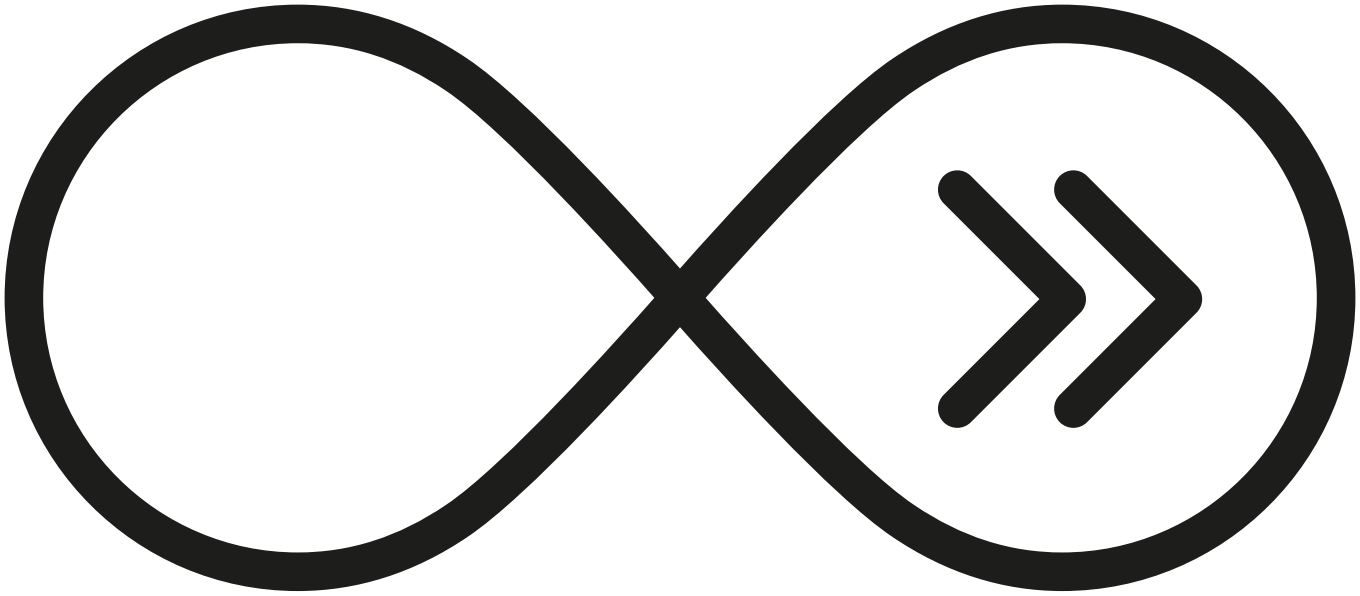
Fundación Innovación Bankinter

FTF Future Trends Forum

29 English Version

Longevity



Longevity

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Thank you so much,
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Jay Olshansky
Professor at the School of Public Health University of Illinois at Chicago, Research Associate at the Center on Aging at the University of Chicago.

What We Talk about When We Talk about Longevity

1.0.

Intro

Jay Olshansky

Jay Olshansky received his Ph.D. in Sociology at the University of Chicago. He is currently a Professor in the School of Public Health at the University of Illinois at Chicago, Research Associate at the Center on Aging at the University of Chicago and at the London School of Hygiene and Tropical Medicine, and Chief Scientist at Lapetus Solutions, Inc.

The focus of his research to date has been on estimates of the upper limits to human longevity, exploring the health and public policy implications associated with individual and population aging, forecasts of the size, survival, and age structure of the population, pursuit of the scientific means to slow aging in people (The Longevity Dividend), and global implications of the re-emergence of infectious and parasitic diseases. He is on the Board of Directors of the American Federation of Aging Research.

The passage of clock time occurs at the same pace for everyone, but the passage of biological time occurs at a different pace in us all. There are two factors that influence the rate of biological time – the force of genetics or family history, and the lifestyle choices we make during the course of life. In long-lived populations today, almost everyone survives past age 65, which means most live long enough to exhibit the health consequences of both genetics and lifestyle. Now that the diseases of aging are a common occurrence, our modern world faces a new dilemma – what happens if we continue to attack major fatal diseases one at a time just as we did a century ago when we engaged in a battle with infectious diseases? One view of our longevity future suggests we can forever continue to make incremental progress in life extension as we did in the past. Another view suggests that unless we attack the underlying risk factor for diseases that appear later in life – which is the biological process of aging – future cohorts of older people could face a protracted period of frailty and disability. Scientists from across the globe have now accepted the latter hypothesis, and a new public health initiative has been born – known as the Longevity Dividend Initiative or Geroscience. Efforts to slow aging are now accelerating under the premise that this new paradigm in public health will become the most effective method of primary prevention to come along since the dissemination of vaccines and antibiotics more than 70 years ago.

Chris Meyer
CEO of Nerve LLC.

+INFO

We know how most tales in the history of oral and written literature end: "and they lived happily ever after." However, reality is always far more complex than fiction, and this perfect ending won't be the case for the increase in longevity that society is currently experiencing. Chris Meyer explains: "*We know that people are living longer at an individual level, but the question is, what repercussions will increased longevity have?*". After all, increased longevity has and will have an impact on many different aspects of society. Health, education, politics, even ethics! To complicate things even further, individual responses are useless when it comes to this issue. "It's not about identifying trends in one specific area, it's about figuring out how those trends will interact with one another and transform society," Meyer adds. He also highlights that this changing situation is the perfect breeding ground for new business, political, and individual opportunities. One particular phrase perfectly sums up the current situation surrounding longevity: "the sky is the limit."

There's such confusion surrounding longevity that people cannot even agree on how long they would like to live and work, if given the choice. At the beginning of the 19th Future Trends Forum (Madrid, December 2017), our panel of experts chose 94.1 and 81.5 as the ideal life expectancy and retirement age, respectively (even though they would later agree that "retirement age" is a blurry concept). By the end of the conference, the answers had shifted to 94 and 79.3, respectively. The mere fact that such a variety of replies emerged from a group of people interested in this field raises many interesting questions. For instance, why would someone wish to die before reaching the average life expectancy in many Western countries, Spain included? Oliver Thorn, YouTuber and creator of the web series PhilosohyTube, who was also one of the youngest participants in the forum, claims that both his grandfathers began to develop dementia at 75. "But how do you know that we won't have found the cure for dementia by the time you reach that age?," another participant argues. This is just one of many unanswered questions that come up when we try to define what we talk about when we talk about longevity.

How Long Can We Expect to Stay Healthy?

1.1.

The concept of "healthspan", or "healthy life expectancy", has been coined to try and provide an answer to this question. In the field of demography, there's a widely used concept called "the distribution of death". It basically presents an in-depth study or picture of how death impacts a certain population.

If we analyse this metric in a population born in 1900, we will find a very high mortality rate among infants and children, as well as women around twenty years old (proof of the frequency of maternal mortality during that

There's such confusion surrounding longevity that people cannot even agree on how long they would like to live and work, if given the choice.

Jay Olshansky
Professor at the School of Public Health University of Illinois at Chicago, Research Associate at the Center on Aging at the University of Chicago.

+INFO

Jay Olshansky
How long we can expect to be healthy?

8:31min

time). But if a person survived those first two decades, it wasn't uncommon for him or her to live to 50, 60 or 70. Nowadays, things have changed. Thanks to humanity's progress, we were able to dramatically decrease early-age mortality during the 20th century, especially with regards to infectious diseases.

"*We redistributed death from the young to the old. We built what I refer to as the mortality mountain. This is the current distribution in most developed nations,*" Jay Olshansky explains. This means that although the risk of death has decreased for human beings in general, the age trajectory of death has never changed. There's a pattern: increased longevity is linked to poorer health at a certain point of the distribution of death.

There's a concept in American football called "the red zone". It basically means that once the ball reaches a particular point on the field, it's almost impossible to move it any further because that zone is packed with defensive liners. It's the same thing with longevity: once a population reaches a very high life expectancy, it becomes increasingly more difficult to raise it any further. In that "red zone", frailty, disability and risk of death rise exponentially every few years. "Here's the dilemma: we've successfully postponed life expectancy from 65 to over 80, but during this extended period, health problems tend to pile up", Olshansky points out.

That's the big paradox: most of the diseases that appear in this red zone are a consequence of the increase in life expectancy, since they can only occur during this age range. Therefore, we face a dilemma: to live longer with a worse state of health, or to live a shorter life with a better state of health? Disciplines like Public Health and Epidemiology have studied this problem in depth and, in fact, they have come up with a name for it: competing risks.

The almost universally prevailing approach right now focuses on attacking age-related diseases one by one. Medical professionals are therefore putting their heart and soul into finding a cure for cancer, dementia, heart disease... But some experts wonder: is this the best strategy for increasing healthspan? Olshansky's answer is categorical: no, it's not, and if we continue to go down this path, we will expose the survivors to new diseases that are going to raise levels of disability. *"In my opinion, increasing life expectancy in the way we are currently approaching it is a harmful strategy."*

This American expert, and many others like him, suggest a different solution: promoting what they call "geroscience", focusing exclusively on slowing down the biological process of ageing. Olshansky believes, however, that increased life expectancy will follow as a logical consequence.

As with most longevity-related issues, the scientific community is far from being unanimous with regards to this view. It is certainly questionable, at the very least. For example, there is debate surrounding whether or not all age-related diseases necessarily result in a reduction in quality of life, and to what extent. Society's tolerance level towards disability is another interesting discussion topic. "It would seem that death is a more positive diagnosis than dementia," Aviva Sufian warns. She adds, "This is a widely accepted framework in the public health sector that we should re-evaluate." Neuroscientist António Damásio points out that lumping all diseases that cause frailty and disability together is a rampant simplification. It's true that conditions such as Alzheimer's and heart disease seem to have a common root cause, but they don't entail the same level of disability. They don't impact our ability to lead a long and productive life in the same way.

But even if we accept this geroscience-based view, it begs the question: can we currently slow down the biological process of ageing with therapeutic treatment? Data and publications seem to suggest that this belief is rooted in optimism and faith, rather than scientific evidence.

Aubrey de Grey
Chief Science Officer and
Co-founder of the SENS
Research Foundation.

What Will our Life Expectancy Be?

1.2.

Intro

Aubrey de Grey

Aubrey de Grey, British researcher on aging, claims he has drawn a roadmap to defeat biological aging. He is the Chief Science Officer and Co-founder of SENS Research Foundation, and VP of New Technology Discovery at AgeX Therapeutics. His main focus is on rejuvenation: that is, the active repair of the various types of molecular and cellular damage which eventually cause age-related disease and disability.

We should be more careful with how we use words like "aging", "longevity", "lifespan", "healthspan" and so on. Like any words, they have not only meaning but also connotations - baggage that is brought to mind when one hears them. And unfortunately, some of that baggage is misleading and distracting - and damagingly so.

First let's say what these words really mean, and then let's look at the "baggage damage" that results from confusing these meanings.

"Aging" is a process that limits longevity, lifespan and healthspan in all higher animals. It is the lifelong accumulation of molecular and cellular changes to the body's structure and composition that occur as intrinsic consequences of the body's normal operation. The creation this damage is, therefore, unavoidable. Moreover, even though long-lived species accumulate damage more slowly than short-lived ones, the minimum rate of accumulation for a given individual is basically not reducible by ny optimisation of lifestyle, diet, etc. Note, however, that the rate can be increased by particularly bad lifestyle choices.

But why do these changes matter? They matter because the body is set up to work best when those changes have not occurred, or only to a limited extent, and eventually the amount of change causes an impairment and eventual cessation of body function. That's why we usually call these changes "damage".

Next, what is "healthspan"? It's how long you stay healthy, of course - but its precise definition centres on aging, so it is how long (starting from birth) you avoid becoming permanently unhealthy as a result of carrying too much damage. Quantifying healthspan is tricky only because everyone has their own definition of the threshold of declining function (mental and/or physical) below which someone should be viewed as unhealthy.

"Longevity" and "lifespan" are used somewhat interchangeably, but usually we say "longevity" to refer to how long a given individual lives before they die, whereas "lifespan" denotes how long someone COULD live if nothing unlucky happens to them.

OK, so what about that baggage? Well, the basic problem is that there is a huge tendency, by almost everybody, to forget that healspan and lifespan are very tightly linked. The sicker you are, the higher your chances of dying soon - simple as that. But if we forget that, then any discussion of future medicines that would extend lifespan is assumed to describe a world in which healthspan is unaltered, so in which people are living longer in a state of health typical of people who, today, are likely to die quite soon. This is obviously an unattractive image, so this error unjustifiably engenders ambivalence or even opposition towards the development of such medicines. Let's stop making that mistake!

Aviva Sufian
Specialist Leader at Deloitte.

+INFO

Antonio Damasio
David Dornsife Professor of Neuroscience at University of Southern California. Trustee of Bankinter Innovation Foundation.

+INFO

When it comes to increasing human beings' life expectancy, there is one researcher who embodies optimism: Aubrey de Grey. He maintains that the current approach to longevity is based on a false premise, and that the focus should be on increasing healthspan, not lifespan. "*In reality, that's not what's happening, and we're failing to achieve either of the two*", he claims. The cofounder of SENS states that an extended lifespan must be and "can only be" a consequence of an extended healthspan. He believes that the focus should be on improving health, and that's what geroscience is based on.

But there's one important point which de Grey and Olshansky disagree on. De Grey believes that viewing the "ageing process" as a one holistic notion can lead us to search for "magic bullets", easy strategies to slow down the ageing process.

So what would the ideal approach to this problem be? De Grey banks on a classic military tactic: divide and conquer. In other words, prioritising prevention. "*We have to examine, classify and address the increasing deterioration in our bodies, but keeping in mind that what we call "deterioration" is a consequence of an accumulation of changes that are inherent to life, modifications at a molecular and cellular level that the body can only tolerate up to a certain level, at which point it decides it's had enough,*" he explains.

His approach is not quite as holistic as it may seem at first glance, but it's still closer to that view than to the traditional method of going after one disease at a time. "We're facing a lot of problems, but, in the end, it's a manageable number of problems," he emphasises. Once again, we are discussing possibilities rather than realities: the expert himself speaks of his "belief" that medicine will be able to solve these issues in the near future.

In any case, these hypothetical treatments would help not only those who reach 80 or 90 in good health, but also those who fall ill at 60 or 70. Because science does seem to support the idea that although everyone dies at different ages, the kind of deterioration built up before death is the same. That is, we contract the same diseases, but some of us do so sooner than others. "This is good news: it means that we should be able to develop rejuvenating treatments that work for everyone, except that some people will need them sooner and more frequently than others", the expert concludes.

It's important to highlight that these treatments are still purely theoretical, and it is admittedly important to establish a timeline. But is it possible? Not even their biggest advocate believes so. In fact, de Grey claims that mentioning a date would be mere speculation. In his view, this does not mean that the answer should be "it will happen when it happens", just that each expert must give the most accurate prediction they can for their field, without forgetting the element of speculation. So why set a timeline at all if we have no idea of its accuracy? The reason has to do with society's perception regarding the defeat of ageing: without a specific timeline, they tend to view it as science fiction. "If we let this fatalistic attitude thrive in society, we will not only be fostering a world in which diseases like Alzheimer's will increase, we will also be delaying the inclusion of these treatments in clinical practice," he says. The reason is quite simple: anti-age-

The concept of "healthspan", or "healthy life expectancy", has been coined to try and provide an answer to this question.

ing medicine requires funding. De Grey's personal stance is that there's a 50% chance of developing these treatments within the next 20 to 30 years. However, he believes that they should be pursued even if they took a century to develop.

The idea that we will be able to treat ageing with therapies that are still being studied and which have absolutely no evidentiary support is highly controversial within the scientific community, as evidenced during the Forum.

But even if we accept this hypothesis, it raises many sensitive questions. Stephen Johnston, CEO and cofounder of Aging 2.0, puts the focus on the economic cost of these treatments, and wonders whether they will have a wide impact on society or whether they will be available

to only a select few. It is not a trivial matter, given that nowadays geriatric medicine is extremely expensive and only accessible to those with a higher economic status, especially in societies with not-so-protective social security systems. De Grey doesn't think this is going to be an issue with age-prevention medicine because, in his view, it will work, contrary to current medicine. "Modern medicine can slightly delay death, but the end always comes, sooner or later," he says.

What would happen, though, if anti-ageing therapeutic treatments really worked? Logically, chronically ill people who were born many years ago could suddenly return to a good state of health. This would involve two types of savings. On the one hand, we could stop spending money on ineffective therapies and on "keeping ill people alive". On the other hand, those people would start, or go back to, being productive. "Even if these therapies were incredibly expensive, it's obvious that the

Aubrey de Grey
Chief Science Officer and Co-founder of the SENS Research Foundation.

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trade-off would be worth it," de Grey says. He adds that not making them available for free to any elderly person who might need them would be "economic suicide, from a social perspective."

In spite of speculations that the, still inexistent, anti-ageing therapies would be expensive, there is already one treatment about to start its clinical trial which does not conform to this premise. Last year, a molecule currently used to treat diabetes, metformin, became the first medicine to be authorised by the FDA to be tried as an anti-ageing drug. The TAME trial, led by Dr. Nir Barzilai, from the Albert Einstein College of Medicine, together with the American Federation for Aging Research (AFAR), will test this molecule on 3000 volunteers who will take it for six years to corroborate whether it increases life expectancy. "The trial will begin next year and the cost is minimal: if it works, it would be cheap and available to everyone," Olshansky says. The expert believes, however, that cost should never be a hindrance and reminds us that many public health developments from the past 200 years have not been equally available to everyone, including health, clean water and education, among others.

In short, even though scientists disagree on whether it is possible to extend our lifespan while remaining in good health, all stakeholders seem to agree that the so-called "red zone" needs to be reduced. "The discrepancies are mostly surrounding the specific mechanisms and

Aubrey de Grey
Will the human being live eternally?

1:34min

approach we should take," Meyer emphasises. Science is certainly working on it. Among many other studies, it is worth noting that the Longitudinal Healthy Longevity Survey, carried out in China with the financial support of the American National Institutes of Health, has assessed the genetics, behaviours and expected lifespan of centenarians who have reached that age in a good state of health. This study will undoubtedly shed some light on this burgeoning field and on the question we would all like to know the answer to: what will our life expectancy be?

How Long Can We Expect to Work?

1.3.

Even though longevity is, in theory, something we all wish for, it clearly presents some challenges as well. As John Martin acknowledges, one partial solution to the challenges posed by longevity is to work for longer. This solution could help secure the financial sustainability of social protection systems into the future—from pensions to the free universal healthcare that many countries, including Spain, offer—but it would also help promote active ageing, as we know from various studies.

The landscape of the labour market of older workers (conventionally defined as those who are aged 55 and over) has undergone many changes in the past few years, especially since the beginning of the 21st century.

Up until the 1990s, there was a trend towards early retirement that has been reversed in the past decade. In fact, data shows that in the 34 countries that make up the Organisation for Economic Co-operation and Development (OECD), employment rates for the age group 55-64 increased by almost 12% between the years 2000 and 2016. In fact, in these countries, one in every seven people aged 70 to 74 were employed in

What will our life expectancy be?

John Martin
Member of the Irish Government's Labour Market Council and Member of the National Statistics Board of Ireland.

+INFO

2016. There are some salient examples like the case of Germany, where the older worker employment rate has risen by 30%, even in age groups beyond the typical retirement age, such as the 70-74 age group. However, the employment rates in this age bracket are lower than in the 55-64 age group.

What is the reason behind this shift? Public policy has clearly played quite a significant role. "There has been a strong movement to curb early retirement incentives and to give positive incentives to those who carry on working," Martin highlights.

Nonetheless, this increase in older workers should be divided into two components. The first is the so-called retention rate: the proportion of older workers who remain with the same company for longer. The second is the hiring rate of older workers: the degree to which employers are actually increasing hiring of older workers to fill job vacancies. Given that the number of older workers in the labour force is going to rise significantly in the future, the increase in older worker employment should ideally come from an increase in the hiring rate, and not only the retention rate. However, the opposite is in fact true; a fact that Martin finds "worrisome".

This is proof that anti-age discrimination legislation in OECD countries is not effective: age is still an obstacle when it comes to hiring. This is particularly true among the older, long-term unemployed who often have a lower

John Martin

What is happening in the labour market of older workers?

9:34min

The landscape of the labour market of older workers (conventionally defined as those who are aged 55 and over) has undergone many changes in the past few years.

level of education and skills, making them less attractive for employers.

But there's another explanation: the role of pay according to experience or seniority. The current trend is that pay increases with job tenure up until workers reach roughly their mid-50s, and afterwards it starts to decline. This seniority pay premium, when combined with strict employment protection for permanent workers, makes hiring an older worker a very unattractive decision for employers.

Lastly, the alleged drop in productivity could also play a role. It's difficult to measure, but there is a general perception that productivity declines as people age beyond their 50s. Science has proven that our cognitive and social skills change as we age.

So if we want to boost the hiring of older workers as a partial solution to the challenges posed by longevity, we need public policies to help overcome the obstacles. There is another obstacle to be added to the list: the lack of certain skills, particularly digital skills, among older workers. Nonetheless, this tech deficit can also constitute an opportunity as, according to economists, digitisation could allow older people to combine work and leisure beyond the normal retirement age. In fact, self-employment and the gig economy have the potential to help many workers in this age range, but experience and skills will always be a plus when it comes to re-entering or staying in the labour market.

In light of the situation, we might ask if employment or self-employment is the only valid definition of "work". Anti-ageism (discrimination on the basis of age) activist Ashton Applewhite wonders if unpaid labour could be considered work. If so, older people are already contributing by, for example, looking after their grandchildren. "One of the biggest challenges we face is turning the definition of productivity around," she highlights. To illustrate this idea, she mentions the following data: if all unpaid family caregivers were paid between 12 and 15 dollars an hour, their contribution to the US economy would stand at 450 billion dollars.

This is not just about the labour market (whether we include unpaid work or not) being prepared to keep or welcome older workers. It is also a question of whether or not these people want to continue working. Some surveys show a high level of satisfaction among senior citizens who work, but we don't know to what extent the two are connected. The survey conducted among the participants of the Future Trends Forum evidenced that no one would choose the life expectancy age as the ideal retirement age. There are many factors at play here, including a psychological one.

In short, as with almost all matters related to increasing longevity, the answer to the question of how long we are going to work is far from being clear. This is one of the many imposing challenges that sociology and economy, among many other disciplines, will have to face.

Ashton Applewhite

Activist and author of This Chair Rocks: A Manifesto Against Ageism.

+INFO

John Martin
Member of the Irish Government's Labour Market Council and Member of the National Statistics Board of Ireland.

Repercussions of Increased Longevity

2.0.

Intro

John Martin

John Martin is an expert in social policy and in the labor market. He has worked for more than 30 years in the OECD, where he has been Director for Employment, Labor and Social Affairs. He has advised the French and Irish governments on employment policies.
He currently works as a consultant for the Bertelsmann Foundation in a project on the political economy of labour market reforms.

Population ageing is a huge global challenge, possibly as important as tackling climate change or other global threats. While increased longevity is a boon for much of the world's growing population, it also poses stark dilemmas for labour markets, health and social protection systems, and social and cultural norms concerning the concepts of "generations" and intergenerational equity.

Many OECD countries are already experiencing rapid population ageing; indeed, Japan's population has been declining for almost a decade. Nor is the phenomenon confined to the OECD countries. China's working-age population peaked in 2011 and has fallen every year since. Such rapid population ageing will put strong downward pressure on labour supply in the coming decades, leading to declining real incomes and huge financial pressures on health and social protection systems unless there is an offsetting boost to employment rates and/or annual hours worked or productivity growth.

One partial answer to these challenges can best be summarised by: "Live Longer, Work Longer". In the past two decades we have witnessed the end of early retirement and increasing employment rates among workers aged over 55 in virtually every OECD country. And the trend towards older workers staying active in the labour market seems set to continue. Nevertheless, employers still seem very reluctant to hire older workers even as their share of the labour force increases. Ageism is alive and well at the workplace and it will require actions on many fronts, e.g. seniority pay, employment protection legislation, lifelong learning, partial retirement, to overcome it.

Longevity poses many challenges to health and long-term care systems. chronic conditions linked to ageing are inevitably on the rise. This will strain health and long-term care budgets, and put major pressures on carers and family support networks. In the meantime, pharmaceutical companies are investing vast sums in seeking to develop new drugs, gene therapies and robots which could help alleviate the medical burdens associated with aging.

We need to rethink the social concept of generations in a world in which many families will have four generations living at the same time. How can we ensure that solidarity continues to hold between the generations in a world in which the share of the elderly continues to increase and many young people struggle to get on the career ladder and found their own families?

Massimo Livi-Bacci
Professor of Demography at University of Florence.

+INFO

Massimo Livi-Bacci
Implications for society of an life expectancy of 100 years old.

6:13min

Sleeping Beauty must have been around 120 years old when the prince's kiss woke her up from the 100-year sleep caused by the evil witch's curse. But this exceedingly long life had no impact whatsoever on the people around her, because the witch had done her a kindness and had cursed all the inhabitants of the castle along with her. They all slept for 100 years, and when they woke up they continued with their life as if that extra century had never happened.

In reality, though, things are very different. Extended longevity is not confined to the four walls of a castle: it is occurring in an increasingly dynamic society. Living longer does not only affect the individual and his or her loved ones (although they take the lion's share of the consequences): it also has a variety of other repercussions involving numerous scientific and social disciplines.

So, even though an extended lifespan for humans is, in principle, good news, this increase in years also entails a series of very pressing challenges: not only for the older people themselves, but also for their environment.

Demography and Health

2.1.

At the time of writing, there are 7,592,757,553 people on the planet. That figure will have grown by the time this paragraph is finished, and it will be much higher by the time these lines are read. This constantly rising figure, well over 7 billion, is offered by the World Population Clock. But if we look at age distribution, we can see that the projections do not distribute this growth equally among different age groups. According to institutions like the United Nations or the United States Census Bureau, by the end of this century there will be more people over 65 than people under 15 in the world. Whilst in 1950 there were 200 million people aged 70 or higher on the planet, this figure will stand at 2 billion by 2100. World population is ageing in all, or almost all, countries.

But we would have to go 20 years back in time to find the longest-living human in history. Her name was Jeanne Calment and she represents the current known limit of longevity. She lived to 122 years in Arles, a beautiful town in the south of France. Her record remains unbeaten, but the evolution of demographic distribution leads us to predict that life expectancy could very well reach 100 years. It seems plausible that it could happen before the end of this century, especially in view of the fact that Japanese women's life expectancy stands at almost 90 already (86.8 in 2017, according to the WHO).

Nowadays, 17% of the population is aged 80 or higher, and 5% is 100 or higher. These figures were unthinkable only a few decades ago, and they compel us to

Living longer does not only affect the individual and his or her loved ones, it also has a variety of other repercussions involving numerous scientific and social disciplines.

redefine concepts that were previously taken for granted. According to Massimo Livi-Bacci, up until now, our societies have been built on the idea of assigning fixed roles to each age group. Education used to be exclusively centred around children and young people, but this notion is changing at a staggering speed. "Lifelong learning" has already become a buzzword. "The renewal and updating of knowledge nowadays is so fast that you can never stop learning," Livi-Bacci says. He's referring to a reality that we are all well-aware of: the roles that society assigns to certain age groups are becoming less and less rigid.

This is not the only change that extended life expectancy will bring about. If life expectancy reaches 100, it is to be expected that our working life will be extended and that the retirement age, that is currently set under 70 in most countries, will be pushed back to 75. It won't be an easy or automatic process, though. Those 25-year-olds starting their careers will be in a different state of health than 70-year-olds: society will have to adapt to this reality.

Many other still unknown developments could occur alongside increased longevity. The question of whether health will be better 12 years from now, in 2030, is still unanswered. Although all signs point to an improvement, the World Alzheimer Report 2015 states that Alzheimer cases will increase by 56% in richer countries and by 239% in poorer countries between 2015 and 2050. Some of the participants in the 19th Future Trends Forum believe that this disparity will be applicable to other diseases as well, and that the world will be divided in two groups: those privileged enough to have access to healthcare, and the rest of the population. This division makes it harder to venture a global prediction of what the health landscape will look like in 2030 and what role technology will play in this regard.

It does seem to be clear that life expectancy won't increase considerably before 2030 in general, but only in the countries where it is lower today—highlighting the division once again.

Economy

2.2.

It is apparent that the older population will increase considerably in the next few years. If nothing changes, these individuals will be retirees who don't work. From the very moment they retire, they will no longer be considered human capital. They can, if they so wish, volunteer or become caregivers, it is their choice. But they are not given the choice to continue to be part of the labour market. This will have important macroeconomic repercussions because the gap between work span and lifespan will expand. Furthermore, individuals do not usually earn money during this period, just like when they are training, and will therefore have to live off what they have previously earned during their work span.

Over the past few years, both the training and the retirement period have gotten longer. We will have to find a solution to the impact this has on the economy if we want a sustainable society in which the costs derived from age-related health problems can be financed. That is why prolonging and optimising working life is so important. "We can ignore the waste of human capital if

Eugene Kandel
CEO of Start-Up Nation Central of Israel.

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Eugene Kandel

Should we extend the work span to mantain our living standards?

9:47min

it is on a small scale, but not when it is on a large scale," Eugene Kandel explains.

The task that lies ahead is not an easy one. As the 19th Future Trends Forum experts pointed out, even philosophical concepts come into play. For instance, whether people act logically when they have the right information, or they act irrationally and require incentives.

Linking the retirement age to life expectancy seems to be an easy solution, but this measure actually faces a lot of opposition. One of the concepts that should maybe be revised is the current linking of retirement with two events: mandatory retirement—which exists in many countries—and the right to receive a pension. These two events go hand in hand, and there is logic behind it: if a person can be fired because of his or her age, he or she needs to live off something, so that is the moment they become eligible for a pension.

But what if these two events were not tied? First of all, we could appease the protests that are taking place in many countries—France and Israel among them—against the postponement of the retirement age. After all, what workers and future retirees are really upset about is losing their eligibility for a pension. Employers are not fans of this measure either, because workers' salaries increase with age, but this isn't necessarily true for productivity. At the current retirement age, productivity levels vary a lot depending on the person. If all of these people were to keep their jobs because of a compulsory, unanimous postponement of retirement and eligibility for pensions, companies would be filled with people who are a burden for society, instead of contributing to it. Employers are scared that mandatory postponement of retirement age might entail an increase in the cost of living, because prices would be higher, or that it could make the country less competitive in the markets.

There are three stakeholders in the longevity economy: the individual, the companies, and the government.

Dieter Staib

Which are the financial implications of living longer?

7:13min

Kandel presents an alternative solution: disentangling these two concepts, so that people have two different decisions to make. On the one hand, workers would have to decide when they want to become eligible for pensions, and we would give them the opportunity to receive more if they postpone it. On the other hand, we would establish a certain time at which employers and employees become totally free to negotiate their contract terms, working conditions and wages, so that renegotiation can be an alternative to firing.

It seems logical that everyone will want to work longer, as long as we redefine our ideas about work. Some possible measures are encouraging people to work from home, eradicating presenteeism and giving people more power to make decisions about their own careers instead of assuming how they will progress based on their age.

One of the challenges ahead is that a very high number of older people will be looking for jobs right at the same time when many jobs are being taken over by robots. However, new work opportunities could be found in the caregiving sector, which is going to expand exponentially.

What is apparent is that we have to avoid punishing those who continue to work. It makes no sense that someone who voluntarily postpones his or her retirement has to pay more taxes.

Many are scared of robotisation leading to a loss of jobs. But these fears have been a part of our society since the Industrial Revolution, and up until now they have always been proven wrong. In fact, there is only one profession that has been completely eradicated by robotisation: lift attendants. Actually, the longer life will bring about new opportunities for robots to be very helpful, and we will always need someone to manage the robots. In some cases, senior citizens could even be the most appropriate people to do it.

Obviously, increased flexibility when it comes to retirement ages would require modifications in welfare, income support and taxation programs. This shift in mentality wouldn't be easy, but it is an interesting challenge that we should take on if we really want to promote employment and have a more productive society. It is important to remember that there are three stakeholders in the longevity economy: the individual, the companies, and the government. All three of them coordinate with each other in order to share the burden of longer life expectancy.

Education

2.3.

When we talk about education, it is important to adopt a comprehensive approach which goes beyond the idea of formal education. There is a fascinating project called The Powerful Now, launched by American organisation Ideo, which is based on the premise that the traditional idea of the three stages of life is outdated. Thanks to technology, we can enhance ourselves and become stronger and fitter. Artificial intelligence and robotics can help us become better people according to our personal interests and goals. The main aim is to help people reinvent themselves, to improve their performance, make them more relevant and provide them with more possibilities in life.

Education also affects our view of older people. Global innovation network Aging 2.0, led by Stephen Johnston, fosters a new attitude towards this age group. The idea is to enable them to become more than just passive consumers of products and services, allowing them to take up a more active role. If we truly want to understand what older people need, instead of letting the younger generation guess what their elders need, we should be listening to what the older people themselves have to say.

This is important because it seems apparent than 50 years from now, older workers will be the biggest working group and many of them will be self-employed. The mentor culture needs to make a comeback: an idea that is also at the core of Aging 2.0. This organisation maintains that different generations need to interact and

Massimo Livi-Bacci

cooperate in order to design new products. For that purpose, we would need to decide on the strongest skill set of each age group. For instance, problem-solving and decision-making abilities both improve with age. A network of mentors supported by technology could help teach this knowledge to younger generations.

If these concepts became part of education, companies would value older people more, instead of considering them as just consumers of products and services. We need a broader understanding of the value of organisations: companies need to open their doors, be welcoming and inclusive, give people more ability to come and go and recognise the value of older people.

Financial Services

2.4.

Banks are soon going to become well-aware of the fact that people are living longer, because the financial needs of this new critical group will be different, especially with regard to three key aspects. First of all, the so-called longevity malus, that is, the burden that longevity re-

Dieter Staib
Management Consultant & Business Angel at Oliver Wayman.

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presents for individuals and their families, especially in those countries where they have to pay for at least part of their treatments. Banks could develop long-term savings plans or specific financial-planning services for these people. Secondly, older people's savings are often invested in their homes, and they will need help from the banks in order to use them to finance their future needs. The third aspect is pension complementarity: the more retirees there are, the less sustainable the public pension system will become. The debate on pensions has shifted so much in the past few years that we went from discussing a possible raise in pensions to considering reducing them so that they are still viable.

If we divide the population by salary, we can see that not everyone is equally affected by the pensions issue. Dieter Staib explains it using the Spanish example, which may be a bit extreme in some regards, but in general is quite representative of the situation in other countries. There is a small minority, around 3%, who earn very high salaries, and another small minority, 4%, who earn very little. For both of these groups, their pension will be similar to the salary they had during their working life. They will be the least affected by the impact of increased longevity in financial services: business will continue as usual for them. But what about the people in the middle? 25% of society earn a reasonable wage, but their pension will be much lower than their current salaries, even if they received the maximum pension. Even if we account for the reduction in expenses that comes with retirement, which usually stands at around 20%, there still is a 30% gap that will need to be financed somehow.

The logical solution would be to encourage saving, but we live in a world that is ruthless with those who have savings. In fact, risk-free savings have negative interest rates right now. This situation poses a lot of individual challenges, but also macroeconomic ones. A good example would be the recent introduction of the sustainability factor when calculating pensions. This parameter is calculated on the basis of life expectancy at the time of retirement: the higher it is, the more reduced the pension will be, particularly higher-end pensions.

Staib points out that many banks are already acting on three key points in the ageing process. The first of them, preparation for retirement, starts when the individual is around 50 years old. These people might still be under extreme financial strain: they might still be paying off their mortgage or have children living at home. What can banks do for them? They can help these people understand what the financial reality of their retirement will look like and offer them affordable savings products that can help them save. The second key point is active retirement: this is when banks need to make sure that their costumers do not use up all of their savings. Finally, we have passive retirement, when retirees need a lot of help, particularly due to age-related issues. Banks have to play the role of a point of contact between their costumers and the services they need.

Social Structure

2.5.

We have analysed the repercussions of longevity from several standpoints, but we also need to take into account how social structure will affect the new, increased longevity. This is where ageism—discrimination against people on the basis of their age—comes into play. According to Ashton Applewhite, anti-ageism activist and author of This chair rocks: a manifesto against ageism, we live in a profoundly ageist culture, as evidenced by the prevailing metaphor for population ageing: the grey

Banks have to play the role of a point of contact between their costumers and the services they need.

tsunami. "It summons up a terrifying vision: a wave of old people poised to swamp our healthcare and social systems and suck the wealth from new generations," she highlights.

But while it is true that increased longevity can entail deficits in some regards, it is also true that older people can contribute to society in many ways. For instance, in the United States, 70% of disposable income is in the hands of people over 50. We need to work on putting that money into circulation.

But good intentions are useless if age discrimination continues to be this rampant. Ageism even impacts the state of health of older people themselves. Research shows that our attitudes towards ageing affect how our minds and bodies function at a cellular level. The World Health Organization (WHO) has even developed a global strategy against ageism, because ending the scourge of ageism would extend our lifespan and improve our health.

At a more practical level, age discrimination—which disproportionately affects women—causes a stigma against walkers and wheelchairs that leads older people to refuse to use them, even if it means never leaving home. This type of discrimination is deeply ingrained into our societies. We always speak of old people as "them" when, in reality, we are all, health permitting, going to reach that stage at some point.

Several anti-ageism measures have been put on the table, and technology can be a fantastic tool when it comes to implementing them. The digitisation of communications makes it easier for different generations to keep in touch, and it also facilitates the creation of advocacy groups. Paradoxically, it can also fuel loneliness: people might decide not to go visit their elderly parents because they are already connected to them through technology.

Intergenerational housing is another budding solution: older people own homes, and young people need a place to live.

But the single most important step, a measure that would affect social structure, education, the economy and many other aspects, would be to break the working/not working dichotomy. We need to be more flexible about the definition of these concepts so that, in the future, older people retiring and then coming back to work—maybe in another way or under different conditions—becomes commonplace. Society will have to prepare itself to face these changes.

Ashton Applewhite

How Social Structures will affect the new longevity?

6:58min

It summons up a terrifying vision: a wave of old people poised to swamp our healthcare and social systems and suck the wealth from new generations.

Specific Opportunities Provided by Increased Longevity

3.0.

Over the past few years, life expectancy has skyrocketed: a fact which has been confirmed by reliable sources such as the World Health Organization. But longevity has already been one of humankind's concern for many, many years. People who live longer than average have been talked about since the dawn of time. The clearest example in ancient literature is Methuselah, son of Enoch, father of Lamech and grandfather of Noah. This Patriarch, the eight of the Antediluvian period, is said to have lived between 720 and 969 years. Regardless of the fictional nature of the character, the mere fact that his story was recorded is proof that man has always aspired to live longer.

The big difference is that now, unlike in the Antediluvian period, we are having success in this area. Increased longevity is here to stay: everything seems to indicate that life expectancy will continue to increase, or at least stay the same. The name that many people are attributing to this phenomenon, "the grey tsunami", clearly displays their—conscious or unconscious—prejudice toward the elderly. However, this is far from being a tragedy. It is certainly a challenge, but also a breeding ground for new opportunities. Older people have a lot to contribute and, judging by the exponential growth of their age group, they are only going to become more and more relevant: to themselves, to those around them, and to society as a whole.

A 20-year-old will regard the increasing life expectancy very differently than someone whom we might call "elderly"—a term most people dislike, by the way. Do we truly understand older people? Do we know what they want? Can this stage of life only be understood by those who have reached it, or can it—and should it—be understood by those who are much younger? Advertising, which is said to be the mirror of society, fails spectacularly when it comes to understanding the needs and concerns of an increasingly ageing population, as evidenced by the different ads for the same products targeted at distinct age groups. Marketing is, of course, segmented by age group, but a quick look at some of the adverts show that something has gone amiss. It makes no sense that reverse mortgages are only marketed towards older people, or that dating services for older people are only offered to that age group. These are just two examples of the opportunities and concerns that different age cohorts associate with the increase in longevity. All of these age groups were represented in the 19th Future Trends Forum, although this was only a privileged and small fraction of the world population. We have a lot to learn from all of them.

Thanks to increased longevity, this age group has the opportunity to act as a mediator between different generations. They can help older and younger people to better understand one another.

20-35 Years Old

The younger generation could become the Methuselahs of the future, and this gives rise to many unmet needs which the rest of society has a duty to deal with. First of all, caregiving could be a new, interesting field for these people. Taking care of their elders in exchange for payment could become a good job opportunity. Furthermore, due to the fact that these tasks are currently performed mostly by unpaid family members or by terribly underpaid immigrants, it would kill two birds with one stone: job insecurity and the lack of caregivers. There is, however, a gender gap: in the midst of the 21st century, these jobs are still considered to be "women's work". This generation should change that if we want to effectively take on the challenge of an ageing population.

But today's youth will have serious problems to face in their own old age, economically speaking, due to underpaid jobs, work instability, expensive housing and, in certain countries where education is not covered by the government, student loans that make the beginning of their professional careers extremely difficult. "We're broke" seems to be the general feeling amongst a generation who have not even had the time to earn anything that they can lose yet.

The financial industry could help them by offering savings products tailored to their age group. But they are not the only ones: the public sector has an important role to play in alleviating young people's disenchantment. A tax redistribution which prioritises education and healthcare should be put on the table.

36-50 Years Old

Everything seems to be looking rosy for this generation. They have been granted extra time that no one was counting on. But when compared to the previous generation, the baby boomers, who could easily afford houses and never doubted that they were going to receive a fair pension, their prospects no longer look as promising.

Today, this generation is facing the tough reality that the pension system is likely to become unsustainable, and they might not receive a pension when the time comes. However, in return, they get a second chance, a whole new life that will give them time to become more fulfilled: both in their careers—by reinventing themselves

professionally—and in their family life—late parenthood and second and third marriages are on the rise.

Thanks to increased longevity, this age group has the opportunity to act as a mediator between different generations. They can help older and younger people to better understand one another. For instance, they could help their elders with digitisation, a skill that they did have time to assimilate.

51-64 Years Old

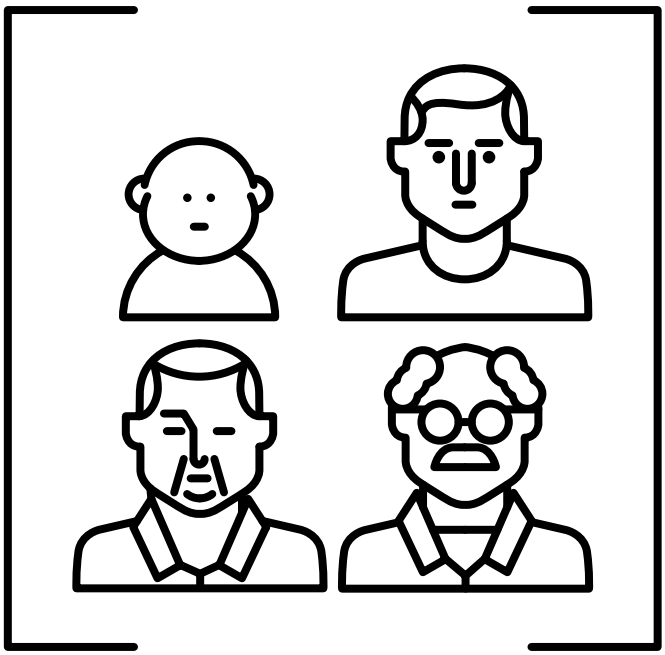
Increased longevity really hits home in this sandwich generation, located right between those who are already considered old and the rest of society. It is a happy generation, as evidenced by the sociological concept of the U-bend of life, which claims that people regain happiness at 50, after a stressful few years of advancing their careers, supporting their families and worrying about the future.

But this positive feeling comes with a new burden: the knowledge that every action a person takes during this phase will have a direct impact on his or her old age. One of the main concerns is the so-called "red zone"—that moment when you start contracting illnesses that are not terminal, but significantly reduce your quality of life. It is not so much the existence of a red zone that people are concerned about: it is the uncertainty surrounding when it will begin.

After all, the red zone could arrive at a very inconvenient time, considering all of the responsibilities this generation has: to themselves, to younger people—many of them are still supporting their college-aged children—and to their elders—people in this age group often have to finance their parents' caregiving, or even move them into their homes.

In conclusion, the main opportunities anticipated for this generation are:

- **Improving health and wellness:** changing their habits to delay the red zone as much as possible.
- **The labour market:** this age group will probably face an unexpected postponement of retirement age.
- **Social life:** old age is still regarded in a negative light, leading to the social marginalisation of older people.
- **Politics:** this generation can help support much-needed changes.



On top of that, there are also business opportunities emerging for this generation, which is so diverse that everything will have to be customised for them: from diets to financial planning.

66-80 Years Old

For people under 81, increased longevity is an unexpected gift that turns a future filled with unpleasant certainties into a whole world of opportunities.

Only a few years ago, age-related loss of mobility was synonymous with never leaving home or becoming a burden on family members. Now, technology is bringing us vehicles that do not require a driver or even a person inside them to move.

Similarly, a few years ago, working life inevitably ended at 65. Nowadays, we are entering a future where there are opportunities—work and otherwise—for these people, a world where experience is highly valued by younger generations. While it is true that health problems start to proliferate at this age, it can be an ideal time for people, especially those who aren't apprehensive, to start preparing for their final years so they can spend them how they wish.

Only a few years ago, age-related loss of mobility was synonymous with never leaving home or becoming a burden on family members. Now, technology is bringing us vehicles that do not require a driver or even a person inside them to move.

81-140 Years Old

Even though this is the age group that is closer to death, they are not, statistically speaking, an unhappy generation, given that happiness is defined as the right balance between reality and expectations. While these people's prospects are not very promising, their expectations are not that high either.

This generation has to live with realities that are very difficult to accept, but the most predominant fear is loss:

- **Loss of financial independence,** health, social interactions.
- **Loss of time:** they are scared that they won't have the time to do all the things they want to do, from reading novels to spending more time with their loved ones.

On the bright side, this period of life goes hand in hand with greater serenity, with a pleasant feeling of having nothing to prove to society and owing nothing to anyone. People in this age group are far more preoccupied with an increase in healthy lifespan rather than an increase in lifespan itself. A longer healthy life does bring about many opportunities, most of them in the fields of technology and caregiving. Politics also have to be accountable to these voters: for instance, they could be worried about immigration restrictions which might put their caregiving situation at risk.

Christopher Meyer

Dor Skuler
CEO & Co-Founder of
Intuition Robotics.

Specific Opportunities: Three Business Models

3.2.

Intro

Dor Skuler

Dor Skuler has co-founded five ventures, the most recent being Intuition Robotics, following his passion to develop artificial intelligence-driven robotics that address major social issues of the 21st century.
He is board member and advisory board member for startups. He holds an MBA and Master's of Science in Marketing from Temple University, has co-authored "Cloud Computing: Business Trends and Technologies" and holds board level advisory and director roles for several telecoms, cyber security and tech-led social impact ventures.

The growing population of older adults is something that simply cannot be ignored. By the end of this decade, annual consumer spending by adults aged 60 and over will globally reach $15 trillion! These demographic and economic shifts provide businesses with opportunities to address the needs and aspirations of this rapidly expanding market.

Longevity demands lifestyle solutions, as well as healthcare and wellness options for diseases that are old-age related, and more. As 90% of older adults prefer to age in their own homes, ways must be found to support and encourage their independence.

Technology can and should play a role in this, but in a world where technology companies are designing technology first and foremost for millennials, older adults have a hard time adapting these solutions. As a result, a huge generational gap is being formed. While the gap exists in almost all facets of social and personal domains, in the field of technology it is even more evident, and the opposite should be the case. Advances in technology can be a game changer in how we provide support for our aging population, where families are living farther and farther apart and there are less caregivers.

It is time for businesses to re-think how they can empower older adults and enable them to thrive in this chapter of their life instead of reminding them of their disabilities. Companies must widen their vision and adapt their products or create new ones.

In our world, increasing longevity is already a given, but only a few have decided to create business models inspired by this situation and to study the market to figure out how to implement them. They will be the pioneers, but there is no doubt that others will follow. In fact, these first groundbreaking businesses are likely to merge with one another to create new products. The innovative business models emerging from the increase in longevity are usually based on technology and, as such, they are met with distrust by a society that is frightened that robots will end up replacing human beings. This fear has been present in society, in different degrees, ever since the Industrial Revolution.

The Longevity Economy: Empowering People Over 50

It seems obvious that age discrimination within society is a fact. This even leads to self-discrimination, with older people voluntarily withdrawing from all aspects of life, particularly from the social and economic spheres. In the future, when longevity becomes the norm, it will be essential for senior citizens to be aware of their role and the power they have to help themselves, the previous generation and the later one. Some organisations are already working to achieve this shift in mentality.

The most characteristic example is probably the American Association of Retired Persons (AARP), a non-profit organisation which aims to empower older people. According to Jody Holtzman, who was its Senior Vice-President for Market Innovation up until November 2017, a key element in transforming the culture surrounding ageing is to "change the narrative". The current situation is devastating in this regard: the dominant economic narrative starts with the premise that we cannot afford a world with so many old people. But this narrative would dramatically change if we stopped viewing longevity as a cost—a view held only by the government—and started viewing it as an opportunity.

In their report The Longevity Economy, consulting firm Oxford Economics and the AARP analysed what a stand-alone macroeconomy driven solely by the consumer spending of people over 50 in the United States would look like. The results show that this market is an opportunity, rather than a burden. The gross domestic product (GDP) of this US longevity economy would stand

Jody Holtzman

Changing the culture around aging: innovation opportunities

8:19min

at 7.6 trillion dollars, making it the third largest economy in the world, after the US and China. There is another conclusion drawn from the document: 35% of the US population is driving 53% of total consumer spending and 43% of the total US GDP.

An in-depth analysis of this so-called longevity economy busts several myths. As proven by organisations like the Kauffman Foundation, people in their fifties and sixties are starting companies twice as frequently as people in their twenties. Most of the patents are also submitted by people over 50. We still regard technology and ageing as two opposing concepts, disregarding the fact that 90% of these people are online.

This is why the business sector should start to think about their 50+ strategy. They should look for opportunities in this existing, but under-exploited, market. In this same vein, every year, the AARP organises an event called Innovation@50+, a start-up competition centred around this age group.

Focusing on older people and caregiving has already led some small companies to succeed. Carelinx, Honour and Hometeam have burst into the home caregiving market. With a turnover of over 125 million dollars, they are already starting to partner up with health insurance companies. These companies are trying to professionalise caregiving as an occupation. They pay their caregivers 25% above market: this benefits the caregivers, obviously, but also older people and their families, because it reduces churn.

Companion Robots

In the film *A.I. Artificial Intelligence* (Steven Spielberg, 2001), there are a series of human-looking androids called *mechas* which are the closest thing to a perfect robot—as the title says, they are intelligent—one

can imagine. They can perform such a wide array of tasks that the writers even bring up the idea of them replacing loved ones who have passed away. In reality, if the world was full of *mechas*, they would be taking care of older people—even though this is not shown in the film. It is an original idea, but hardly new.

Almost since the very inception of robotics, robots have been thought of as companions for humans, giving rise to a variety of prototypes. Some of them have been marketed already, such as Jibo. This small android, which looks like a highly-sophisticated loudspeaker, helps families take care of their older relatives for 54 dollars a month. But what happens when families live far away from their older loved ones, or when younger people cannot spend as much time as they should—or would like—with their elders?

Intuition Robotics was born two years ago precisely to address this issue. People who live longer face a big problem which is not discussed often enough: loneliness and social isolation, which affects between 40% and 60% of people in this age group. This company is developing an "active ageing companion" called ElliQ. They have raised 20 million dollars for this project, and they intend to spread a new mentality that celebrates ageing, instead of focusing on disability, as Dor Skuler, co-founder and CEO, explains.

Loneliness has a direct impact on older people's quality of life, and even on their health. If we want to put an end to it, we need to modify two trends that are deeply ingrained in our society: the digital gap, and older people's tendency to repeat the same routine over and over again and be reluctant to introduce changes.

ElliQ is a social robot that reminds its owners of their appointments—both in person and by phone—and alerts them when they need to take their medication. It also arranges transportation for them and can even suggest leisure activities to engage in together, such as online games. The price of this companion is still to be announced, but the co-founder says that it won't surpass the price of a good-quality laptop, plus a monthly fee that will be "affordable."

Loneliness has a direct impact on older people's quality of life, and even on their health. If we want to put an end to it, we need to modify two trends that are deeply ingrained in our society: the digital gap, and older people's tendency to repeat the same routine over and over again and be reluctant to introduce changes.

Contrary to other digital assistants like Alexa, no specific skills are required to handle ElliQ. On top of that, it is a pro-active, AI-based system which tries to understand the world around it and adapt to a few objectives that the older person has introduced into the system. This little gizmo, similar to a bedside lamp, will be in the homes of people who can afford it in 2018.

And it will probably not be the only one. The European Union has allocated more than 3 million euros to financing Accompany, a start-up that is creating an android companion to "help older people perform tasks"

Dor Skuler
CEO & Co-Founder of Intuition Robotics.

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Dor Skuler
A brand that celebrates aging

9:14min

Takanori Shibata
Chief Senior Research Scientist at the National Institute of Advanced Industrial Science and Technology.

+INFO

Takanori Shibata
A seal robot for therapeutic treatment

8:31min

that they can't do on their own. The program is being developed in the United Kingdom, and it was one of the projects discussed at the Ninth International Conference on Social Robotics (ICSR), which took place in Tsukuba, Japan, in November 2017. The very existence of this conference is proof that companion robots are here to stay.

Animal-Assisted Therapy (Real-Life and Robotic Animals)

In 2013, *The Lancet,* one of the most prestigious scientific journals in the world, published a study called *Dolphins, dogs, and robot seals for the treatment of neurological disease.* There is something striking about this title: it mentions real-life animals—whose therapeutic benefits for a myriad of diseases have been widely studied and proven in the past few decades—alongside another animal which is not exactly 'real-life': it is a complex machine that delights anyone that touches it.

It was promoted by the National Institute of Advanced Industrial Science and Technology (AIST) in Japan, which a few years ago decided to support a company that creates robots for older people. This particular robot looks nothing like a loudspeaker or a lamp. Its likeness is far more easily recognisable: a seal. At first sight, it seems to be just a stuffed animal, but PARO—its name in every country but Spain, where it was changed to NUKA given that the word "paro" has some negative connotations—is much more than that. In fact, the aforementioned study corroborated the therapeutic benefits of this robot seal, which weighs 2.9 kilograms and costs around 6,000 euros.

Its creators describe it as a neurological therapy robot, and there is plenty of data to support its effectiveness. In 2009, it was approved by the FDA (the US Food and Drug Administration) as a non-pharmacological medical treatment, and its creators have been trying to get other government agencies to do the same ever since.

PARO has been tried in people with dementia, cancer, and in children who have autism or are hospitalised. According to its creator, Takanori Shibata, there is evidence that, due to increased longevity, in the future we will need twice as many caregivers as we do now. PARO wouldn't replace these professionals, but it could be of help in the first few stages of caregiving, or make things easier for caregivers and retirement home staff. PARO has been shown to alleviate uneasiness in people with dementia, thus reducing the need for psychotropic drugs.

Only 5,000 units have been sold so far, most of them in Japan. In order to increase sales, Shibata believes that more clinical evidence should be provided, so that government agencies can consider its inclusion in public health systems.

Just like Intuition Robotics' ElliQ, PARO is not one of a kind. In 2016, toy company Hasbro launched their Joy for All line, consisting of robot animals—three cats and a puppy. They are just companions and there is no proof that they have therapeutic benefits. Nonetheless, some retirement homes have already acquired them, and the residents seem to love the idea. The most striking example is that of AIBO, Sony's pioneering robot dog. Even though it was launched with great fanfare, and a study was published comparing its effectiveness to that of real dogs, this dog-like android was forced to retire in 2006. Funnily enough, just last year, Sony announced that it is being re-launched. Perhaps it is just another sign of changing times.

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The Tasks of Longevity

4.0.

Intro

Ashton Applewhite

Ashton Applewhite is the author of This Chair Rocks: A Manifesto Against Ageism. In 2016, she joined PBS site Next Avenue's annual list of 50 Influencers in Aging as their Influencer of the Year. Ashton has been recognized by the New York Times, National Public Radio, and the American Society on Aging as an expert on ageism. She blogs at This Chair Rocks, has written for Harper's , Playboy, and the New York Times, and is the voice of Yo, Is This Ageist? Ashton speaks widely, at venues that have ranged from universities and community centers to the TED mainstage and the United Nations. She is a leading spokesperson for a movement to mobilize against discrimination on the basis of age.

Ageism pits us against each other by framing population aging as a zero-sum proposition in which the old profit at the expense of the young. This framework is unethical. We don't allocate resources by race or by sex. Weighing the needs of the old against the young is equally unacceptable. Period.

It also fails the common sense test. Communities that are good to grow old in—with social services, safe public spaces, and public transportation—are good for everyone. The same is true for workplaces that offer the accessibility and flextime that older workers require. They're *all*-age-friendly.

Population aging is *new*. Science has leapfrogged culture, and roles and institutions haven't had time to catch up. This gives us a critical window of opportunity in which to frame longer lives as not just a challenge but as a remarkable and unprecedented opportunity to tap into a "silver reservoir": the social capital of millions more healthy, educated adults than ever before in history.

To take advantage of this "longevity dividend," we need to quit the reflexive hand-wringing, challenge the ageist assumptions that underlie it, and think realistically and imaginatively about how to shape the multi-generational society that we all hope to live long enough to inhabit. It's going to take all hands on deck—and all ages.

We always talk about older people in the third person. It is a huge paradox: no-one wants to be part of that group, but no-one wishes for the alternative either. After all, the only possible alternative to growing old is dying. Fortunately, advances in fields like public health and medicine have reduced mortality, leading to an increase in life expectancy and longevity.

This is not the only significant change: society is also making great strides in disciplines such as science, medicine and economics. But these transformations don't seem to go hand in hand with our current ageing pattern, which will have to change at a societal level. There are tasks associated with longevity which must be completed, and all members of society will have to "do their homework". Whether or not this happens will determine what our future will look like 60 years from now: it could be an apocalyptic, baby-less world, or a world where biomedical interventions specifically targeting ageing will have reduced conditions like cancer, Alzheimer's or heart disease by half.

All prospects seem to contradict Edgar, a character from Shakespeare's famous play *King Lear*, when he concluded his final speech by saying: "The oldest hath borne most. We that are young shall never see so much, nor live so long." Bad news, Edgar (or maybe good?): that's exactly the opposite of what the future holds.

Training

In Spain at least, there are certain educational institutions called "senior citizen universities". They all share some core characteristics: they don't offer formal training and they are aimed exclusively at this age group. After all, who would possibly want to study after retirement? This mentality will have to be altered, given the impact that increased longevity is having—and will have—on our world.

Age-related silos have to be eradicated. When we live longer, we will have plenty of time to reinvent ourselves, especially career-wise, and we will need to constantly update our skills. Training will have to go from being confined to a certain age or stage of life to being a constant throughout our lives. The most essential task ahead is to create a sense of urgency about the need for continuous learning. It cannot be optional anymore: it has to be considered almost indispensable.

Fortunately, advances in fields like public health and medicine have reduced mortality, leading to an increase in life expectancy and longevity.

In the world to come, university training will not be the only education that matters. Companies will have to make sure that their employees don't become stagnant and push them to continue to acquire new skills as they age.

Even formal education will have to undergo a transformation. It is perfectly possible that, one day, 80 or 100 years might go by between graduation and the end of working life. In that scenario, people would probably want to study a second degree or a Master's halfway through their lives, when they feel that they have already peaked in their current careers.

This is only one of the many changes that educational institutions will have to implement over the next few years. Older people will have to train younger people, and vice versa, because in an ageing world, inter-generational coexistence will become the norm.

Psychology

Transforming the stereotypes surrounding ageing is one of the key tasks that all age groups have to work on. This is not only about ending ageism—age-related discrimination—among younger people, but also about keeping older people from assuming with resignation that their lives are over, leading them to hide themselves away in their homes and try not to be too much of a burden as they await death.

As individuals, we can prepare to be better centenarians. First of all, we can educate ourselves on how to keep the red zone—where longevity coexists with poor health—at bay. Young people can research information on healthy habits and, most importantly, put them into practice to avoid behaviours that will cause their old age to deteriorate down the road.

As for older people, they can, and in fact should, always continue to be ambitious. It is often true that knowledge comes with age, and therefore the contribution of older people to society is more essential than ever. They don't have to feel like a burden; in fact, exactly the opposite is true.

It might be worth taking a look at times gone by and at other societies to remember the role that indigenous peoples traditionally assigned to their elders, a custom that has faded with time. One of the tasks ahead is to stop seeing ageing as an inevitable consequence of living, and instead, to start seeing it as an opportunity.

Social Integration

While people do have to change at an individual level to prove their worth as older people to themselves—a concept that, according to some, should not be defined by chronological age—, society as a whole has homework to do as well. After all, it must get ready to welcome an ever-increasing number of older people, an age group we will—if all goes well—all be a part of one day.

Communities have to integrate older people and protect them from isolation, and for that purpose we might have to rethink the spaces where older people live together: both retirement homes, more common in Europe, and retirement communities, predominant in the US.

Paradoxically, these facilities are usually designed by young people. Shouldn't the people who are going to benefit from these spaces have a say in their planning? Older people might not want to spend the rest of their lives surrounded only by people their own age. Maybe the key instead would be to promote communities which are friendly and accepting towards older people.

Working Life

Many predictions have been made for the next few years, but there is one that almost everybody seems to agree on: the retirement age is going to be pushed back. However, this delay should be accompanied by a transformation in social attitudes towards career prospects. This should not be a static career extension, with people staying in the same position for a few more years while they slowly lose their skills and are surpassed by younger generations. Nonetheless, older people are reluctant to change jobs because they are afraid of losing the perks associated with seniority in a company. It will be challenging to change this attitude, but there are ways in which we can do it. For instance, trade unions could go from being confined to a certain industry to becoming more global. Instead of focusing only on salaries, they could encourage people to update their skills too, so that changing careers becomes easier. They could also work on ensuring that workers maintain their seniority perks even if they switch workplaces.

But a longer working life does not necessarily have to mean changing jobs. Companies could adjust their employees' duties according to their age, so that older workers can remain useful for their companies instead of becoming a burden. One of the possible strategies on the table is to offer a higher pension to those who choose to postpone their retirement. But there are many other proposals, such as encouraging remote working or putting older people in charge of tasks in which they can excel—like mentoring younger people in areas that require a higher level of expertise.

The professional world is also riddled with stereotypes that need to be eradicated if society wants to be prepared for extended working lives. We tend to link the idea of being employed to being physically present in the workplace, and we associate freelancing and working part-time with a precarious economy. There will be no place for these assumptions in a world where older people work for longer.

Some fields will have to be completely redefined. Caregiving will cease to be exclusively in the hands of family members and immigrants and will become professionalised—provided that we can close the gender gap. The medical profession will have to shift its focus from acute care to chronic illness care, and telemedicine will undoubtedly be of help in this regard. To sum up, all of the assumptions surrounding the notion of work will need to be challenged when increased longevity arrives. Such is the task that lies ahead.

Finances

Who is going to finance our elders? 30 years ago, the answer would have been easy: retirement pensions would cover the costs of a population segment who would drastically reduce their expenses anyway. If that

did not work, there were always family members that could take care of their parents and grandparents. But things have changed, and in an increasingly ageing society, financing mechanisms will have to change too.

The responsibility for financing a society which lives for longer can no longer fall only on the government. This model is just not sustainable, and foundations and private investors will probably take on a more relevant role in the future. We will have to come up with new systems to reduce the current healthcare budget, or at least make it more sustainable. Investing in prevention, for example, will be one of the main tools when facing this challenge.

We will likely witness a shift in the top areas of investment. Inter-generational housing projects, technology funding and the creation of a common language to discuss the impact of investment are some of the key items on the agenda to finance a longer-living world.

Politics

The increase in life expectancy is a global phenomenon, but it doesn't affect all socio-economic classes in the same way. The challenges, and therefore their solutions, are different. If we are going to carry out the necessary actions to make a longer-living world possible, ending inequality will be a crucial task in which politics will have a key role to play.

Apart from fighting inequality, the political sphere will also have to pass legislation that protects the welfare state in an ageing world. The people in power have to start turning the ideas that different stakeholders formulate into real actions which can have a direct impact on the population. In this same vein, politicians will have to abandon the short-term vision and think of the long-term, because citizens will be around to applaud or criticise their leaders' decisions for longer.

However, the task of collecting these ideas cannot be confined to one individual only, not even to one country. One of the duties to be carried out will be to create a "global bank of ideas" pooling together the best proposals from all countries.

Statistics are going to become even more important than they currently are. We are going to need data more than ever if we want to implement efficient, sustainable policies.

But the single most important improvement in politics will have to be communication. If people are going to live longer, they need to be aware of what is coming with enough time to make well-informed decisions. Behavioural economics will not be just another discipline anymore: it will become a crucial pillar of good legislation. Politics have to work on putting longevity at the heart of discussions; for example, by ensuring that government agencies pay attention to this issue.

After all, in this new scenario, economics and politics will be closely intertwined. Labour laws, for instance, will have to be flexible enough to leave room for solutions that allow people to extend their working lives. Tax policies will have to be modified: we are currently taking it for granted that taxes have to finance longer lives, but we might have to move towards a different approach based on encouraging self-financing throughout people's lives.

However, the most relevant pending task for politics and the most necessary paradigm shift is turning the government into a catalyst for all of the innovative solutions emerging from different sectors. And to those politicians who think only of the short term, a little reminder: when people live longer, they will vote in many more elections.

The Ten Commandments of a Longer - Living World

There is plenty of proof that the transition towards a longer-living world is not going to be easy. Specific actions will have to be taken in almost every sphere: social, economic, healthcare, legal, work, politics, and many more. The picture looks gloomy, but there is a silver lining: the tasks to be undertaken in each of these fields have already been identified, and more will surely follow in the next few years. Vladimir Lenin once said—paraphrasing an ancient Eastern proverb apparently—that "if you are not part of the solution, you must be part of the problem." In the current situation, this statement makes more sense than ever.

- **01.** Shifting the narrative surrounding ageing: from seeing it as a burden to embracing it as an opportunity.
- **02.** Fighting loneliness and social isolation.
- **03.** Broadening the definition of "work" to include part-time work and even simply working towards a goal that will contribute to society.
- **04.** Structuring work for older people.
- **05.** Giving the labour market the chance to hire the right people to complement the existing technology.
- **06.** Financing retirement in an ageing society.
- **07.** Raising awareness around how pressing and essential it is to encourage active learning.
- **08.** Re-evaluating the role of immigration in light of new requirements.
- **09.** Improving efficiency in caregiving and healthcare systems.
- **10.** Shortening the "red zone" through biological modulation.