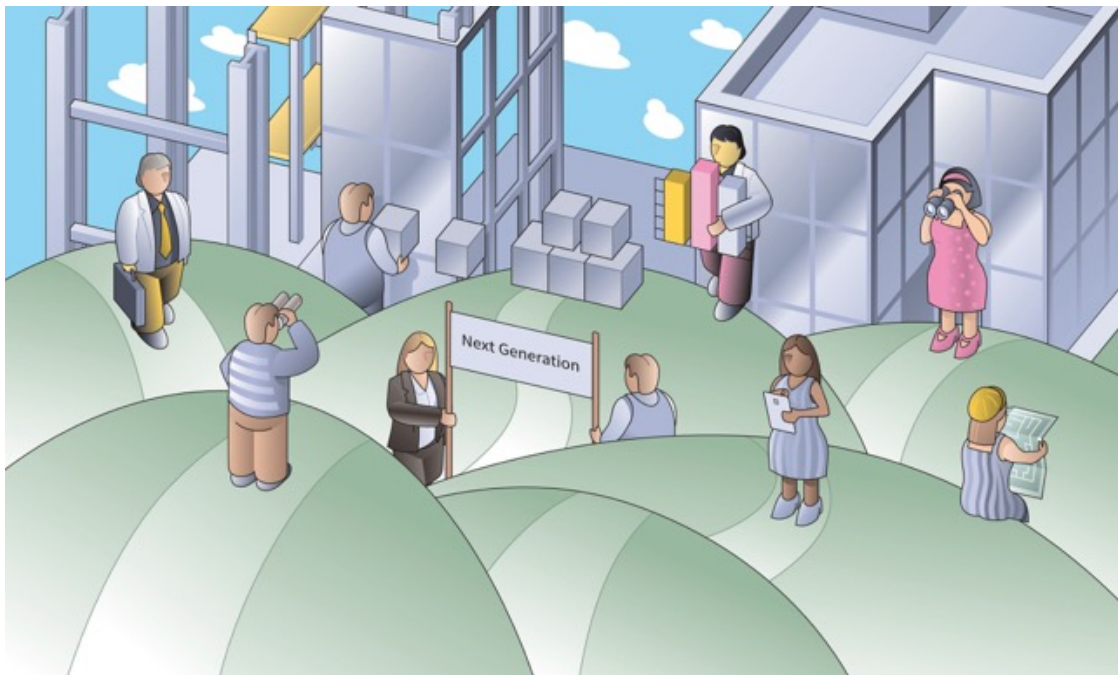


## Views from Generation Y



### **The Race between Technology and an Ageing Population**

Author: Sandro Leugger

## The Race between Technology and an Ageing Population

### Difficult times ahead?

Demographic change is undoubtedly one of the most impactful megatrends of the 21<sup>st</sup> century. A lot of this change is connected to the industrialization of countries. While African countries are still trying to reach a more industrialized state and are expected to experience a population explosion in the coming decades, other regions like Europe and North America, but also Japan and South Korea, have already been through this development and face decreasing fertility while people live longer and longer. This leads to a shift in population age with many upcoming challenges. How can we support our elderly with a diminishing workforce? How can we integrate them into society and avoid isolation? How can we achieve a graceful, happy, healthy and long-lasting life for everyone? In this article we are going to find out if it is possible to tackle the upcoming challenges of one megatrend with the promising benefits of another, namely digitalization. Can new technology help to make longevity a sustainable development?

### Can technology save our pensions?

Diminishing social welfare for the elderly is a hot topic in politics right now. Everyone is painting a black picture of the future of our pensions. Many young people believe they will work until 70 or even longer to support the growing number of seniors, while fear about poverty in old age is growing throughout the population. But maybe the future is not that bad. Before understanding how technology can contribute to solving the problem, one first needs to understand the problem itself. The intense discussions about rising retirement age, cutting pensions or increasing contributions to public pension funds are all possible solutions to the same problem. In Europe in 1980 there were more than four working people per senior. In 2019 there were three and in 2050 there will be fewer than two. It becomes clear that it gets more and more difficult for the workforce to support the elderly. But how can technology help with this challenge?

To answer this question, let us take a step back and look at the problem in its more general context. Figure 1 shows the current state of the European economy. The bar on the left represents all the goods and services our workforce can produce (approx. equal to the GDP). The bar on the

right represents the consumption of the population as distributed between the young, the working-age population and the elderly.

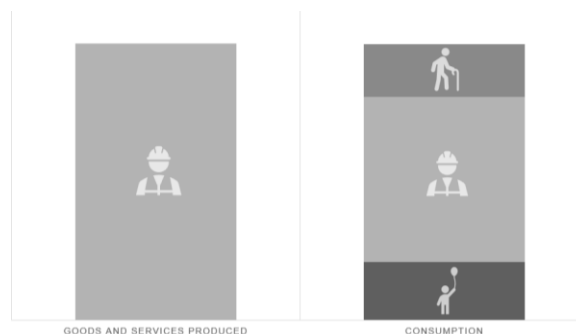


Figure 1: Model of European production and consumption of goods and services by demographic group in 2020

Figure 2 shows the same situation in 2050 with the projected change in demographics, but with productivity per worker and consumption per capita staying the same. The workforce and the related production of services and goods will decrease by approx. 15% while the whole population will decrease by only 5%. This will lead to an imbalance.

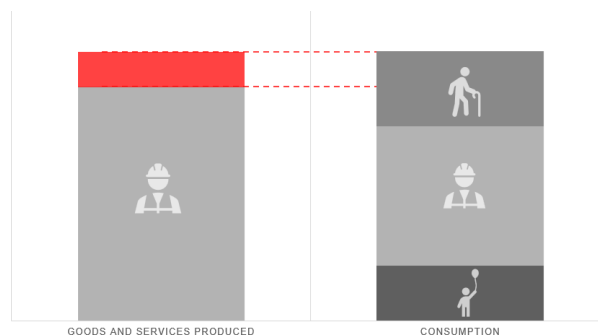


Figure 2: Model of European production and consumption of goods and services with 2050 demographics

There are different approaches to tackling this imbalance. The most obvious approach would be to reduce consumption, which would make us on average poorer in 2050 than we are right now. Of course, there are a lot of discussions about distribution (cutting pensions, paying more into pensions) but they basically only determine who will be hit hardest by the costs of a growing elderly population. A different approach would be to increase production by keeping elderly men and women in the workforce for longer (in other words, raising the retirement age). Technology could certainly help to keep people productive for longer, by assisting them

directly with their tasks or by keeping them fit and healthy more generally.

Certainly, making the elderly more productive through technology will help to increase overall productivity. However, the biggest growth in production can be achieved by making the already available workforce more productive. Increased productivity of the existing workforce through technology could help us in creating enough wealth to support the elderly and therefore make longevity a more sustainable achievement.

But how much can we increase productivity through technology? The following paragraphs will provide a short overview of technologies that show huge potential for increasing productivity in the areas of communication, energy, production and logistics.

For communication, the most relevant factor is the interplay between three technologies: the internet of things, big data and artificial intelligence. Currently there are 26 billion devices connected to the internet. This number is expected to triple by 2025. These devices will be able to communicate with each other and produce an unprecedented amount of data. The volume of data on earth is doubling every two years and artificial intelligence allows us to analyze this data in a more efficient way than ever before. There are thousands of ways this can increase productivity. You could for example make your supply chain more efficient. Data intelligence allows you to accurately predict the demand for a given product. This information can be sent to a smart factory which operates just-in-time manufacturing. If you produce in a smart way you can reduce waste, have very little stock in storage, and require far fewer workers to manufacture the same number of products.

There is also a revolution going on in the energy sector. Solar energy has become cost-competitive against fossil fuels. This is a huge step away from our dependence on fossil fuels, which is currently an immense burden for our economy. Our vulnerability to energy prices can be seen in the economic indicators. Every time oil prices rise significantly, the price of goods across the board goes up, while consumption and production decrease.

Regarding logistics and production, 3D printing and autonomous driving could revolutionize those fields forever. At present, 3D printing is

mostly used for rapid prototyping and autonomous car makers seem to be stuck at level 4 autonomy. But as soon as the technology improves and the cost goes down, the size of the necessary workforce in these sectors will diminish.

All these new technologies will significantly contribute to an increase in workforce productivity. Technology is of course not the only factor. There are additional factors like education, organization and so on. However, all these dynamics combined will help our society to create more goods and services which can compensate for the imbalance seen in figure 2. The GDP of Germany, for example, is expected to increase by a factor of 1.55 by 2050 despite the shrinking workforce. The new situation is presented in figure 3. In this model, we can see that there is a lot of additional created wealth. More than enough to compensate for the demographic changes. Meaning that if we manage to significantly increase productivity per worker and distribute the additional wealth fairly, we will be better off in 2050 despite the demographic shift.

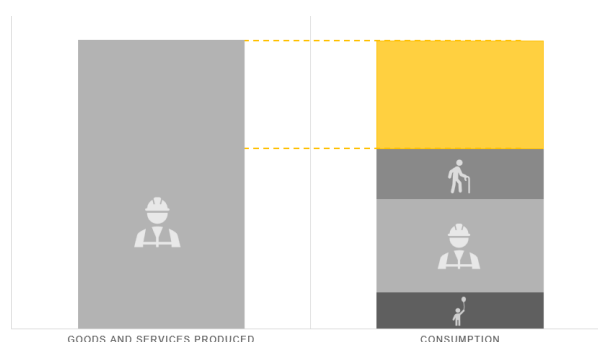


Figure 3: Model of European production and consumption of goods and services with 2050 demographics and GDP

## Staying home

However, productivity is not the only way in which technology can help the elderly. Three out of four seniors want to stay in their current residence for as long as possible. However, most of them cannot foresee themselves being able to stay for as long as hoped. For most seniors their home feels comfortable, safe and easy. In addition to that, they are able to stay within their local communities. Financially, a care assistant costs on average 4000 USD a month (for 44 hours of care). While this is already a lot of money, a private room in a nursing home costs twice as much on average.

Yet, a new field of technology is growing and promises to improve homecare and the independence of seniors. “Gerontotechnology” or “age-tech” are terms under which thousands of entrepreneurs, designers, developers and engineers are building new technologies that are designed to serve the elderly. In the following paragraphs I will introduce a selection of start-ups in this field and explain how technology can help the elderly stay more independent for longer and make longevity a more sustainable achievement.

The first challenge many start-ups and established firms are trying to address is limited physical strength and mobility. One example is a company called Seismic. They are currently cooperating with a design company called Fuseproject to develop an exosuit for the elderly. Figure 4 shows the wearable technology which is packed with motors, sensors and artificial intelligence and reacts to the natural movements of the body giving extra muscle power to complement the user’s strength in staying upright, getting up, and sitting down. There are several other companies that are working on exosuits or exoskeletons for elderly people. Current users of this technology face a tradeoff between power and comfort but there could be a provider that is able to offer both within the next few decades.

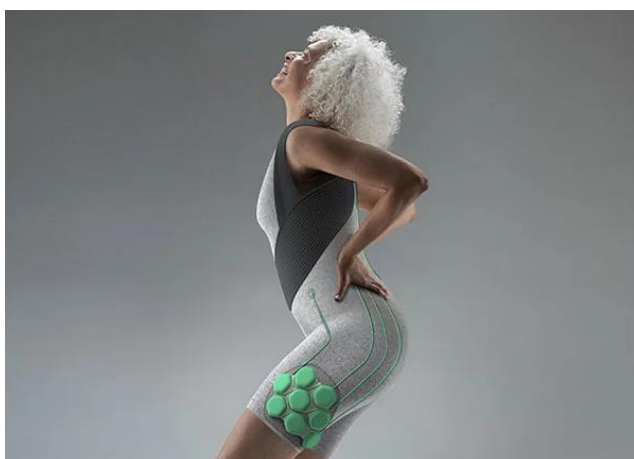


Figure 4: Aura Powered Suit by Superflex (now Seismic)

As already mentioned, there are also a lot of major corporations that are seeing the potential of the age-tech market. Google recently introduced a smart spoon that is helping people with physical tremors. The combination of sensors and the microprocessor in the spoon are countering the shaky hands of tremor patients so they can enjoy their meal independently. Technology seems to be able to help the elderly in almost every step

of their daily routine, whether it is a bed that is helping people to stand up in the morning, or robots that can cook or even help people to dress.

Furthermore, technology can simplify and improve the health-related monitoring of seniors living by themselves. Sensors and microprocessors can be worked into textiles and can monitor the user’s state of health 24/7. If there are any health-related concerns the mini-computers in the textiles can immediately send a message to relatives or in a more serious incident directly contact a doctor or call an ambulance.

However, inventions that enhance the independence of elderly people do not always have to use advanced technology like microprocessors or artificial intelligence. A lot of improvement in homecare can already be achieved simply by re-designing houses and apartments for the needs of seniors using currently available technologies. Something as simple as a shower that you can sit in can be of great value to people with limited mobility.

The second problem that a lot of companies try to tackle with the help of technology is psychological health. Decreasing brain functionality through dementia is a widespread problem. Additionally, many elderly people tend to get isolated from society. A company that is trying to tackle this issue is Intuition Robotics. They developed a cute looking little robot called ElliQ which serves as a voice assistant for seniors. Even if the short talk with the robot cannot replace a human conversation, it can still help seniors to feel less lonely. However, the interaction with the robot itself is not the biggest benefit of the technology with regards to the problem of social isolation. The voice assistant can also help users to better connect with their loved ones. Many seniors are overwhelmed by new technologies like tablets, modern computers, smartphones and especially by the dozens of apps young people use to communicate. With a voice assistant they can easily message their friends and relatives without even touching a computer.

The various examples in this article have shown that technology can contribute towards making longevity a more sustainable achievement. However, the benefits that old people can derive from technology do not only depend on the technology itself. Adaptability is a significant factor as well. Technology for seniors needs to be designed in a way that ensures they are willing to

engage with it. Furthermore, the cost factor cannot be neglected. I already mentioned that it is possible to redesign a house or apartment to better suit the needs of an old person. However, to rebuild a house that way can easily cost over 100,000 USD. This also applies for many of the other technologies introduced in this article. The exosuit for example is not on the market yet but the price is expected to be high as well. So, the effort of scientists, designers and engineers around the world should not only go into creating new technologies but also into reducing the cost of those that are already available. The real sociological potential of age-tech can only be realized if the technology becomes affordable for a large percentage of seniors.

In conclusion, technology can greatly contribute towards making longevity a more sustainable innovation. For one thing, it can help with the social security problem: if we can increase productivity per worker and create more wealth for everyone, we will also be more able to provide a life without poverty for our elderly. For another, technology specifically designed for seniors can help to increase their mobility and independence and it can also help seniors feel less lonely through being able to better connect with their loved ones.

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## **About the author**

Sandro Leugger studies Business Innovation at the University of St. Gallen and has a Bachelor in Business and Economics from the University of Basel. He is currently a working student in the strategy and digital transformation department of a major Swiss insurer. The analyses and opinions presented in this article are his own.

## **Contact information:**

sandro.leugger@gmx.ch