe, inaugural chairman of the Council and luminary in the field of aging advised the project from its inception. Of course, we will never forget the support, inspiration, and good sense that former Advisory Council Chair, James Johnson, contributed to this work. We hope that this report would have pleased him.

The New Map of Life got its start in 2018 with a workshop co-led by Mark Cullen, then Director of the Stanford Center of Population Health Sciences, and Mark Duggan, Director, of the Stanford Institute for Economic Policy Research, in which a diverse group of experts came together to envision what high quality century-long lives could be and to identify ways to achieve them. At the 2018 meeting and throughout the effort, we benefitted from the expertise from several academic contributors outside of Stanford who became key partners in charting new maps of life.

The initiative was made possible by the generosity and vision of our sponsors, who saw the potential represented in the initiative, and contributed both financial support and a wealth of expertise and encouragement. Sponsors included Wallis Annenberg and the Annenberg Foundation, Bank of America/ Merrill Lynch, Tushara Canekeratne, The Eisner Foundation, The Hewlett Foundation, Honda Motor Company, Inc., The Packard Foundation, the Rainwater Charitable Foundation, and Halbert Hargrove. We are especially grateful to Cinny Kennard, Surya Kolluri, Carol Larson, Jane Nakagawa, Andrew Sieg, Jeremy Smith, and Trent Stamp for their guidance throughout the effort.

At its core, the New Map of Life report reflects the work of ten Stanford fellows who worked tirelessly for two years to analyze and envision critical domains of life that must change to support century long lives. Each fellow was guided by a Stanford faculty advisor, who provided input to fellows and contributed directly to the project. Thomas Rando, Deputy Director of the Stanford Center on Longevity shared unparalleled knowledge of geroscience. A highlight of the initiative was a weekly seminar for the fellows, in which they heard from internationally acclaimed experts spanning academic disciplines, businesses, and industries and generated lively discussions and insights as they came to know each other in a richly

multidisciplinary environment. We thank all of our speakers for these invariably instructive sessions. The resulting domain reports - focused on built environments, climate, early childhood, education, financial security, healthcare, intergenerational relationships, lifestyles, and work - provided the basis for the present integrated report skillfully interwoven by Karen Breslau. During the latter phases of the project, we received strong support from our communications partners at Palisades Media and RALLY.

This report would not exist without the tireless efforts of a talented and dedicated staff at the Stanford Center on Longevity. They operate much like a family, supporting one another when needed and going above and beyond when challenges arise, even a global pandemic. It is my great privilege to work with these remarkable colleagues.



Laura L. Carstensen
Founding Director, Stanford Center on Longevity
Professor of Psychology
The Fairleigh S. Dickinson Jr. Professor in Public Policy
Stanford University

Stanford Center on Longevity Advisory Council

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Kathleen Brown
Partner, Government and Regulatory Healthcare Financial Services & Banking Manatt, Phelps & Phillips, LLP

M. Michele Burns
Former CEO, Mercer

Tushara Canekeratne
Founder & CEO, Nadastra, Inc. Co- Founder Virtusa Corporation

R. Martin Chavez
Retired Partner, Goldman Sachs

Kathleen E. Christensen
Former Program Director, Alfred P. Sloan Foundation

Chip Conley
Strategic Advisor for Hospitality and Leadership, Airbnb

Kim Dorgan
Managing Director, SIGNAL Group to Redbrick Partners

Irene Mecchi
American Writer

Thomas E. Moore, III
Senior Managing Director, First Republic Bank
Ryan O'Hara CEO, President, Board Director, Investor

Paul Pagnato
CEO Founder, PagnatoKarp

Catherine B. Reynolds
Chairman and CEO, The Catherine B. Reynolds Foundation

John (Jack) Rowe – Founding Chairman Professor, Department of Health Policy and Management, Columbia University Mailman School of Public Health

Amit Sachdev
Executive Vice President, Chief Regulatory Officer and Chief of Staff to the CEO, Vertex

Maureen Schafer
President, The Schafer Company

Andy Sieg
President, Merrill Lynch Wealth Management, Bank of America Corporation

Rick Smith
President, Pinkerton Foundation

Ann Bennett Spence
Managing Director, Cambridge Associates, LLC

Sarah Stoker, Ph.D.
Clinical Psychologist

Margaret (Margie) Sullivan
Founder and Chief Executive Officer, Sullivan Strategy

Allen Thorpe
Managing Director, Hellman & Friedman, LLC

Solomon Trujillo
Chief Executive Officer, Trujillo Group, LLC

Norman Volk
Chairman, The John A. Hartford Foundation, New York, and Member of the Hartford Board
(1979)

Geraldine (Gerri) Walsh
President, FINRA Investor Education Foundation Senior Vice President, FINRA Investor Education

Laysha Ward
Vice President and Chief External Engagement Officer, Target

Barbara Waxman
Gerontologist

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HALBERT HARGROVE

Academic Contributors

THE NEW MAP OF LIFE RESEARCH FELLOWS

Ilana Horwitz – Education Fellow

Diego Sierra Huertas – Built Environment Fellow

Sasha Shen Johfre – Eisner Foundation Intergenerational Fellow

Andrea Jonas – Healthcare and Technology Fellow

Matteo Leombrone – Financial Security Fellow

Alice Milivinti – Work Fellow

Jonas Miller – Early Childhood Fellow

Megan Deakins Roche – Lifestyle Fellow

Jialu Streeter – Financial Security Fellow

Chenghao Wang – Climate Fellow

THE NEW MAP OF LIFE STANFORD FACULTY ADVISORS

Michael Fredericson (Medicine)

Jeremy Freese (Sociology)

Ian Gotlib (Psychology)

Robert Jackson (Earth Sciences)

Ari Kelman (Education)

David Rehkopf (Medicine)

Nirav Shah (Stanford Center for Clinical Excellence Research)

Gopi Shah Goda (Stanford Institute for Economic Policy Research)

Mitchell Stevens (Education)
Paul Wise (Medicine)

DISTINGUISHED ACADEMIC PARTNERS

Linda Fried (Columbia Public Health)

Andrew Scott (London Business School Economics)

Teresa Seeman (UCLA)

John Wong (National University of Singapore Medicine)

THE NEW MAP OF LIFE SEMINAR SPEAKERS

Amani Allen (UC-Berkeley)

Ramsey Alwin (National Coalition on Aging)

Steve Cole (UCLA)

Chip Conley (The Modern Elder Academy)

Noelle Daly (Stanford)

Thomas Egan (Foundation for Senior Living)

John Etchemendy (Stanford)

Ruth Finklestein (Hunter College)

Marc Freedman (Encore.org)

Anne Friedlander (Stanford)

Terry Fulmer (John A. Hartford Foundation)

Alan Goldstein (Proctor and Gamble Ventures)

Fei Fei Li (Stanford)

David Lindeman (UC-CITRIS)

Richard Louv (Author)

Haig Nalbantian (Mercer)

Richard Saller (Stanford)

Daniel Shen (Eargo)

John Shoven (Stanford)

Marcia Stefanick (Stanford)

Myra Strober (Stanford)

Debra Whitman (AARP)

Jamie Zeitzer (Stanford)

Amanda Zink (Waymo)

COMMUNICATIONS

Karen Breslau (Feature Well Stories)

Ken Stern (Palisades Media)

RALLY (an issue-driven communications firm)

Stanford Center on Longevity Staff

Joleen Castro

Marie Conley-Smith

Martha Deevy

Jackie Macdonald

David Pagano

Julia Randell-Khan

Ken Smith

Laura Tejero

Nikki Tran Duff

Expert Contributors from the Initial New Map of Life Workshop

Deborah Abele (Annenberg Foundation)

Russ Altman (Stanford)

Michelle Barry (Stanford)

Tim Brown (USAA)

M. Kate Bundorf (Stanford)

Deland Chan (Stanford)

Carrie Cihak (King County Government)

Jonathan Collie (MD, Author)

Ric Edelman (Edelman Financial Services)

Andrew Elder (University of Edinburgh)

Dale Garell (Photographer)

Jerry Jacobs (University of Pennsylvania)

Kate Jerome (Author)

Katy Fike (Aging 2.0, Generator Ventures)

David Gensler (Gensler Design)

Paul Irving (Milken Institute)

Russ Hill (Halbert Hargrove)

Robert Kaplan (Stanford)

Jodee Kozlak (Kozlak Capital Partners)

Iris Litt (Stanford)

Hazel Markus (Stanford)

Pat Milligan (Mercer)

Arnold Milstein (Stanford)

Sanjiv Mirchandani (Fidelity)

Lis Nielson (National Institute on Aging)

Lark Park (Office of Governor Edmund G. Brown)

Philip Pizzo (Stanford)

Denise Pope (Stanford)

Cecilia Ridgeway (Stanford)

Tom Robinson (Stanford)

John Rother (National Coalition on Healthcare)

Francesca Salipur (Stanford)

Sara Singer (Stanford)

Aaron Smith (YI Advisors)

Matthais Weber (SwissRe)

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