



# The *Futuremover*

4<sup>th</sup> quarter 2018

Living  
to 100?  
Page 8



## WILL NEW TECHNOLOGIES SAVE OUR PLANET?

**Earth to mankind: We have a problem. The WWF Living Planet Report 2018 is out. And there's no room for complacency – urgent action is needed.**

The WWF appraisal outlines the ecological state of our planet every two years. In an area where environmental warnings are often written off as scare-mongering, some figures might be helpful: 60 percent of all animal species have disappeared over the last 50 years. In the same period, the rain-

forests have shrunk by 20 percent. 90 percent of sea birds have plastic waste in their stomachs. And we're heading for global warming of between three and four degrees centigrade. The worldwide costs of all environmental damage are estimated to be over 6,000 billion euros. That's more than 11 percent of global GDP.

During the earth's 4.5-billion-year history there has never been such a rapid human impact on the environment – primarily

due to uncontrolled economic growth which takes no account of the planet's needs.

At the moment we're behaving as though we had the resources of 1.7 planets available to us every year. Or to put it another way, it means that we have used up the earth's entire resources by the 1<sup>st</sup> of August each year. Can innovative technology – if it is sustainably used – turn things round?

Who's going to save the world?

# THE SITUATION HAS NEVER BEEN AS FAVOURABLE FOR NEW TECHNOLOGIES AND SOLUTIONS AS IT IS RIGHT NOW

**The new Brazilian president, Jair Bolsonaro has announced that he wants to clear more of the rainforest for road-building, industrialisation and the cattle industry – despite the fact that climate change and environmental destruction have become the biggest threat to the whole global economy.**

Is mankind actually capable of adopting a different approach to the one that's been used up to now? A current study by PwC and the World Economic Forum (WEF) aims to find out by using new technologies to rectify technological blunders.

*Artificial intelligence is thought to be capable of facilitating the energy revolution.*

Artificial intelligence plays a leading role in this field. Many far-sighted people believe that it can facilitate the energy revolution, get to grips with environmental pollution, and maintain biodiversity.

## ARTIFICIAL INTELLIGENCE BECOMES CLIMATE INTELLIGENCE

How is this possible, and above all in which areas can artificial intelligence (AI) become 'climate intelligence'? The field is wide-ranging: AI can predict meteorological disasters and natural catastrophes, and it can analyse them and develop response strategies. AI can make towns and villages

more efficient in their use of energy. Smart energy grids and the distribution and the storage of renewable energy are also a key issue. And geodata and satellite data make it possible to monitor and manage environmental systems with a new level of precision and speed.

The potential of AI is almost limitless. Did you know that 92 percent of the world's population lives in areas which do not meet the clean air standards set by the World Health Organization (WHO)? To tackle this problem AI can help to regulate traffic levels by providing forecasts of smog and similar conditions and by using smart mobility guidance systems. And the idea of getting into an autonomous electric vehicle or even of forming car pools is a promising one, not only in terms of reducing greenhouse gas emissions.

## IT'S NOT A CASE OF MORE, BUT OF BETTER

In order to feed the world the UN reckons that current levels of food production will have to be increased by 70 percent by 2050. But just increasing production also increases environmental destruction, which then leads to more dependency, poverty and hunger.

"Farm View" is an American initiative which aims to improve agricultural yields with the help of AI. Research is currently under way into a variety of millet known as "sorghum". The plant has 40,000 different seed varieties and therefore has huge potential.



## GLOBALANCE FOOTPRINT

*Artificial intelligence requires human intelligence*

Artificial intelligence doesn't just depend on programmers. The more opportunities that arise in this field, the more solutions are needed in relation to socio-economic issues as a whole and ethical dilemmas in particular:

How can we avoid a dramatic rise in inequality as a potential consequence of the decline of work? Who is responsible if an autonomous vehicle kills someone?

Everybody has to be involved in these issues – anthropologists, scientists, philosophers, sociologists and even artists – in order to shape this discourse for our society. In addition, we have to demand much greater empathy from technology companies in relation to undesired side effects.

Due to all these challenges we need a good regulatory framework and good laws.



The search is on for a perfect combination of seeds. The selective observation, evaluation and combination of the various characteristics of seeds would be a task which would take mankind hundreds of years to accomplish by itself.

AI and robotics are used to quickly find the most resistant sorghum mixture for specific developing countries, such as India, Nigeria or Ethiopia. This means that crop failures can be avoided and harvest yields can be increased.

**New technologies** are increasingly finding their way into agriculture

**A SWISS ROBOT IS PUTTING PESTICIDE PRODUCERS IN A BAD MOOD**

A small Swiss company is making the giants tremble.

*EcoRobotix only sprays herbicides where they are actually needed – on weeds.*

Equipped with cameras, robotic arms and artificial intelligence, the solar-powered EcoRobotix works a twelve-hour shift with no complaints. It only sprays herbicides where they are needed, in other words on the weeds rather than the plants. It consequently uses 20 times less herbicide than the conventional method which shrouds whole fields in a fog of spray.

**THE QUANTUM LEAP INTO THE FUTURE: QUANTUM COMPUTERS**

The quantum computers are coming. Google is leading the world, China is spending billions to catch up, and even the EU is investing in the “super brain”. But what’s new about quantum computers compared to existing super computers?

*The laws of quantum physics make the “one step after another” processes redundant.*

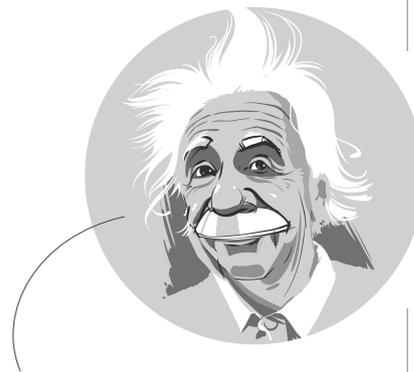
To put it simply, a normal computer calculates each step in turn, and its ‘bits’ dutifully store the results. However, the laws of quantum physics make the “step by step” process redundant. The busy qubits within quantum computers can simultaneously store huge quantities of data. This enables chemical processes, for instance, to be better mapped.

But what’s the benefit for us? – How about the prospect of chemical reactions which use less energy and therefore make more environmentally-friendly catalysts possible?

Or how about the development of organic solar cells? Or optimising the use of materials in order to save resources? Or the use of new findings in the development of personalised medicines?

**A GOOD TEAM: THE HUMAN SENSE OF RESPONSIBILITY & ARTIFICIAL INTELLIGENCE**

There are hundreds of ways in which AI can be used for the good of the planet, and no doubt just as many ways in which it can be used to harm it. Let’s break out of our comfort zone and try new approaches. We have to use the new technology now where it makes sense to do so rather than merely in cases where it helps to increase profits. Then we will all be winners.



*“We can’t solve problems by using the same kind of thinking we used when we created them.”*  
Albert Einstein



**GLOBALANCE FUTURE-MOVER**

**DAVID HERTIG**  
Founding partner & Head of Investments

**David Hertig on futuremovers in the new technologies sector:**

**Innovative, disruptive, attractive**  
Futuremovers arise where megatrends meet technological innovations.

Win-win is the name of the game: attractive returns for investors, handy solutions for our planet.

Never have inefficiencies been eradicated as thoroughly as they are today – thanks to IT, data availability and global networking. An investment crisis? Far from it. **Smart mobility, smart farming and smart cities are all growth markets which are growing by between 15 and 20 percent a year.** Long-term investors are well advised to align their portfolios with these future growth areas.

**DELICIOUSLY VEGAN – MEAT FROM THE LABORATORY**

The US firm “Beyond Meat” produces meat in the laboratory directly from vegetable proteins, fat, and amino acids.



Source: Impossible Burger

## Interview with Patrick Stal of Uber

# MOBILITY IS CHANGE

*Patrick Stal, Head of Marketing for EMEA, on the image of Uber and the future of mobility.*



In future we and our children will no longer move around our cities in just one dimension.

### Where is Uber currently?

Uber currently operates in over 600 cities in 65 countries. About 15 million journeys are arranged via the app every day. In total there are well over three million drivers around the world who regularly use the app. In Switzerland we operate in four cities and have roughly 300,000 active users.

### Uber has been a frequent target of criticism recently. What's changed?

Uber made mistakes in the past. We concentrated too much on growing our business instead of being a good partner for cities and drivers.

*Naturally we're also looking into the question of social security cover.*

Things have changed now. We know that our drivers cherish the flexibility and independence which the app offers them.

## Patrick Stal

Patrick Stal is the Head of Marketing for EMEA (Europe, Middle East, Africa) at Uber, and he heads up a team of over 200 marketing professionals. They work tirelessly every day to strengthen and further develop the Uber brand.

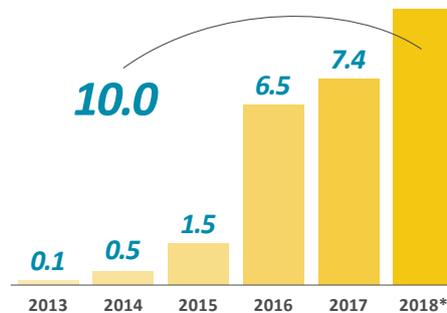
Before he moved to Uber he held leading marketing positions at TomTom and he also managed the Benelux business of the leading brand consultancy, Interbrand. He began his career in a management consultancy. Patrick Stal is half Dutch and half German, and he speaks four languages fluently. He lives in the Netherlands and has two daughters.

*"I'm sure that flying taxis will be with us in the not too distant future."*

Naturally we are also looking into the question of social security cover. For instance, working in partnership with AXA we offer free insurance for drivers in almost all European countries.

### LIFE IN THE FAST LANE

Uber's worldwide rate of growth (turnover in bn. USD)



Source: Forbes, Uber, Bloomberg, Statista (\*forecast)

### Inner-city mobility is currently undergoing major changes. How will people get around in future?

Traffic levels are increasing in cities, and it's becoming increasingly difficult to move around quickly and cheaply. As our cities continue to grow, we need new forms of mobility which are not centred on privately-owned cars. Instead there has to be a mix of various types of transport, with public transport as a key element which is supplemented by new mobility solutions, such as bike sharing and on-demand services like Uber or taxis.

### What are Uber's aims in all of this?

We would like to turn Uber into a real mobility platform. We want to make it possible for people to use various means of transport with our app, ranging from electric bicycles to public transport and various delivery services (such as Uber Eats). The aim is for the customer to put together his or her journey in the most convenient way possible: whether it's using trams, buses, trains, taxis, bicycles or Uber.

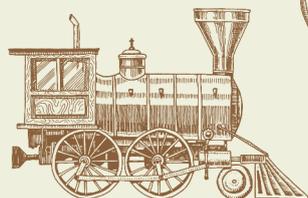
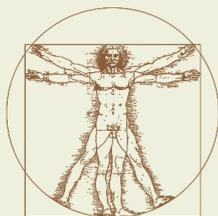
### The key to it all is AI: How long will it take for self-driving cars to make their breakthrough?

There will be a mixture of human drivers and self-driving technology for many years to come. There is little doubt that the technology will soon be able to be used for short journeys, and will consequently reduce traffic levels because much better use will be made of the cars, which will be an alternative to owning your own car. However, there will still be many circumstances in which people will be needed behind the steering wheel.

### Uber has also announced that it wants to move people around in taxi drones. How far are we from this?

I'm sure that flying taxis will be with us in the not too distant future. We're working hard on getting the first flying taxis into the air by 2023. Then we and our children will no longer move around in our cities in just one dimension.

# Yesterday's Futuremover



Florence Nightingale (1820–1910) is regarded as the woman who laid the foundations of modern nursing. In the Victorian age she didn't fit in with the general perceptions of women.

## Florence Nightingale

*“If you're born with wings, you should do everything that you can to actually use them to fly.”*

Imagine a genteel household in 19<sup>th</sup> century England: this is where 17-year-old Florence reveals to her parents that she wants to become a nurse. They're “not amused”, since well-brought up young ladies should concentrate on becoming dutiful wives rather than getting their hands dirty in hospitals. In the hope of getting their daughter to change her mind, they send her traveling. However, Miss Nightingale prefers to visit hospitals rather than to go sightseeing. Eventually her parents reconcile themselves to the vocation of their second child. After having gained experience of working in a variety of hospitals, by 1853 Florence Nightingale is already running a sanatorium. She passes on her accumulated knowledge in professional training courses.

### THINKING HOLISTICALLY IS MORE HEALTHY

She is the first person to incorporate factors such as hygiene, the psyche, and nutrition into care. Florence Nightingale consequently sets a milestone on the road to modern healthcare, and she gains a considerable reputation in England.

*The “lady with the lamp” becomes a legend.*

When in 1854 Great Britain enters the Crimean War against Russia, the public are outraged at the increasing mortality rate in the military hospitals. The government sends Nightingale and 38 other nurses to



Professional nursing was already able to significantly reduce the mortality rate by the middle of the 19<sup>th</sup> century.

the Scutari military hospital in Istanbul. The doctors working there are not exactly delighted at the female invasion of their field of work. But they have to concede defeat: within a year the mortality rate drops from 14.5 to 5.2 percent. Nightingale even ministers to her charges at night when all the doctors are asleep – the “lady with the lamp” becomes a legend.

*The famous pie-chart is invented.*

### THE FIRST DATA COLLECTOR OF THE MODERN ERA

Florence Nightingale collects data relating to the course of diseases, hospital conditions, and medical instruments. Thanks to the recordings that she makes she manages to provide better and more efficient care in the military hospitals. When she herself falls ill and can no longer practice, she uses mathematical skills to draw up complicated statistics, and to illustrate them in the form of charts and graphs. The famous pie-chart is invented.

Florence Nightingale becomes not only the most important adviser on health matters but also the first woman to be appointed to the “Royal Statistical Society”.

She lives to the age of 90 and leaves a legacy of numerous reforms which are still effective today.

### Florence Nightingale – a brief overview

- Reformer who pioneered modern healthcare
- Collector of data, social statistician, inventor of the pie-chart
- The first woman to be awarded the “Order of Merit”
- The inspiration behind the founding of the Red Cross

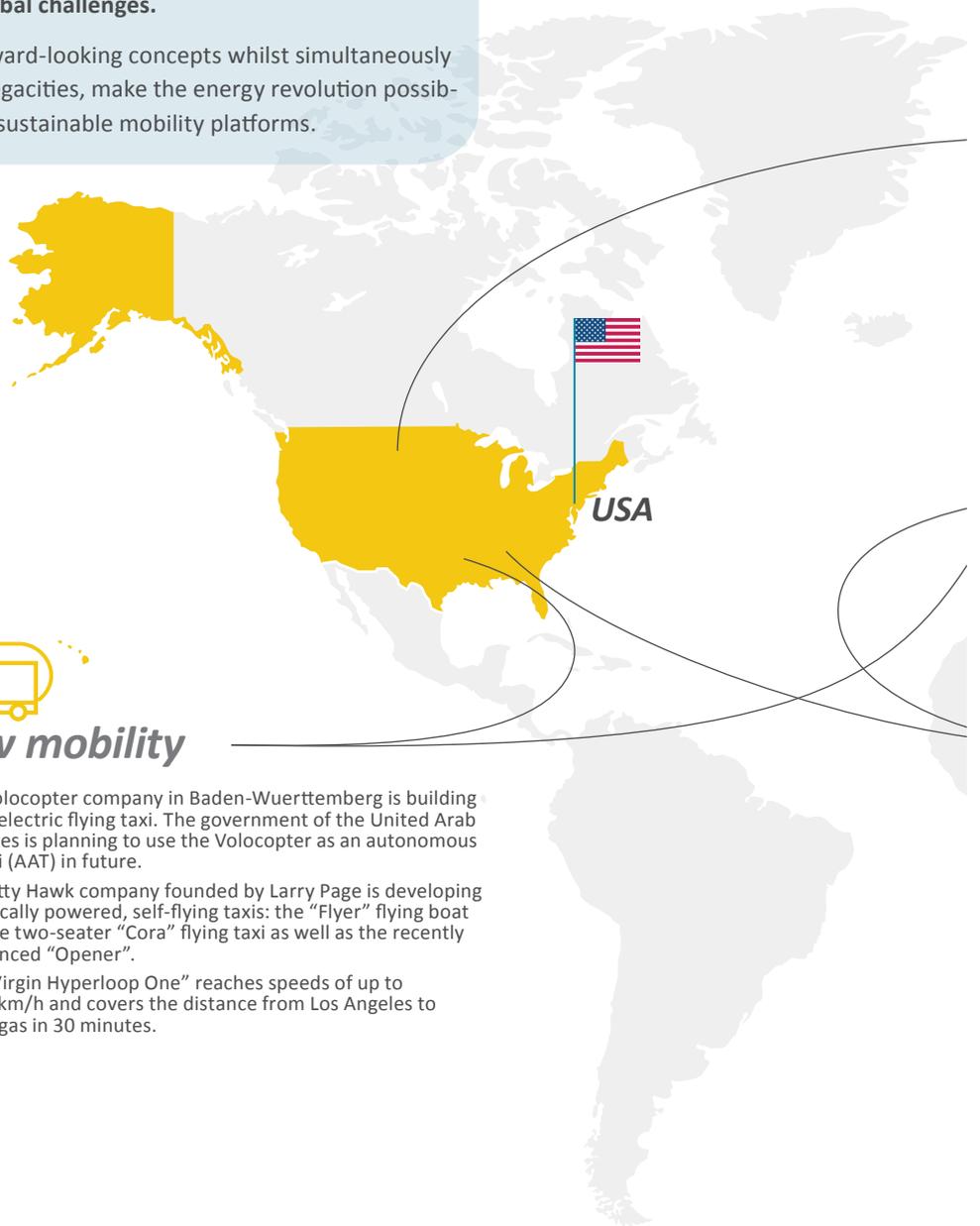
# OUR WORLD OF THE FUTURE



## What is a futuremover

Futuremovers are companies which respond successfully to worldwide megatrends and develop solutions to global challenges.

They replace redundant business models with forward-looking concepts whilst simultaneously achieving a positive footprint. They build smart megacities, make the energy revolution possible, focus on the circular economy, or they develop sustainable mobility platforms.



## New mobility

- The Volocopter company in Baden-Wuerttemberg is building an all-electric flying taxi. The government of the United Arab Emirates is planning to use the Volocopter as an autonomous air taxi (AAT) in future.
- The Kitty Hawk company founded by Larry Page is developing electrically powered, self-flying taxis: the "Flyer" flying boat and the two-seater "Cora" flying taxi as well as the recently announced "Opener".
- The "Virgin Hyperloop One" reaches speeds of up to 1,200 km/h and covers the distance from Los Angeles to Las Vegas in 30 minutes.



## Accenture

Recognising customer needs earlier.

Accenture is developing the Digital Services Factory for Schneider Electric: this is a new platform which reduces standard development periods by up to 80 percent. This enables it to offer industrial customers "predictive maintenance" of their investments.

Globance Footprint 85



## ADP (Automatic Data Processing)

IT companies which focus on personnel services.

ADP investigates pay differences and confirms that women earn roughly 17 percent less than men six years after being appointed. ADP cites lower starting salaries for the same work as the main reason for this. Its recommendation: pay women the same rates right from day one.

Globance Footprint 80



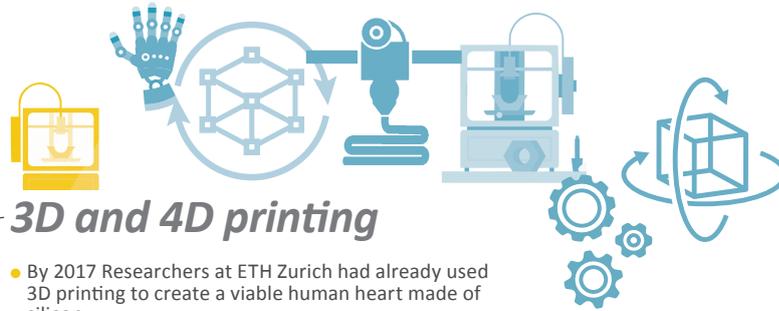
## First Solar

First Solar develops and operates solar energy equipment.

First Solar's photovoltaic equipment has particularly good manufacturing statistics. Its carbon footprint is one sixth of that produced by average solar energy equipment. What's more, about 90 percent of the raw materials within its equipment can be reused.

Globance Footprint 78





## 3D and 4D printing

- By 2017 Researchers at ETH Zurich had already used 3D printing to create a viable human heart made of silicon.
- 3D printers can print artificial limbs and consequently help millions of amputees.
- 3D printing is being followed by 4D printing which adds time as the fourth dimension. Products only constitute themselves when they are needed. For example, in space travel or medicine.



Germany

Switzerland

China

Japan

## Artificial intelligence

- Scientists around the world are already using artificial intelligence in order to combat hunger and poverty.
- In agriculture AI is combating weeds. The autonomous robot built by the Swiss firm, EcoRobotix, is a fully autonomous, solar-powered, high-precision machine which uses 90 percent less herbicide.
- In Beijing China is building a gigantic research centre for over 400 companies.

## Health

- There are almost 70,000 people over the age of 100 in Japan. This has consequences for society, pensions and the country's health systems, and for the provision of care.
- Since 2009 Google Ventures has invested roughly 36 percent of its 2 billion dollar revenues in start-ups within the healthcare sector.
- Calico, Alex Therapeutics, Metacrine and Inity are biotechnology companies which are developing ways of delaying human ageing.



**Intel**  
The world's computers use Intel technologies to operate and communicate.

Intel is developing so-called trail cameras which can, for instance, recognise an Amur tiger no matter how stealthily it creeps past. Such image recognition technologies make valuable applications possible: Intel systems often recognise illnesses on medical images better than people do.

Globance Footprint 82



**Lenzing**  
Making fibres from wood.

Wood cellulose fibres are a sought-after, high-value niche product which in some respects has better properties than cotton. Lenzing is committed to the circular economy, and sustainability is embedded at the core of its corporate strategy.

Globance Footprint 60



**NTT Docomo**  
The largest telecommunications company in Japan.

NTT DoCoMo is very committed to artificial intelligence as a basis for providing the best possible support for its customers. Improved speech recognition helps older people and people with disabilities to use devices or to make phone calls.

Globance Footprint 81

*New thinking is helping an ageing society*

# LIVING (ACTIVELY) TO THE AGE OF A HUNDRED



Almost 70,000 people in Japan have reached the age of 100. In ten years' time the number of centenarians is expected to be as high as 170,000. Is the dream of eternal life turning into reality, or are the problems of ageing getting worse? The fact is that demographic change raises enormous challenges for society, the world of politics and the economy – not only in Japan.

At the age of 80 Yuichiro Miura conquers Mount Everest. Hiromu Inada competes in the Ironman in Hawaii at the grand old age of 83. The Guinness Book of Records is crammed with success stories about “madcap old people”. Having the longest life expectancy in the world is something to be justifiably proud of. Experiencing a significant decline in the birth rate may make people worried. It means rising health costs, higher social security contributions, and a shortage of care workers etc.

*In ten years' time there are expected to be more than 170,000 centenarians in Japan.*

But the Japanese are not prophets of doom. In 2017 “The 100-Year Life” written by Lynda Gratton and Andrew Scott is appearing on bookshelves in Japan. Both of the authors teach at the London Business School, and they highlight in striking scenarios the impact which a long life may in future have on people's finances, health, and social lives.



## GLOBALANCE FOOTPRINT

PETER ZOLLINGER  
Head of Impact Research

*What does “fit for the future” mean for an ageing society?*

An ageing society faces some very special challenges: for instance, how will it manage to ensure and maintain secure access to healthy food, affordable health services, or further education without putting age restrictions in place?

We use the Globalance Footprint to search for companies which achieve success by making use of special innovations: food companies which develop products that are tailored to the needs of older people. Pharmaceutical companies and insurance companies which help to ensure that health costs remain affordable in old age. IT and telecoms companies which help older people to maintain their social contacts and to carry on learning throughout their life.

## *The Japanese “Gerontological Society” raises “old age” from 65 to 75.*

This makes such an impression that the Japanese government uses it as the basis for its policies. A disparate group of ministers, scientists, and business and trade union representatives is founded. Prime minister Abe chairs all the meetings, which shows just how much importance he attaches to this subject. One example of how practical the work is is an 83-year-old who helps to develop the app games for the elderly. Critics talk about a spectacle put on by the government – but the public are paying attention and therefore exerting an influence.

### 75 IS THE NEW 65

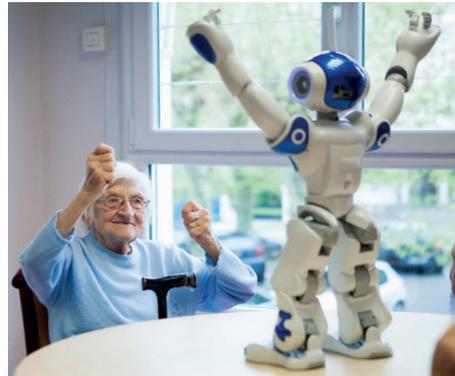
The Japanese “Gerontological Society” has readjusted the definition of older people from 65 to 75 years old. Older people pay more attention to their health, fitness studios are booming, and property fairs show how extra room can be created for older family members. Companies are benefitting from older people's taste for spending in areas ranging from package tours to technology and body care products. Financial services providers offer new services for very elderly people, and companies are developing models of work which will provide a contractual basis for older workers to “re-engage” in the world of work. This is because Japanese men and women would like to work for as long as possible due to social and economic reasons.

**ARTIFICIAL INTELLIGENCE FOR HUMANITY**

By 2025 there will be a shortage of about one million human care workers in Japan. Why not talk about artificial intelligence and put dystopian phantasies to one side? The people of Japan feel little if any resentment towards artificial intelligence. Hardly surprising given that the world leader in the production of robots is a Japanese company which supplies 52 percent of global demand. On average about 100,000 of these creations are exported every year.

*In Japan's old people's homes and care homes robots or androids are already being used as assistants for care personnel in many places.*

The machines which often have human, likeable "facial features" bring variety and stimulation to the lives of elderly people. For instance, the residents of an old people's home in Tokyo are encouraged to do exercise by the "Pepper" robot. The robotic dog AIBO reacts to music, gestures and speech and is an attentive friend for the ill and the elderly who brings joy into their lives. PARO, a fluffy seal that has been specially developed for people who suffer from dementia, helps those who are affected by the illness to display positive emotions. However, the care staff are also thankful for the high-tech assistance: Digitally controlled "movement coaches" help people to keep



The "Pepper" robot encourages senior citizens to exercise.

their limbs moving, and the care home residents retain their independence while also easing the workload of the nursing staff. The carrying of patients is made easier through the use of a portable movement assistant which helps to prevent back and muscular problems among the staff.

**TURNING A CURSE INTO A BLESSING**

Predicting the future is fraught with uncertainty, but demographic change is certain. Including outside of Japan. Why not supplement the 3-stage linear process of learning, working and retiring with more flexible life phases?

*Is working in old age becoming more important than just having paid employment?*

Using knowledge, health, independent decision-making and technological support to make good use of the extra years of life: not a bad option.



**GLOBALANCE FUTURE-MOVERS**

**Demographics and age**

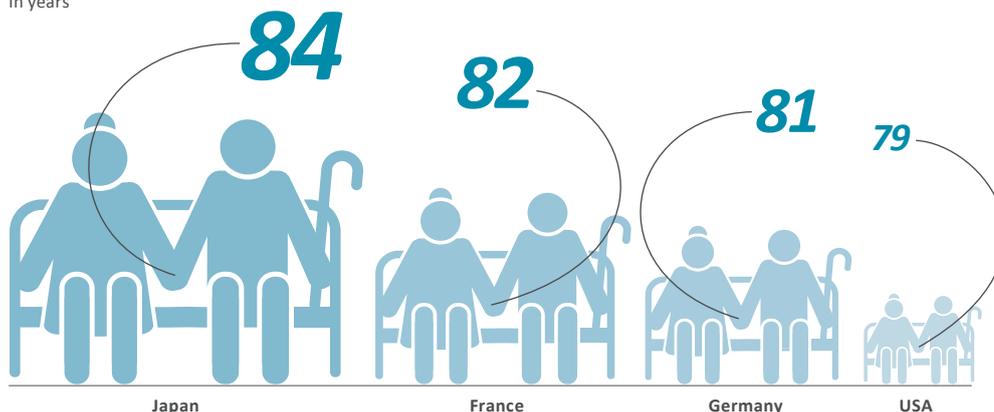
**Ventas Inc.** is an American company which specialises in the development and operation of accommodation and care/health centres for older people. Its portfolio comprises almost 1,200 properties in the USA, Canada and the UK. Ventas benefits from the increasing demand for specialised accommodation for the elderly.

**Teladoc Inc.** is a US health company which provides medical care remotely via mobile devices, the internet and videos, and over the phone. With 1,200 employees and an annual turnover of USD 400M the company services a continually growing number of users.

**Stryker Inc.** Stryker Corporation which has its head office in the USA is a leading company in the field of orthopaedic and surgical implants. Stryker is benefitting from the increasing global demand for artificial limbs and endoprostheses which keep our locomotor system in shape even in old age.

**A COMPARISON OF LIFE EXPECTANCY IN DIFFERENT COUNTRIES**

In years



Source: The World Bank

# Flying taxis, flying cars, autonomous flying READY FOR TAKE-OFF

**The German digitisation minister, Dorothee Bär, recently demanded that there should be flying taxis. The country reacted with derision, as did people online. People said that what was needed was to tackle political issues on the ground rather than going off in flights of fancy. But is the idea of flying taxis etc. really so out of touch with reality?**

1863 in London. Thousands of carriages, horse-drawn buses and pedestrians streaming to work: a city which is facing gridlock. The decision is made to put the traffic underground. “An insult to common sense” is the comment in the press. The world’s first subway (underground railway) is built all the same. Nowadays it’s motorised vehicles which are clogging our cities. And things are not getting any better: two thirds of the world’s population are predicted to be living in cities by 2050. So why not take to the air?

## Transport in the future: “VTOL” (Vertical Take-Off and Landing)

### EMISSIONS-FREE VERTICAL TAKE-OFF VEHICLES

“An emissions-free vehicle that can fly reliably and safely is the next step in the development of transportation” according to Fred Reid, the chief executive of Zephyr Airworks. Cora, a prototype plane which is just about to be put through its paces in Christchurch, New Zealand, shows what it can do: the unmanned aerial device can fly 100 kilometres in an hour. Admittedly, the test area is flattering for the firm which belongs to Kitty Hawk – a company owned by Larry Page, one of the founders of Google. The airspace is virtually empty and the authorities are not overly zealous in imposing regulations. Nevertheless, Cora does already have an airworthiness certificate from the New Zealand authorities.

## Innovations are ready to be unleashed.

The vision of aerial mobility is every bit as enticing as the underground railway once was. Developers and researchers think that VTOL technology has great potential. The agile aircraft could be part of the solution for alleviating traffic jams in cities, and for plugging mobility gaps in the countryside. Its vertical take-off and landing capabilities could turn the roofs of houses into stations. It’s clean, silent and fast, and it uses no fossil fuels. It flies autonomously so it’s accessible to a wide range of customers – a concept that numerous far-sighted companies around the world are working on: Uberair with roughly 70 committed partners, Volocopter and Lilium in Germany, Ehang in China, or PAL-V, a model of flying car from Holland.

Now all that’s needed is for politicians to set the legal framework and ensure the provision of a reliable infrastructure. The air taxis are already ready for take-off.



### GLOBALANCE FOOTPRINT

*Are drones good for people and the environment?*

Before drones become a permanent feature of our transport systems, numerous technical, legal, and economic as well as psychological hurdles have to be overcome.

A provisional summary of the pros and cons: drones perform better in terms of their noise emissions and energy consumption, and in terms of infrastructure, in situations where they replace existing, inefficient methods of transport (e.g. trucks for lightweight goods and helicopters for shooting films). Drones have the greatest positive potential in new, indirect agricultural and scientific applications, or in the monitoring of infrastructure. Drones are more stable and therefore safer than helicopters. It would be a problem if drones were to lead to a rapid increase in the use of (personal) mobility, and consequently to increased environmental impacts.



**VTOL technology.** Autonomous flying without fossil fuels. Clean, silent and fast.

# Urban farming/vertical farming

## THE FARM MOVES TO THE CITY

**Agricultural innovations mean that you can hear the vegetables growing. New kinds of farms are ploughing up the familiar agricultural landscape. Is this a utopia, or a market with a promising future?**

The megacities are coming, and that means a shortage of space and food supplies. Residential areas will eat up surrounding arable land. It will become virtually impossible to create new agricultural land because according to agricultural experts 80 percent of it is already being farmed.

*Foodstuffs are thriving where people didn't think it was possible: in skyscrapers, on roofs, or in disused hangars.*

The US firm, Urban Organics, has already been operating professional, urban farms in various cities for years.

### FISH AND PLANTS THRIVE IN A BREWERY

In a former brewery in Saint Paul, Minnesota, vegetables are being grown while salmon are also being reared. The fish and plants benefit from a water circulation system that is as simple as it is inspired: the material that is excreted by the fish ends up in the water tanks that are used for the plants. It is used there as fertiliser, after which the cleaned water flows back into the fish tanks. The so-called "aquaponic" technology saves water and eradicates the need for artificial fertiliser.

*Supplies to local customers include freshly caught fish and fresh vegetables – without the need for long-distance transportation or time-consuming and costly intermediaries.*



**Fruit and vegetables grow in illuminated shelves in skyscrapers.** Innovative farms are ploughing up the familiar agricultural landscape. Image: Urban Organics

### WHY NOT FARM VERTICALLY?

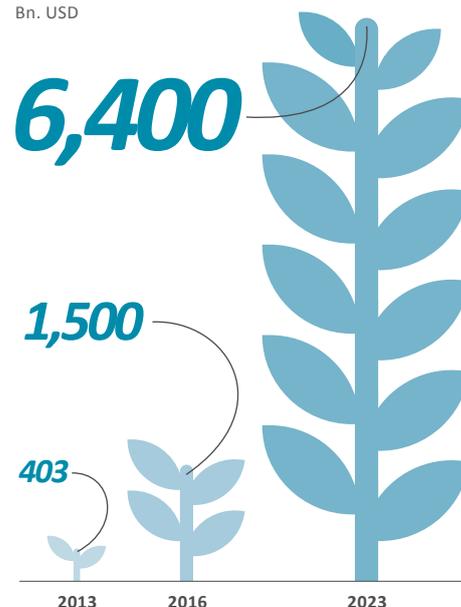
Agriculture in the city sounds paradoxical – if one thinks "horizontally". Lateral thinking on the other hand creates space for innovative, vertical cultivation areas. Vegetables and fruit grow in illuminated shelves in skyscrapers. Not in the ground, but in water. The condition of the plants as well as air humidity, nutrients and the temperature are measured by sensors, digitally evaluated, and adjustments are made as required. This means that the process is independent of seasonal influences or natural catastrophes.

*The desert kingdom of Dubai also wants to make use of vertical farming.*

The Emirates airline is planning to build a 12,000 square metre vertical farm at the end of 2018 in collaboration with the US company, Crop One. The aim is to harvest 2,700 kilograms of herbicide- and pesticide-free leaf vegetables every day – and to achieve this with a 99 percent reduction in water consumption. This should not only improve the freshness of airline catering, it should also improve the ecological footprint of the food. Dickson Despommier, a scientist at Columbia University, estimates that urban farming will have a turnover of between 50 and 100 billion US dollars in ten years' time. And a study by the Fraunhofer Society is convinced that this sector is going to be part of the future.

### A HUGE MARKET FOR VERTICAL FARMING

Bn. USD



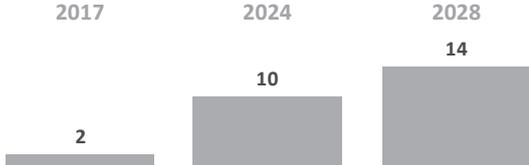
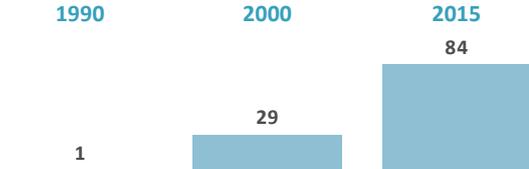
Source: Allied Market Research; GlobeNewswire © Statista 2018

# Globalance Cockpit

# 3,570 TIMES AS CHEAP

40 years ago a kilowatt hour (kWh) of solar energy cost USD 77. This year Nevada Power (a company in which Warren Buffett has a major shareholding) offered a price of 2.15 cents for a kilowatt hour of electricity. This reduction is equivalent to a litre of milk which cost 1.30 Swiss Francs 40 years ago now costing just 0.03 francs.

Source: cleantechica.com

	<p><b>Economy</b></p> <p>Global growth for the flying taxis, flying cars and autonomous flight (VTOL) market (bn. USD)</p> <p>Source: bisresearch.com</p>	 <table border="1"> <thead> <tr> <th>Year</th> <th>2017</th> <th>2024</th> <th>2028</th> </tr> </thead> <tbody> <tr> <td>Growth (bn. USD)</td> <td>2</td> <td>10</td> <td>14</td> </tr> </tbody> </table>	Year	2017	2024	2028	Growth (bn. USD)	2	10	14
Year	2017	2024	2028							
Growth (bn. USD)	2	10	14							
	<p><b>Health</b></p> <p>Proportion of children worldwide who have been vaccinated against hepatitis (%)</p> <p>Source: ourworldindata.org</p>	 <table border="1"> <thead> <tr> <th>Year</th> <th>1990</th> <th>2000</th> <th>2015</th> </tr> </thead> <tbody> <tr> <td>Proportion (%)</td> <td>1</td> <td>29</td> <td>84</td> </tr> </tbody> </table>	Year	1990	2000	2015	Proportion (%)	1	29	84
Year	1990	2000	2015							
Proportion (%)	1	29	84							
	<p><b>Technology</b></p> <p>Global artificial intelligence turnover (bn. USD)</p> <p>Source: www.statista.com</p>	 <table border="1"> <thead> <tr> <th>Year</th> <th>2016</th> <th>2019</th> <th>2025</th> </tr> </thead> <tbody> <tr> <td>Turnover (bn. USD)</td> <td>3</td> <td>11</td> <td>89</td> </tr> </tbody> </table>	Year	2016	2019	2025	Turnover (bn. USD)	3	11	89
Year	2016	2019	2025							
Turnover (bn. USD)	3	11	89							
	<p><b>Society</b></p> <p>Average number of children that women have (fertility rate 2016)</p> <p>Source: wikipedia.org</p>	 <table border="1"> <thead> <tr> <th>Country</th> <th>Switzerland</th> <th>India</th> <th>Israel</th> </tr> </thead> <tbody> <tr> <td>Fertility rate</td> <td>1.55</td> <td>2.33</td> <td>3.11</td> </tr> </tbody> </table>	Country	Switzerland	India	Israel	Fertility rate	1.55	2.33	3.11
Country	Switzerland	India	Israel							
Fertility rate	1.55	2.33	3.11							
	<p><b>Environment</b></p> <p>Earth Overshoot Day: the day in the year on which the natural resources of the earth are used up for the year.</p> <p>Source: wwf.ch</p>	 <table border="1"> <thead> <tr> <th>Year</th> <th>1971</th> <th>1995</th> <th>2018</th> </tr> </thead> <tbody> <tr> <td>Earth Overshoot Day</td> <td>21<sup>st</sup> December</td> <td>21<sup>st</sup> November</td> <td>1<sup>st</sup> August</td> </tr> </tbody> </table>	Year	1971	1995	2018	Earth Overshoot Day	21 <sup>st</sup> December	21 <sup>st</sup> November	1 <sup>st</sup> August
Year	1971	1995	2018							
Earth Overshoot Day	21 <sup>st</sup> December	21 <sup>st</sup> November	1 <sup>st</sup> August							

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