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Credit: Bigthink

Abstract

We always want to know with different levels of interest and urgency what the future brings. We would like to know our personal future and how other people might behave and obviously, we want to know what the weather will be tomorrow. We are also interested to know, in which direction certain situations and the world in general develop in short-term, medium-term and long term. We know that nobody knows but we nevertheless try to obtain predictions from whoever volunteers to make them. '*Predictions are difficult – especially when they concern the future*'. This is how you can put it.

We also know that our lives would be entirely different – even impossible - if we knew precisely and, in all details, ahead of time what happens in future with us and with the world. We would not have the illusion of a free will because we don't have to make decisions if we already know what is coming up. Our lives are animated and driven by the fact that we don't know our future. We live under the condition that we don't know.

If God knows, is a different question for theologians and for philosophers. This question makes only sense if we assume firstly that God exists and secondly that he can have knowledge, which assumption requires that we anthropomorphize God and treat God as an entity that possess human characteristics. I talk about these issues in the essay about Gods, Religions and Churches. For those who believe that God is able to know, the short answer is that he is omniscient, that he knows everything, including our future, and that he does not let us know.

We can use different methods how to satisfy our curiosity about the future. We can ask fortune tellers or psychics or can use crystal balls or astro-charts. If we are adventurous, we can ask economists. But I think that they are only slightly more reliable than crystal balls.

We might also use a chatbot with artificial intelligence to tell us the future. We finally can use methods that are more scientific. One of these methods, which business people and some economists prefer, is to make forecasts based on information, data and on statistics from the past from which we might extract some trends. These trends can then give us a vague idea into which directions things might move in future.

A holy book might announce that a terrible cataclysm will happen some time in the future. But the hope that nothing catastrophic will happen – at least not during our lives - keeps most of us going. Only few people, mostly in doomsday sects, commit suicide to escape the forecast of a catastrophe.

If we don't base our predictions using one or all of the methods above, gut feelings – as always in decision-making – creep in and define our forecast.

In this essay, I give some examples of mostly inaccurate predictions that people have made in the past. I then add some predictions of our future that I have based on some casual information and facts but mostly using my gut feelings.

I am quite optimistic about future developments of science and technology like gene editing, quantum computing, nuclear fusion and cultivated meat despite serious risks that new technologies harbor. I am not very optimistic that humans will be able to stop global warming by reducing CO_2 emissions. But I am optimistic that mankind will be able to neutralize some negative effects of global warming. I am not equally optimistic about the chances of survival of the US and the EU and of liberal democracies in general. They have reached the end of their useful lives. But even if democracies don't survive because they have

no self-healing capacities, and even if other political systems also don't survive, it is in medium term no major problem for mankind. Political systems always come and go and mankind has so far always survived political changes and all other changes. Mankind will continue to survive unless a natural or a man-made catastrophe destroys all human beings. But even in such a case, another cycle of human evolution might start because it is very likely that some biological leftovers, like DNA of humans, survive the catastrophe and will be the basis for another cycle of human evolution that we can call reincarnation of mankind.

Predicting one's own Future

When I was a young boy, my focus was not on the future of the world but solely on my own personal future. My mind was closer to my personal development than to general developments in the world.

It did not come to my mind to ask some clairvoyant what would become of me. I did not want to be told my future. I wanted to create it. I wanted to move forward; I wanted to shape my future myself with my own strengths and with my own activities. The sky seemed to be the limit for me while the future of the world did not concern me. Peter F. Drucker, the inventor of the concept known as management by objectives, suggested that the best way of predicting the future is to create it.

My parents told me that I would have a marvelous future if I only followed the rules of life's game. These rules were to learn, to work hard and keep out of trouble. And this is what I tried to do with some success. My life was in front of me. I tossed in my mind many scenarios for my development and was excited by the prospect to achieve something valuable that would be enjoyable at the same time. All options were open and I was free to select law as the field of leaning at university. This was the first very important decision that I made. I had taken the future in my own hands and not in the hands of a fortune teller. But after a few years I noticed that my decision had also narrowed the window for future career options. Lapse of lifetime and Important decisions that we make diminish future opportunities and make predictions more focused on the opportunities that are left over for the rest of life that becomes shorter every day.

Nobody can undo an action. If you regret an action, you might – if you are lucky – be able to undo or to repair the damage that you have done. But as life progresses, the options for repair of past mistakes become fewer and fewer until there is no other option left than to accept the end of one's existence. This end is the only prediction that does not fail even if we want to avoid it. It is the only thing that for sure will happen. The only uncertainty is that we don't know when it will happen. If you are 81 years old, as I am now, this uncertainty is reduced to a few years or possibly less. Planning a future is redundant. It is a thing of the past.

If we knew at a younger age exactly the details of what is in store for us in our lives, we would not have the illusion of a free will. If an omniscient and 100% reliable fortune teller had told me when I was a boy that I would become a lawyer I would not have studied hard at university because there was no way avoiding to become a lawyer. Ignorance of the future and hope to master all challenges, are essential to motivate a person. There is no hope if you know with perfect accuracy what exactly lies ahead. Nobody would get married if he knew for sure that a divorce was coming. The expectation that a divorce will not follow the wedding, overcomes all possible hesitations that you should have because statistics tell you that at least 50% of all marriages end in divorce. But on the day of a wedding, most couples predict that the marriage will last "until death do us part". We predict that divorces happen only to other couples.

Let's assume that a 100% reliable fortune teller lets a young man know that he will meet the perfect love of his life at the age of 40 and that he will happily be married with her. Let's further assume that this man meets at the age of 25 an attractive girl and that he falls fondly in love with her. What will he do? Will he

trust the prediction of the fortune teller and wait until the age of 40 to meet the love of his life? No, he probably will assume that the fortune teller was out by 15 years and he will get married since he is in love. But he might get divorced and re-marries at the age of around 45 years and will then say that the fortune teller was right but was only out by five years.

Some thinkers believe that our omniscient God knows ahead of time all details of our lives. The Bible says, for example, that '*Before a word is on my tongue you, Lord, know it completely*' (Psalm 139:4)

God is omniscient and will know all our actions before we know. We must thank him that he is wise and nice and does not to tell us what he knows. In this way he gives us the illusion of a free will. If he did tell us what he knows, we could not live. We could not become conscious of a situation if we are already aware of it ahead of time. We can perceive a new situation only if we are not aware that it evolves. If we were aware of what will happen, we cannot do anything to change or run away from it.

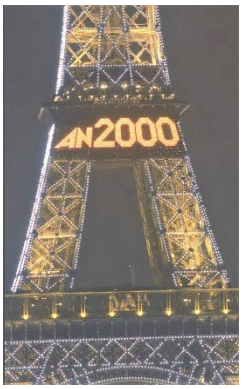
Roald Dahl describes in a very short story a man in a village of the ancient Middle East. The man had heard from a reliable fortune teller that he would meet on the next day Grim Reaper, the lord of death who always appears when a person's time on earth is up. Frightened as he became, he took his horse and galloped at high speed away from his village to avoid him. After one day of hectic ride, he arrived at an intersection where Grim Reaper greeted him saying "Welcome, I was expecting you".

Another story, this time real, happened in Berlin during the 2nd World War. Wealthy parents feared for the lives of their two children and sent them to a private school in Switzerland. A huge avalanche came down from the top of the mountain and killed all students in the school. But the mansion of their parents in Berlin remained miraculously one of the few buildings that the allied bombs had not destroyed.

The principle is that you cannot escape destiny, by which I mean the future. This also applies to the life of mankind. We, as members of mankind, cannot run away from what we fear will happen. If we knew what lies ahead, candidates in democratic elections, for example, would have nothing to promise. If a politician in a rally during an election campaign promises that salaries will increase, his audience would complain that this statement is boring because they know it already. As a matter of fact, if we know the details of how our country evolves there would be no room for politics and for politicians.

At the beginning of my life, the new millennium was decades away, too far ahead for a young man to contemplate.

I could as a young boy not imagine what my life would look like at the beginning of the third millennium. In contrast, young people who are 24 years old today think of the year 2000 as a year of ancient history. I calculated as a boy that I would be 57 years old at the turn of the millennium. A man of that age, I thought, was a very old man – even older than my father at the time when I made this calculation. But the new century and the new millennium arrived with certainty and in no time, because time flies like a rocket into nowhere. We celebrated the arrival of the new millennium in Paris in front of the Eiffel Tower. We stood in the middle of an enormous crowd when a gigantic display counted down the minutes until midnight. When the countdown reached zero, the Eiffel tower displayed the number 2000 and a huge wave of noisy cheers swept through the crowd. People hugged each other as if something fantastically new had happened.



Eiffel Tower
01 January 2000

But the day of 01 January 2000 was not new. The arrival of this day was predictable to the second. Why do people celebrate? I guess the celebrate because they survived until this day and are not yet dead.

I was a mature adult at the turn of the millennium but was still looking forward doing valuable things, earning money and enjoying my life. But at this remarkable moment I became slowly aware that more than half of my life was already behind me. I had to live only the remaining smaller half of my life into a basically unknown future. I could particularly not predict that I would come to live in China. This was unimaginable at that time.

More than twenty years later, I am now an old man – 81 years to be precise at the time of writing. This gives me little additional time to look forward into a personal future. At that age you are like in death row. Death is easily predictable.

When I see younger people hustling and bustling in the streets and elsewhere, I ask myself why the hell they are eagerly doing what they are doing. In a few years' time they will be in the same position, in which I am now. This is predictable.

I see many construction sites in Vancouver and in Zhuhai - actually everywhere. I regularly ask myself if I will ever be allowed to see the finished buildings. I watched in 1969 on television the first landing of men on the moon. If everything goes according to plan, the next human landing on the moon will be by Artemis 5 in 2028 and by China's Chang'e-8 in 2030. This is predictable unless something goes wrong. It is more predictable that I will not be alive to watch these events.

I will have to pass the age of 90 if I want to experience the year 2035 when all non-electric cars will be banned in the European Union as the European Parliament has decided in 2022. It is predictable that I will not be part of this interesting future world. Life is like watching a brief scene of an interesting movie. The movie of the world's game is well under way when we are born and we have to leave the theatre in the middle of the performance. We are actually not leaving in the middle of history's story but rather well ahead of the predicted 4 billion years of our earth's future existence.

My interest in the development of the world grew as I grew older and I started to see myself as part of the world. I now find it particularly interesting to observe that many phenomena in this world – even things that look significant – disappear and even some powerful people who play important roles share the transience of life until they predictably pass away like everybody else.

Persons of Interest

The futures of three public figures keenly interest me but I will in all likelihood not witness during my life what will become of them. These people are Vladimir Putin, the Russian president and Xi Jinping, Putin's colleague in China. Elon Musk, at some times the richest and most flamboyant individual in the world, is the third person who definitely interests me.

Putin and Xi are now at the helm of their respective countries. They strongly influence world politics because American political power on our planet is still very raucous but slowly decreasing while China grows stronger and Russia flexes its muscles under the over-ambitious Russian dictator. The room for maneuvers of the American president in our world and within his own country is shrinking even though president Trump tries with his erratic activisms to make America great again. He certainly makes the US and himself often in the headlines of the news. Like Elon Musk, he relishes to see his name every day in the headlines.

The world now belongs to Russia and to China. Vladimir Putin and Xi Jinping are currently the main political leaders in the world with Narendra Modi of India slowly joining the two leaders. All three obviously acknowledge the existence of the US' strong standing in the world, which they want to break. They together talk about a 'multipolar world order' but sometimes Xi Jinping mentions a 'Sino-centric

world' as the new world order. America will only be one out of five global powers and cannot dictate any longer their agenda on other nations. He tries to coerce others to do what he wants but by intimidating friends and foes, he slowly contributes to the decline of the US.,

Xi and Putin are almost the same age; ten years my juniors They were born in 1952 and 1953 respectively when both their countries were in the grip of brutal and vicious communist regimes. They both were swept to the top of their countries at almost the same time in 2012 and 2013 respectively. It is probably no coincidence that strong leaders like Xi Jinping and Vladimir Putin are children of totalitarian systems. However, democracies also produce undemocratic leaders like Donald Trump in the US, Jair Bolsonaro in Brazil and Victor Orban in Hungary. German people chose Hitler in a democratic election and he thanked them by using democratic methods to make himself a cruel dictator. The concept of democracy does not include a guarantee for its survival.

In addition to Putin and Xi, I am keenly interested in the future of Elon Musk the prominent businessman whom we know mainly for his involvement in Tesla cars, in SpaceX space vehicles and his bold and powerful role that he plays in the White House as Trump's buddy whose 2024 election campaign he supported with more than $290 million. Elon Musk has an overwhelming presence in social networks. His pure presence is often noisy and disturbing wherever he goes.

Vladimir Vladimirovich Putin

President George W. Bush, claimed after a meeting with Putin that he had *'looked the man in the eye*' and had gotten '*a sense of his soul*'. He judged that Putin was '*very straightforward and trustworthy*'. Another American president, Joe Biden, in sharp contrast called him '*a thug*', '*a murderous dictator*' and '*a war criminal*'.

A member of the Russian parliament had nominated Putin for the Nobel Peace Prize in 2001 for his merits to bring stability to Russia following the tumultuous aftermath of the demise of the Soviet Union. but the International Criminal Court issued in 2013 against him an arrest warrant for war crimes. All these facts show how contradictory Putin's life is.

As a person of German origin, I have a peculiar interest in Vladimir Putin (Владимир Путин). He lived four years in Dresden, East Germany, as a Soviet spy until the Soviet Union fell apart and Russian military had to withdraw from the territory of the re-united Germany. Putin was eyewitness in 1989 when an angry German crowd stormed soviet properties in Dresden after the fall of the Berlin Wall. He was devastated and called the disintegration of the Soviet Union, which his mind has never digested, the '*greatest geopolitical catastrophe*' of the 20th century.

Putin speaks fluently German with a pleasing east European accent. This has made Putin and Merkel, who speaks fluently Russian, special political actors for 16 years until Angela Merkel decided in 2021 to call it quits as Germany's chancellor. There is also the deep friendship between former chancellor Gerhard Schröder and Putin. There is no language barrier, which facilitates their friendship.

One of Putin's daughters was born in Dresden. Putin himself was born into a low-class family in Leningrad, which is now again called Saint Petersburg. His family lost some members during the cruel German siege of his home town. Other family members of Putin's family lost their lives in the fight against the German army. Putin started after the war as a rebellious street kid and was known as a fierce fighter in the low-class environment, in which he lived. He risked to slide into the career of a criminal but his engagement in Judo saved him from becoming a criminal. He then found an occupation in the soviet secret service that suits his character. His role in the secret service allowed him to proudly and legally play the tough

game of a 'glorious spy'. He loved James Bond whom he tried to emulate, particularly by often showing a poker face.

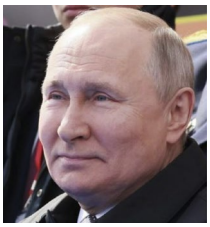
After the soviet empire had crumbled, he started a political career in various different posts first in his home town Leningrad, where he became assistant and then deputy of mayor Anatoly Sobchak, his former teacher. When Sobchak lost a mayoral election, Putin moved to Moscow, where he had the good flair of joining those politicians who retained power. In the administration of Boris Yeltsin, he was at the right time at the right place when Yeltsin needed an efficient prime minister. He then was prime minister until Yeltsin resigned and Putin became the acting president. He subsequently presented himself successfully in several elections, which he efficiently manipulated in his favor. Putin calls this 'managed democracy', by which he means that he has pre-determined the outcome of an election. He has already created the legal conditions that will allow him to get re-elected to stay on as president until 2036 when he will be 84 years old if he is not killed by assassination or by cancer before that date.

I worked 1999 in St Petersburg when Yeltsin appointed him as prime minister. When this news came out of the radio, my Russian colleagues spend excited applause, which reflected the public mood of the Russian population in general.


Vladimir Putin 1985
Soviet Spy


Vladimir Putin
as Boy

Putin was extremely popular at that time. Unlike most of his countrymen he is not known for drinking vodka or other alcoholic beverages. He has been a remarkably strong leader for more than 24 years not only in his country but also on the world stage.


Vladimir Putin 2022

But he also faces opposition from some Russians. Putin's subjects correctly see in him a brutal dictator enriching himself recklessly from state coffers. Putin condones the incredible wealth of oligarchs probably in exchange of a certain percentage of their assets. Using his remarkable skills as a secret service professional of the Soviet Union he has so far weathered the increasing political enmities with all tricks and means at his disposal, including incarceration and poisoning of his critics.

Many prominent critics of Putin or dissidents pass away under mysterious circumstances. Many of them have fallen inexplicably out of windows of high-rise buildings. This method, which we might call 'defenestration', prompted a western diplomat to say that NATO had a policy of open doors while Russia had a policy of open windows. One victim of mysterious circumstances was Yevgeny Prigozhin, a former friend of Putin who turned into a foe. This is for Putin unforgivable. Loyalty is for him – like for Donald Trump – extremely important. Prigozhin had attempted a military coup against Putin in 2023, which he suddenly abandoned while his Wagner mercenary group was only 200 kms away on his way to Moskow. A missile brought down Prigozhin 's private airplane in August 2023 and crashed on its flight from Moscow to St. Petersburg killing seven passengers and three crew members. This made for Putin an orderly trial for treason conveniently redundant. Joe Biden showed publicly no surprise and said that if he were Putin's enemy '*I would be careful what I rode in*'. We have a long list of opponents of Putin who died from poisoning or under mysterious circumstances. The list includes Yevgeny Prigozhin that I have already mentioned, Boris Nemtsov, Boris Berezovsky, Alexander Perepilichnyy, Alexander Litvinenko and many more. But nevertheless, the Russian news agency TASS reported that more than 78 % of Russians trust Putin and that more than 75 % approve what he is doing. But this report might not entirely reflect reality because firstly, TASS is for sure not objective and secondly, people who don't approve him, have to fear for their lives.

Putin shows no intention at all to slow or to step down. He always manages to have the formal law on his side and revenges his opponents or makes them disappear. While I am writing these lines, Putin wages war in the Ukraine in its fourth year. He has the intention to make this country part of Russia. He might succeed even as it currently appears that this will be possible only with heavy losses on both sides. If Putin's intention behind the war in Ukraine is to restore Russia to the size of the former Soviet Union, Europe and the world will have a serious problem because he might continue enlarging his empire beyond the Ukraine. But in terms of history, it is only a temporary problem. It is a problem caused by a finite despot and not by the Russian people who survive him.

I wonder and would like to witness in which form his tenure will end and what consequences his disappearance will have for his country. Dictators either disappear in riots and get killed or they pass away while in power and leave a country behind that is then rocked by unrest and chaos. Dictators regularly fail to arrange for an orderly succession. Josip Broz Tito, the dictatorial president of former Yugoslavia, is an example of a strong leader who kept Serbs, Croats, Slovenes, and other Balkan nationalities together by efficiently suppressing national and religious sentiments with his tailor-made personal governance style. Tito failed to form his territory into a lasting nation. As a result, Yugoslavia, which was formed after the 2nd World War despite serious national and religious differences, fell apart in bloody wars that started 10 years after Tito's death. I can imagine that Putin also does not arrange for an orderly succession and I predict that Putin will involuntarily lose his power in a revolt against him by the people or by strongmen in his administration. This will cost him his life during the uprising or soon afterwards.

Other examples of strongmen who left disorder behind when they left the scene, were Saddam Hussein in Iraq, Muammar Gaddafi in Libya, Josef Stalin in the Soviet Union and Ferdinand Marcos in the Philippines.

Xi Jinping and China

The second politician whose future interests me as much as overall the future of China, is Xi Jinping (习近平). He is the son of an important Chinese Communist veteran, Xi Zhongxun. Xi's father was 'purged' during the Cultural Revolution. Being the son of a disgraced communist leader, Xi Jinping was as teenager exiled to a harsh life in the countryside where he grew up without his parents. Family was for communists in these years of much less importance than the party. I am sure that the humiliating rough treatment that Xi received from the communists as the son of a disgraced leader has left deep marks on him until now.

He had the right flair to join the communist party while he was in exile. This helped him after a few years to be admitted to the famous Tsinghua University as a "Worker-Peasant-Soldier Student" for studies of chemical engineering.

He then made it as a faithful professional servant through the ranks of the communist party and moved in various posts steadily upward until he became vice-president under Hu Jintao in 2008 and China's president in 2013.


Xi Jinping 2021


Young Xi Jinping

It was most likely not God who has pre-determined that he should hold this office. How can God arrange for such things in a country that is not only communist but also promotes atheism? I am also sure that Xi had not decided as a boy to succeed Mao Zedong. I rather believe that he was by a sequence of coincidental events the right man at the right time when promotions were on the agenda in the communist party. His generally ambitious personality let him benefit from all opportunities whenever he saw a chance to move upwards. During their career in systems like China, some career oriented civil servants work hard to gain the reputation as faithful and obedient civil servants, which helps them climbing up the ladder. Once they are on top, they no longer have to be obedient and might turn authoritarian out of a desire for revenge.

If Xi had been the child of strictly catholic parents, he might today be 'Pope Xi the First' after having benefitted from a consistent range of circumstances favorable to his career.

Xi is weak-looking and always slightly smiling with a friendly and naïve face. But he is actually very strong. Looking weak and naïve is an efficient ingredient for success in politics, where opponents agree on the election of such a man because they believe they can handle and control him. Konrad Adenauer was the first German Chancellor of the newly created Bundesrepublik Deutschland. Parliamentarians elected him, a former mayor of Cologne. They thought that he was feeble and naïve with his heavy countryside sounding local accent. They elected him in 1949 with the expectation that Adenauer would not stay long time in power because he was already 76 years old. They thought and expected that a weak man at that age had only a few years more to live and that they could then chose a more permanent successor. The parliamentarians were wrong. Adenauer dominated German politics with stubbornness for another 14 years.

Xi Jinping will in all likelihood be around and will remain a tough helmsman for many more years. My interest in Xi's future does not only come from the fact that I have been living in China on and off for more than twenty years. I am also generally interested to see how this strong and determined leader fares with his ambitious national and international agenda. Nobody predicted when I was a boy that China would develop from a weak and backward-looking country in 1949 to a modern world power that it is now.

I would like to see not only from heaven but as a living man the outcome of the increasingly fierce duel between China and the USA. These two countries work both hard to gain or maintain political and economic dominance in the world. The fast rise of Chinese economic and military power creates the fear of Americans that the US might lose its world dominance, which they take for a natural birth right. This competitive situation is dangerous because the US have difficulties accepting their decline and will try to maintain it with all means at their disposal. The US call China's efforts 'economic imperialism' while the US refer to their own corresponding economic and political ambitions as 'America First'.

I predict that China will win the battle for world dominance. The path towards this position might include military confrontations. China will win the battle unless foreign influencers manage to instigate in China – as they tried in Hong Kong - violent pro-democracy movements with the goal to create turmoil and to abolish the one-party system. The Chinese population works best under a firm political hand. A multi-party system, if installed, will easily get out of control and will weaken China.



Brawls in Taiwanese Parliament

Once the Chinese people are off the leash and no longer under the umbrella of a resolute leadership, they will fight one against the other as we sometimes see in Taiwan with its raucous political environment inside and outside its parliament.

We have also seen this political fighting mood in China's mainland before the establishment of the Peoples' Republic. After the demise of the Qing dynasty in 1912, heavy fights broke out within China between Kuomintang (KMT) under Sun-Yat-Sen and later Chiang Kai-Shek on one side and the Communists under Mao Zedong on the other side and various factions in-between. The fighting parties either condoned or fought the Japanese invaders. It was a political and military mess.

There is currently very little unrest to fear in China. Today's generation has experienced nothing but tremendous progress during the last 40 years and the communist party is claiming and getting credit for progress even though favorable circumstances mainly fueled the growth. Chinese people saw dramatic increases of their incomes and improvements of living conditions during the last four decades. Food supply – unlike before - is now abundant and affordable. The transportation infrastructure changed from dilapidated roads and trains as I saw these 24 years ago, to world class systems. All developments pointed and still point in the same directions: more, bigger, taller and larger. The obsession to build everything larger bigger and taller is very visible in China. But it is also a world-wide phenomenon. Economists apply the motto 'the more the better' to the economy which they say must steadily grow. They claim that a country is sick if its GDP does not consistently grow. But where is the end of this growth? Nothing can grow for ever.

The infamous RMS Titanic, which sank in April 1912, was a technological giant as the largest ship at the time she entered service. Compared to the huge luxury cruise vessels and container ships today, she looks almost like a toy ship. The Titanic was 269 meters long and had a gross register tonnage (GRT) of 46,328 tons. The Icon of the Seas, in contrast, is almost 100 meters longer than the Titanic and with close to 251,000 tons the currently largest cruise vessel in the world.


Titanic of 1912 and modern Cruise Vessel

It carries almost 10,000 passengers. Larger ships will come for sure. The Eiffel Tower, to give another of many more examples, was with 330 meters height the tallest man-made structure in the world when it was completed in 1898. Architects since then have been competing to create much taller high rises. The Burj Khalifa in Dubai with a height of 828 meters holds the current record.

Architects are already working on the construction of the Jeddah Tower, a skyscraper with 1,000 meters height when it will be completed in 2028 unless God intervenes. He had stopped the attempt of our ancestors to build the tower of Babylon in biblical times. God might punish mankind again for their hubris. God punished the builders of the Babylon tower by creating many languages that made communication impossible between men. I could imagine that this time God will punish mankind by strengthening male sex drive on one hand and by further weakening - on the other hand - the libido of women to leave men terribly wanting. God might even declare any and every form of male advances as punishable sexual harassment unless the woman declares her agreement in a notarized written statement. In such a hypothetical situation, a man who goes out to seek sexual adventures, should do this in the company of a notary public.

The surface of farmland in China decreased considerably with the construction of massive infrastructure projects. In addition, extensive farming methods contaminate ground water with excessive use of fertilizers and pesticides. China is now dependent on food imports. The food trade deficit is continuously increasing, which is now no problem. Other countries like Brazil, the US, Ukraine and Canada produce for the time being more agricultural products than they consume. They are now keen exporters of produce like rice, milk and beef. Most rice in China is imported from countries like Thailand. Milk, which supermarkets sell, comes not from China but mostly from New Zealand, Australia, Germany, Poland, Great Britain and other European countries. More goods from Russia populate now the shelves of supermarkets since China and Russia have again moved closer together. China has still sufficient foreign reserves to pay for food imports. But if the supply of food from overseas – for whatever reason – dries up, China will regret having destroyed too much farmland and having neglected farming as a socially accepted profession. 'Farmer' is in China a condescending word for a person who does not dress and speak in the style that modern city dwellers use.

I am aware that food security is a very complex issue that needs more insights than I have. I am just judging – as I always do in my essays - by looking around with open eyes and with a critical mind.


Mountain Highway in China

During the last 20 years I have seen that the transportation infrastructure grew in China into an impressive network with futuristic-looking multi-level exchanges of highways and railways. There are many mountain underpasses and long and tall bridges across rivers and valleys. Cities like Guangzhou and Shanghai feature crisscrossing expressways on two or even four levels above the ground between high-rises and above the city's street life below.

During the 1960's the builders of comprehensive and – at that time - impressive transportation infrastructure in the US would have looked with envy at today's daring designs of huge interchanges and railway tracks above the ground as if they were part of an air transportation system. I took a few years ago the maglev (magnetic levitation) train from Shanghai's Pudong airport to the city. The train travels at 430 km/h. Engineers already test other maglev trains that will soon travel between Shanghai and Beijing with a speed of 600 km/h, which is faster than airplanes. I also observed that China has heavily invested in truly gigantic modern hospitals in most major cities and they have also built large and impressive airports in these cities.

Sixty years after the infrastructure building boom in the US, lack of regular maintenance has caused the fabulous infrastructures to dilapidate. Chinese engineers and politicians should have a look across the Pacific Ocean to realize that for every kilometer of a modern highway between $1,500 USD and $24,000 USD per year should be budgeted for maintenance. If they don't do this, a pent-up demand for maintenance will develop in China towards the end of this century. The urgent need for repairs might appear in a situation when a sluggish economy has possibly made the government cash-strapped. When it rains, it always pours. Concrete structures might need urgent repairs when adverse circumstances don't allow such repairs. In this context I might mention my observation that Chinese are very fast and efficient in the construction of huge and new infrastructure and buildings. But they are quite negligent in maintaining and repairing. Housing developments and residential high-rises, for example, go up in no time but generally look old and dilapidated after 10 or 20 years for lack of maintenance. They then prefer tearing down buildings and re-building from scratch instead of maintaining and renovating.

Property developers in China built large residential developments with dozens of high-rises one next to the other. They call them 'villages' (xiǎo qū - 小区), and sell the apartments as condominiums. The builders retain the right to manage the common elements for a fee as property managers in western

countries do. But the community of apartment owners is not legally organized as a condominium corporation or as a similar entity that decides management and maintenance issues democratically. Nobody collects contingency funds for repairs and replacements. When building requires major work like re-painting or replacement of an elevator, no legal framework is in place to manage and to fund the work. Given that most residences are condominiums or strata properties, I predict that lack of funds for maintenance will create huge problems in 20 years when large numbers of buildings have to be renovated and need major repairs.

When ordinary Chinese people observe what is happening in the USA and see the current sad state of affairs in the US democracy, they rather want to keep the communist party system because Chinese people will not easily be convinced that a multi-party democracy is suitable for their country.

I predict that Xi Jinping will be replaced in the middle of his third term in office when China's economic boom stops. Xi's replacement will happen as the result of an internal power struggle that will not be visible in public. Ambitious and influential members of the communist party will plot against Xi and will manage to replace him. Such political purges have happened often in the past behind closed doors and will happen again.

Elon Musk

I single out Elon Musk as a person for whom I want to try a prediction. His future life interests me as much as the future of Vladimir Putin and Xi Jinping. Musk was born 1971 in Pretoria as the son of a South-African father and a Canadian mother from Saskatchewan. Elon went to the venerable Boys High School in Pretoria


Elon Musk Infant


Elon Musk as Boy


Musk & Son with Trump in White House 2025


Elon Musk 2023


Elon Musk 2022

I had lived the first four years of this millennium in Pretoria and passed this school often during my frequent Sunday city walks. Christiaan Barnard performed in 1967 the first heart transplant in Cape Town, South Africa. The patient, who knew that he was a guinea pig, survived only 18 days but this did not diminish the glory of Barnard's achievement. He became like Nelson Mandela one of the rare famous South Africans.

We now have Elon Musk as a rare addition to the small roster of famous South-Africans. He is actually also a Canadian since his mother is a Canadian citizen. It is a peculiarity of Canada and of the US that you become a national of these countries if one of your parents is a citizen of these countries or if you were born there from both parents with foreign nationalities. My daughter is an example. When she was born in Canada with a German father and a French mother, she obtained right from birth three nationalities. She married a US citizen and has now four nationalities.

Musk attracts my attention because he is not just an individual. He is a universe in his own right with almost 70 million followers on Twitter that he renamed 'X' after he had bought the internet platform for $44 billion USD. It amazes me that Elon Musk finds the time to feed his followers constantly with his ideas

and opinions. Musk also spends regularly many hours in interviews on YouTube and on other networks and has become as buddy of Donald Trump a special government employee with far-reaching powers.

He accumulated some 400 billion dollars net worth to become the richest man of the world. It seems to be an indicator for his meandering life and fortunes that Musk's net worth changes considerably from time to time. During the year 2020, for example, his net worth increased by 142 billion USD to $170 billion and some reports claim that two years later it reached 338 billion USD. I ask you and myself the question if there should be a limit to the wealth that one single person can amass. There should also be a limit to the amount of a pay package that a manager like Musk can receive in one year. For the year 2018, for example, the board of Tesla approved an amount of 51 billion USD as compensation for him. The court in Delaware, where Tesla is headquartered, threw out the board's decision as excessive but the board re-tabled the issue and approved the same pay package at a subsequent shareholders' meeting.

I think that it is a sign of a sick society if it allows individuals to have that much financial benefits and powers.

In the context of this essay about the prediction of future, the question is how far further Musk might go up or how deep his destiny and fate might push him down onto normal levels or even deeper. A genius like Elon Musk, who acts on impulse, risks to fall deep down because a genius has limits but stupidity is boundless as Albert Einstein apparently put it. And indeed, Musk's genius certainly did not guide him when he bought Twitter for 44 billion USD in 2022 and renamed it 'X'. And Musk has already earned a place in the Guinness World Records for the largest ever loss of personal wealth. According to Forbes, Musk's net worth dropped from a peak of $320 bn in 2021 to $138 bn as of January 2023.

It is difficult to ignore Musk's current dominance in many different technological areas and in American politics in which he engages. I am sure that there are many other contemporaries with amazing life stories about which we read very little. But Musk extends the manifestation of his life into the public realm of social networks and flamboyant public appearances and actions.

His physical and mental strengths seem to be unlimited. He is heavily involved in fields like space exploration, electric cars, crypto currencies, brain-computer interfaces (BCI) and supersonic mass transport in tunnels etc. The companies that Musk founded or co-founded include Zip2X.com, PayPal, SpaceX, Tesla Inc., Tesla Energy, OpenAI, Neuralink and 'The Boring Company'. He also got very actively involved in politics by spending more than 290 million USD to Donald Trump's third election campaign and becoming together with Vivek Ramaswamy the head the Department of Government Efficiency (DOGE), which is another of Musk's creations.

His most visionary idea is to make mankind a multi-planetary species living on the moon and on Mars. Human beings, he says, live only coincidentally on earth; they are meant to go further. Some Christians don't share this vision and believe that God confined human beings to live only on our planet. Musk's vision of humans who should colonize the cosmos is not new. Konstantin Tsiolkovsky, the first Russian space scientist, said at the turn of the 20th century that "*the earth is the cradle of humanity, but one cannot live in a cradle forever*". Human beings, he claimed, are now grown up and must venture out to other planets. Stephen Hawking voiced a similar opinion when he said that '*We need to expand our horizons beyond planet Earth if we are to have a long-term future. We cannot remain looking inward at ourselves on a small and increasingly polluted and overcrowded planet*'.

Whenever and where ever Musk appears, he behaves like a shaker and mover with impacts that he and the media widely publicize. The Time Magazine nominated him 'Person of the Year 2021' but he is not just a person of one year. He is rather a person of a decade if not the person of our current century. He

is a technology monster as he called himself and is a volcano that erupts in the public eye almost permanently with surprising new ideas that he pursues relentlessly with big publicity as if obstacles did not exist for his concepts and projects.

If people who surround him, don't contribute to the execution of his ideas, they do not seem to exist for him. He just seems to storm ahead if an idea comes to his mind. He apparently treats his employees with outburst of anger if they do not perform as he expects. In this context, the word bipolar disorder emerges in some reports about him. He revealed voluntarily to his followers in social networks that he might suffer from Asperger Syndrome or autism spectrum disorder (ASD), as scientists generally call it. This condition weakens the capacity to perceive some details of the environment. A person with ASD will also have difficulties to notice thoughts and feelings of others around him. An extremely strong and specialized focus on own ideas is typical for ASD. When Musk sets his mind on something, he becomes like a bulldozer which knocks everything out of the way. Such a strong focus assists in the efficient pursuit of his own ideas. However, it might also make him blind for risks and dangers.

Psychologists might associate his mental state as a behavior attention-deficit/hyperactivity disorder (ADHD) but it is probably difficult to classify this man and to classify the performance of his brxain and the status of his mental health.

Elon Musk is very outspoken in his tweets on 'X', which we knew as 'Twitter'. We also know Musk for making decisions, that other people usually do not make as lightly as he makes them. In May 2021 he appeared on "Saturday Night Live", where he announced as a surprise that Tesla would no longer accept Bitcoins for car purchases. This was a sudden U-turn from a decision only three months before when Tesla announced to accept Bitcoins and invested 1.5 billion USD in this cryptocurrency. As a result of his appearance in Saturday Night Live, the Tesla stock and Bitcoin lost considerable value, which losses amounted reportedly to a loss of 20 billion USD for himself.

Evidence of Musk's originality came in 2018 when he used a test flight of the SpaceX Falcon Heavy rocket to shoot a convertible Tesla roadster into space as a publicity stunt. Behind the steering wheel sits a puppet called 'Starman' that allegedly looks like Elon Musk. An indestructible plaque engraved with the names of 6,000 SpaceX employees is mounted underneath the car if 'underneath' exists in a space that does not know gravity. The car is now flying forever on an elliptical path around the Sun and has already made its way past Mars before flying by Venus and Mercury. In 2091 the car will again come close enough for people to see with a powerful telescope from our earth. There will be no rust on the vehicle because there is not any oxygen in space. If things go terribly wrong on our earth, the Tesla roadster will be the only remaining evidence of our civilization. To make the identification of the object easier for extra-terrestrials, a plaque fixed to the circuit board says "Made on Earth by Humans". It speaks for Musk's modesty that the plaque does not say that Elon Musk has made the car and that he has not modified the first sentence of John's gospel by chiseling on the plaque the words 'In the beginning was Elon Musk'.

In 2021, to give another example for Musk's creativity, he let his followers on 'X', as he renamed Twitter, decide whether he should sell 10% of his shares in Tesla. More than 50% of his followers recommended the sale and Musk followed suit immediately. This had the result that the value of Tesla stock dropped by more than $200 USD per share within two days, which reflected a loss of 50 billion USD for him personally. Elon Musk might have been right with his decision to follow the vote by his followers who are laymen in investments. It is very difficult or even impossible to predict reliably the performance of an investment. Instead of listening to economists and stock market experts, you might as well toss a coin. Asking his followers and following advice from his followers, who are probably all lay people, is practically the same

as throwing a coin. But his action gave him much more publicity, which he is always keen to have. He seems to feel that he exists only if he is present in social media and in public.

Talking about Twitter, it is remarkable that Musk bought this company in 2022 for 44 billion USD. He took possession of Twitter by entering its head quarters in a-t-shirt holding a washbasin in his arms. In the presence of the media – he never forgets the media – he said "let that sink in". With this ambiguous and humorous short sentence, he seemed to admit his need to realize and to become aware of the importance of his purchase, which seems to have been one of Musk's spontaneous actions. Everybody is puzzled why he bought Twitter at a very high price. Speculations abound that he might lose much money. After a few months of his chaotic leadership as CEO of Twitter he asked again his followers to tell him if he should step down. The majority recommended that he should resign, which he subsequently promised with the proviso that he had first to find a suitable successor. Many weeks later, he found a new CEO in Linda Yaccarino who actually behaves like his puppet while Musk still controls the company as its owner. He still oversees product development, technology and software and systems operations. He also retains the position as the company's executive chairman. He renamed Twitter to become 'X'. This is apparently Musk's favorite letter that he also used in naming of SpaceX and Tesla's Model X. Musk christened one of his sons, wo was born in 2020, with "X' as the boy's first name.

Elon Musk is in private matters equally unrestrained. After his first divorce, he married actor Tallulah Riley in 2010, divorced in 2012, married her again in 2013 but then divorced a second time in 2016. Within not even two decades, he fathered with three different women twelve children, the first of which died ten weeks after birth in 2002. He had a pair of twins in April 2004 and then triplets after in vitro fertilization in 2006. He christened his son, wo was born in 2020, "X AE A-XII Musk, with "X" as the first name and "AE A-XII" as middle name. Musk is his son's last name. According to the baby's mother, a mainstream Canadian artist with the stage name Grimes, 'X' represents the obscure variable used in science. 'Æ' or 'AE' is supposed to refer to artificial intelligence and A-12 refers to the couple's preferred airplane, which is the Lockheed A-12 high-altitude reconnaissance aircraft that can travel at Mach 3+. I wonder how his poor boy will deal with his unusual name.

A surrogate mother gave Elon Musk and his girlfriend Grimes in December 2021 a baby girl, which they christened Exa Dark Sideræl Musk or 'Y' for short. Musk and Grimes regularly break up and get together again. One month before the birth of the baby girl, Musk had again become father of twins with an executive of Neuralink, Shivon Zilis, with whom he had a third child in 2024. Musk tweeted that he was "*Doing my best to help the underpopulation crisis*," and claimed that a "*collapsing birth rate is the biggest danger civilization faces by far*". His claim that birth rates are collapsing is basically correct given that OECD has reported that in its 38 member countries the total fertility rate was 3.3 children in 1960, but has dropped to 1.5 children per woman while we need 2.1 children per woman to keep populations constant. The medical journal 'Lancet' predicts that by 2100 only Chad, Niger and Somalia in Africa, Samoa and Tonga in the South Pacific and Tajikistan in Central Asia will keep the threshold of 2.1 children per woman.

Musk's Russian corresponding man is tech billionaire Pavel Durov. He founded, amongst many other things, the encrypted social media app 'Telegram', which has 800 million monthly active users. He shares with Elon Musk a libertarian lifestyle and an obsession with pro-natalism. By donating his sperms over a period of 15 years he has fathered more than 100 children as he claimed.

One of Musk's twin sons applied to a court in California to have his gender officially changed to be a woman. Musk's son, who now is one of his daughters, also applied to the court to have her family name changed because she wished no longer "*in any way, shape or form*", as she emphasized, to be related to her father. Elon Musk has not mentioned in Twitter his son's démarche probably because it does not fit into

the picture that he likes to paint of himself in public. It would be interesting to learn which other issues and events of his life he is hiding from the public.

Nothing seems to be normal around and above Elon Musk. He likes to share with his followers on 'X' (formerly Twitter) some blunt political stunts. In January 2022 Musk publicly compared Justin Trudeau with Adolf Hitler because the Canadian prime minster had cracked down on crypto transactions. His unconventional comparison aimed at helping – I don't understand how - the truckers who protested against vaccine mandates by blocking several important border crossings to the US. Just two months later, when Putin's army started to invade the Ukraine, Elon Musk on his Twitter account challenged Vladimir Putin to a physical duel and offered the Ukraine as the stake in this combat. He also invited publicly his arch-enemy Marc Zuckerberg to a cage fight and proposed "*a literal dick measuring contest*" to compare their respective virility. Musk is for sure no longer the shy boy that he claimed that he used to be when he went to high school in Pretoria.

A reporter from CNBC mentioned that Musk's blunt and offensive statements made Twitter advertisers move away. He admitted in his response that he did not care and said: '*I'll say what I want to say, and if the consequence of that is losing money, so be it*'.

When I read about Elon Musk, my brain readily digs out from my memory Howard Hughes, the American aviator and movie producer who was born 1905 in Texas and passed away at the age of 70 while flying high above Texas as passenger in his own airplane. Hughes had established in California an aircraft company – like Elon Musk's SpaceX - and designed an airplane that he piloted to set a speed record of 567 km/hr. He also set in 1938 a new record by flying around the world in 91 hours. Through these and numerous other spectacular ventures, Howard Hughes increased substantial wealth that he had inherited from his father.

Howard Hughes became famous for his eccentric eremite living style which he started after a terrible air accident at the age of around 50, which is Musk's current age. Hughes stayed mostly isolated in many different luxury hotels that he constantly changed. He was always surrounded by only a few male aides. He often worked for several days without sleep – like Elon Musk – and developed health problems as a result. It seems that Hughes, who was eccentric, suffered from severe obsessive-compulsive disorder (OCD), which made him always eat the same food. He developed a severe phobia about germs and a manic passion for privacy. In the last phase of his life, he lived as a disgruntled hermit either impoverished or uninterested in his own wealth.

The craving for privacy distinguishes Howard Hughes from Elon Musk who, in drastic opposite, shows a passion for publicity and self-projection, by which he probably hides his inner self. Mark Twain said that '*everyone is a moon, and has a dark side which he never shows to anybody*'.

Musk wants to be the person as which he manifests himself in public and probably not as the private citizen Musk. He told a reporter that he had been at school in Pretoria, heavily bullied as the youngest and weakest classmate. By the time he was 15 years old, he had learnt karate, judo and wrestling to defend himself. He became extrovert and was – as he said in a TV show - "*dishing it out as hard as they'd give it to me*" and gained the respect that he continues to claim forcefully for himself.

I predict that Musk's life will either be short or he will become like Howard Hughes a disgruntled hermit without money or not any more interested in money.

City and Country of Interest: Dubai, United Arab Emirates (UAE)

Dubai is a city in the United Arab Emirates that attracts my attention because of its amazingly fast development out of desert sand. There seem to be no limits for its development. On the other hand, I fear and predict that its current grandeur might in the future disappear at the same speed as it is currently developing. Oil production and extraction of natural gas has become since 1969 the main source of wealth and the engine for Dubai's incredible growth.

I had spent in 2003 some time in Dubai when it was still a quiet city with just a little bit more than 1 million inhabitants. This increased to three million people in 2023. The main memories that I retain from my visit were the old mosque, an abundance of jewelry stores that brightly sparkled in the gold of their voluptuous displays. These stores gave Dubai the nickname as the City of Gold. I also observed fishermen who peacefully carried on their traditional trade. The only outstanding modern building at that time was the hotel Burj Al Arab. Burj meaning 'tower'.


Fishermen in 2003

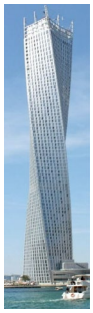

Mosque


Jewllery storefront 2003


Burj Al Arab

The hotel Burj Al Arab with its gold-plated interior was only the beginning of a building development frenzy. The government had decided to use the abundant income from oil to develop Dubai into a gigantic destination for wealthy tourists who want to enjoy hyper luxury.


Andaz Capital Gate


Cayan Tower


Dubai Cantilever Building


Jumeirah Beach Hotel


Burj Khalifa

Dubai has displayed during the last twenty years the passion to test the creativity and performance of architects that they employ from across the world. They want to break world records in the building industry with attention-grapping designs. It looks as if the city of Dubai does not issue a building permit when the planned building does not feature at least one world record. Burj Khalifa with its 829.8 m height and 168 stories is one famous example. It features a total of six Guiness world records, including the tallest service elevator in the world. The Aeternitas Tower will be the world's tallest residential clocktower at a height of 450 meters. The Address Beach Resort features the world highest infinity pool at 294 meters, which is another Guiness World record. The Ciel Tower in the Marina district will be tallest hotel in the world with 365 meters.

Overall, Dubai had, as at 2019, 21 buildings with more than 300m height. No other city, not even Shanghai and Hong Kong, feature that many skyscrapers with such height.

Dubai features world records not only with buildings. The world's tallest performing fountain at the base of the Burj Khalifa shoots water 50 stories high in the air – another Guiness world record. Deep Dive Dubai features the world's deepest pool with a depth of 60 meters, which the architects built for thrill-seeking tourists. The Dubai Mall with a size of 1.1 million square meters features over 1,200 outlets. It is gigantic but not even the largest in the world.

The starting price for one room in most of Dubai's flashy hotels is $5,000 USD per night. One night in the Royal Bridge Suite in the Atlantis the Palm hotel costs almost 20,000 USD. One special penthouse suite in the Royal Atlantis is available for $100,000 per night. A suite in Palazzo Versace cost around $21,000 USD per night. The Burj Al-Arab hotel outperforms all the others. It offers its guests a private helipad near the roof and the world's largest chauffeur-driven fleet of Roll-Royce's. It features an underwater restaurant that diners can reach by a submarine. No wonder that in the Burj Al-Arab hotel a suite with gold-plated fixtures and amenities costs some $28,000 USD per night.


The Royal Atlantis


Islands in the Sky

Islands in the Sky is an architectural wonder. It will include botanical gardens suspended from the air, cascading pools filled with restorative thermal and mineral waters as well as spaces for cultural and social events. The architects designed Islands in the Sky for 1.7 million visitors every year and say that the building sets '*a new standard for holistic and daily wellbeing*'.

Having observed the development of Dubai at breakneck speed since 2003 – remotely I admit - gives me the impression that it is a city similar to places of gold diggers in the Wild West, which exploded within short periods of time and disappeared similarly fast when the underlying conditions disappeared – or rather turned out to be non-existent. I anticipate that the demand for excessive luxury will not persist and will not continue to grow as Dubai planners seem to believe. And places that offer extreme luxury, and very little else, are susceptible to suffer from negative changes of market conditions. The United Arab Emirates wanted to become independent from oil and gas revenue and they have now become dependent from a limited number of extreme wealthy international tourists who seek exaggerated luxury.

Almost 17 million tourists came to Dubai in 2019, which is six times its population. Tourists stay in more than 700 luxury hotels with more than 150,000 beds. The numbers of visitors fell in 2020 and 2021 to 5.5 million and 7.3 million respectively due to the COVID-19 pandemic. This shows how dependent Dubai's overly important tourism sector is on persistent favorable economic conditions in the world. I can imagine that these favorable conditions will not persist.

I find it significant for Dubai's future that Dubai's 2040 Urban Master Plan does not emphasize the development of a productive economic environment but on consumption. It focuses on the creation of healthy communities, enhancement of parks and open space, improvement of environment and protection of heritage, archaeology, and places of cultural significance. All these developmental priorities aim at improvements of amenities for more tourists, which might not come any more at one point in the future as I predict.

Future of the World

I want to predict in this essay a few features of our future world. Important features that we take for granted or that we love, might in future no longer be the same or might disappear. New features of life will appear. Some of the new features might make our current lives either more pleasant or more painful. By not living a few centuries later, I might, for example, miss out on medical treatments that can extent

my life by 50 or 100 years or that will allow me to change my gender freely as I might wish from time to time.

In the back of my mind is the hypothetical judgment if I should be happy to have lived from the middle of the 20th century into the first decades of the 3rd millennium or if it would have been more beneficial and more entertaining if I had been born a couple of centuries later.

Some predictions, which we call 'long-termism', try to establish what the world will look like in the remote future. But most popular are predictions that target short-term or medium-term future. Predictions go hand in hand with the question to what extent we have the moral obligation to ensure the survival of future generations. We obviously feel that we are responsible to leave behind an environment, in which our children and grand children can easily survive. But if we look beyond, these two future generations, we feel free to care less: after us the deluge and let the devil take care of the future. We hide this selfish attitude with the optimistic belief that nature has self-healing powers and that mankind will continue making progress in managing catastrophes as they occur. Let our descendants deal with future problems.

When looking at the future, we should not only consider deteriorating features of nature. We should also look at the people, countries and organizations that manage the risks and consequences of natural situations and events. We should, for example, base our predictions on an assessment of how efficient the signatories of the Paris Agreement of 2015 will be to reduce or eliminate industrial CO_2 emissions by the year 2030. The Paris Agreement is a nice document but it is difficult to predict how efficient the signatories of the Paris Agreement will implement it. It is much more challenging or even impossible to foretell how people and organizations will perform in several hundred years. Predictions for such a far future are highly speculative.

Long-Term Predictions

Prophecies in the Bible mention an end of the world. But '*that day or hour no one knows, not even the angels in heaven, nor the Son but only the Father*' (Matthew 24:36). We assume that this is a long-term prediction and that there is currently nothing to worry about. In addition, if it happens, the biblical prophecy promises our descendants a new and better world. A kingdom of God will replace the existing world. People will happily spend their lives in a new environment on earth or in the Beyond. This sounds attractive even if this paradise is only available for righteous people, which we all hope to be after God's gracious salvation. I mention biblical prophecies further below.

Not only the Bible, but astronomers also predict an end of our earth. It will come in four billion years at the latest when the sun will stop shining and no life will be possible on earth. This is not frightening because it will be a natural death of our world and will happen only in the very distant future.

Scientists, and not only the Bible, anticipate possible ends of our world in different scenarios well ahead of the time when the sun's fire extinguishes.

Scientists at the University of Bristol in the UK used supercomputer climate models and predicted that in about 250 million years, the current five continents would be merged into a supercontinent that they baptized 'Pangea Ultima'. The computer told them that temperatures and humidity will reach levels, in which humans will no longer be able to survive. I am more optimistic because the developments will be slow and nature and biology ensure that our bodies evolve and adapt to new conditions.

Scientists remind us that mass extinction of life on earth happened many times during our planet's long history and make us fear that this can happen again almost any time.

A gigantic space rock, that scientists christened 'S2', slammed into Earth more than three billion years ago. The rock of between 70 to 140 kilometers of diameter destroyed almost all life that existed. This life was at that time mostly in form of single-celled microbes. Human life eventually evolved from the microbes that survived the catastrophe.

Some 66 million years ago, another asteroid from the outer solar system slammed into the Yucatan peninsula in Mexico with a speed of several kms per second. The asteroid had a width of around 14 kilometers and penetrated the crust of our earth 20 kms deep. The impact with an energy of 100 million nuclear bombs resulted in a gigantic tsunami and earthquakes around the world. All this killed 75% of animal and plant life on earth.

The above catastrophes happened in the distant past. But scientists explore these past events to predict if and when they can happen again. The possibility of future catastrophes of such biblical dimensions creates for us only slight shivers because the 'principle of hope' keeps us confident that it will not happen to us while we are alive and, if it happens it happens. We cannot lose more than our lives.

After many years of research, scientists have estimated that by the end of 2300 the meltwater from the Denman and Scott glaciers in the Antarctica will increase sea levels by nearly 16%. This is too many years away and we cannot avoid it anyway even if we were caring for the future of our descendants. However, if the Thwaites Glacier, which scientists call the 'Doomsday Glacier' in the Antarctic collapses sometime during the 2040's, as scientists predict, sea levels worldwide will increase by 65 cm with catastrophic consequences. People who are born at the time of writing this essay will only be 16 years old. This is really scaring and requires our immediate attention even if it is difficult to figure out how to survive.

The more distant the period of time, that predictions target the more it is difficult – even for scientists – to produce realistic forecasts because the numbers of imponderables increase. Scientists can dig deep into our earth's history and might conclude that our earth has experienced regular cycles of ice ages and warm periods. They predict that the next ice age will come in 20,000 years or so.

Scientists study the earth's long history. They collect data, for example, about periods of hot and cold climates as these different climates took turns during the history of our earth. They try to establish if there are regular cycles or patterns that might recur at the same intervals in the future as they occurred in the past with different strengths. A warmer, interglacial period regularly follows a glacial period, which we call ice age. These periods came and went during the last million years. The last ice age peaked some 20,000 years ago when the globe started slowly to warm again. Scientists then study the reasons why an interglacial period follows regularly a glacial period. They mention several factors. Regular contributors for climate changes were the amounts of carbon dioxide (CO_2), which change naturally and regularly in the atmosphere and not only through man-made emissions.

Ice ages come and go for reasons that are not entirely clear. Some researchers think it is due to cyclic "polar wandering" that happen parallel to the shifts of the earth's crust. The magnetic north has indeed moved more than 1,100 kms in north-northwesterly direction at a speed that increased from about 16 kms per year to about 55 kms per year.

Whatever the causes, the fact remains that ice ages come and go with periods of global warming in-between.

Taking into account all factors that have influenced climate changes in the distant past, scientists measure the current strength of these factors, including the levels of CO_2, and predict the best and worst-case scenarios. We can, for example, predict what happens if sea levels rise by 5 meters and compare this with the situation that the sea levels will rise by 10 meters at a certain point in future. And then: the more we

look into future millennia; the more other factors might influence the development of nature. For example, a huge meteorite might hit our planet or a gigantic volcano might explode. There might also again be a reduction of sunspots as it happened in the 17th century. This created the 'Little Ice Age'. These and other natural events might happen in 100 years from now or in thousand years. We just don't know and are totally unable to predict the far future. All we know from scientific organizations like NASA is that the average global temperature has increased by some 1.1^0 Celsius since 1880. Most of these increases happened since 1975 at a rate of 0.15^0 to 0.20^0 Celsius per decade. These changes of temperature look extremely small compared to dramatic changes in the past and much greater changes that we can expect in future. But the changes, as insignificant as they look, are big enough for us to call it a climate crisis or climate catastrophe.

Everybody, except conspiracy theorists, firstly agree that catastrophic draughts and floodings, rising sea levels and violent cyclones and storms are the effects of these small temperature increases. They warn that a myriad of negative ripple effects will seriously harm the entire population on earth. Scientists secondly agree that greenhouse gases like carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and hydrofluorocarbons (HFCs) are the causes for the increase of global temperatures. Everybody seems to agree that we risk a dramatic increase in natural catastrophes if the levels of greenhouse gases in the atmosphere increase. They also agree that mankind must make an effort to reduce greenhouse gas emissions that we produce by our activities. We obviously cannot reduce the gigantic masses of carbon that the thawing permafrost releases into the air.

Catastrophic events in the past, which nobody predicted, look in hindsight like ephemeral dark dents in an otherwise happy history of our earth. I should not use the word 'happy' and should rather talk about a 'normal' or a 'standard' course of our earth's history. Because earthquakes, tsunamis, eruptions of volcanos and other of such events are normal expressions of nature's might. And obviously, in our human-centered view we talk about catastrophes or of an apocalypse only if such events have a disastrous impact on human beings.

There were many different types of catastrophes. One example is a cold climate catastrophe in Scandinavia during the years from 536 to 550. A series of volcanic events lowered average temperatures, leading to crop failures, hunger and mass extinctions. The population in Scandinavia fell by at least 50%.

An example of a powerful catastrophe is the Spanish Flu, which killed up to 100 million people in 1918. Another event is the bubonic plague, known as the Black Death or the Great Pestilence. This pandemic killed in the 14th century almost half of the European population. In a geo-historical view, such episodes are insignificant. They are little happenings and small derailments of the normal course of our earth's history. From such a point of view these episodes are like sneezes of an otherwise healthy nature, for which we can predict an overall happy – or normal - continuation.

Events like the Black Plague were nasty for human beings. But they left most other species and the flora relatively unaffected.

The World Health Organization estimated that the toll of human lives associated directly or indirectly with the COVID-19 pandemic during 2020 and 2021 was between 13.3 million and 16.6 million. These years were a challenge for everybody who, like me, went through this nasty period. But four years afterwards life on earth became normal again and the pandemic became history in the memories of most survivors.

Catastrophes always came and went. Nature ensured every time its own survival and the survival of mankind. These disasters had not profoundly changed nature and environment, which remained almost the same except temporary setbacks. Life was able to continue afterwards as usually with natural

appearances and disappearances of species. Even the Ice Age did not extinguish life on Earth. Such catastrophes, including draughts, floodings and volcano eruptions will again come and go regularly in future but the time when these things happen is unpredictable. We don't know what we don't know and we cannot make predictions of the unknown and of what is currently unthinkable.

Hitler's thousand-years empire (Tausendjähriges Reich) was only a short episode in historical dimensions. In hindsight and as more years pass, we must recognize that it was only a tiny dent in the arc of history and in the arc of the universe. Hitler predicted that his Reich would last for thousand glorious years but it lasted only 12 miserable years. It was a brief interruption of an otherwise continuing development of Europe and the World. It is futile to imagine what Europe and the world today would look like if Hitler had not started the war on 01 September 1939 by invading Poland. Vladimir Putin would anyway not have called the invasion of Poland a war. He would have talked about a 'special military operation' or even a 'peace mission', as he called his military invasion of Ukraine in 2022. In 1939, Hitler had already incorporated first Austria and then parts of Czechoslovakia (Sudetenland) into Germany. The leaders of the UK (Chamberlain), of France (Didier) and Italy (Mussolini) had previously okayed and blessed Hitler's acquisitions in the Munich Pact, which they signed on 30 September 1938. Hitler promised verbally in exchange of these concessions to stop future acquisitions. And the signatories of the Munich agreement predicted that Hitler was keeping his promise. But Hitler broke his promise after only 11 months. All this is history now. Life continues as if nothing significant had happened.

It is impossible to imagine what the course of history would have been without certain events. We call this hypothetical situation 'counterfactual history'. It is impossible to imagine the hypothetical situation that Hitler had stopped Germany's geographical acquisitions with the Sudetenland and that the Nazi ideology had continued until today without the 2nd World War. The cultural landscape in Germany and Europe might now look a little bit different. But I guess that history had anyway not a survival of the Nazi Regime in mind. Hitler was on the wrong track of history. His policies were not sustainable. Similarly unsustainable were the absolute monarchies in Europe. Their time was up and they were condemned to make room for new political landscapes. To my knowledge, no fortune teller has predicted the 2nd World War, but if someone had predicted it, he would have been wrong by telling his contemporaries that the course of history would fundamentally change. History continued its normal course as it did after the Black Plague.

You can argue that our century and our millennium are different from all previous centuries and millennia. During the last two centuries, mankind has seen unprecedent technological and scientific achievements. On one hand, these unbelievable achievements point at an even brighter future if progress continues undisturbed, peacefully and accident-free. On the other hand, technology and science have created unprecedented risks that can affect not only one region of our globe but our entire planet. And these changes will not only be temporary but can reach far into the future. The effects of a nuclear world war, to name a real risk, will be much more far-reaching than the catastrophic war of thirty years in the 17th century in Europe. A nuclear war will destroy all parts of the earth. When such a war ends, life will probably not resume as before. It will be like Germany after the 2nd World War when it was totally destroyed. But there will after the 3rd World War no Marshall Plan and no help from neighboring countries because they will all equally be ruined. However, surviving humans or at least remnants of human DNA will probably start a new cycle of human evolution.

Some contemporary philosophers and researchers claim that the technologies, which developed incredibly fast during the last two centuries, carry the risk to influence the long-term future more than technologies in any century before. These people refer to our century as a "hinge of history" or as a

turning point which decides the future of mankind. People might have thought the same when gunpowder made wars more destructive. But the risks look currently more serious. Nuclear weapons, artificial intelligence and gene manipulations look today more dangerous and riskier than gun powder.

I share the assessment that our century is at a turning point. I talk about significant risks from Global Warming, Cultivated Meat and Artificial Intelligence further below. Current technologies for the genetic manipulation of plants, for example, might improve insect resistance and herbicide tolerance of corn and soybeans. But these manipulations might as a side-effect or by accident pass on these characteristics to noxious weeds, bacteria and microbes that become resistant as well. Many other risks exist for the human body. I think about gene manipulations that target specific human characteristics but easily can have uncontrollable and unwanted side-effects on organs, plants and on animals. Genes of animals that scientists manipulate with human genes to make the organs of an animal grow for transplant into human bodies, might spread to other organs or to the brain of the animal causing unforeseen changes and collateral damage. If gene manipulations go deep into the areas where life originates, we might create unwanted and unexpected ripple effects. After all, organs and cells have their own biological intelligence that might react to human interferences in a way that our human intelligence and not even our artificial intelligence can anticipate. It is, for example, possible that gene edits destroy inadvertently the gene that stops the growth of a human being. In such a case, people might grow into unmanageable sizes that heart and joints cannot support. Growth into unsustainable sizes might have contributed to the extinction of huge dinosaurs, of giga-geese weighing 500 pounds and of other mammoth animals some 50,000 years ago.

A so-called 'chaos theory' developed from the understanding that complex systems are highly dependent on sub-components and on the continuation of their initial conditions. We know this phenomenon as 'Butterfly Effect'. A small change in one part of a system can have significant effects elsewhere in the system. The American meteorologist Edward Lorenz has coined the expression 'Butterfly Effect' by asking the question if the flaps of a butterfly's wing in Brazil can cause a tornado in Texas. This question is reasonable, he argued, because a tiny change to the atmosphere can generally have far-reaching consequences.

It is therefore important to study the chaos theory to understand the unpredictable behavior of natural systems and the importance to carefully consider the interconnectedness of all parts of every system and sub-system.

Unexpected side-effects of genetic manipulations might not show immediately but in future generations. But here again, we should not entertain or exaggerate doomsday fears. When doctors opened the human body for the first time for surgeries, they broke a holy tabu and might have feared nasty consequences, including God's ire. Doctors thought that bleeding, pain, and infections made surgeries impossible. But they have skillfully removed these obstacles and have overcome the fear of God's ire. Surgeries became standard procedures in the 19th century. The clever mankind with its strong survival instinct will have the strength to manage and mitigate new risks. This is my view as an optimist.

The exhaustion of non-renewable resources might be another cause for future catastrophes. Life cannot continue as before without these resources. The current level of civilization and progress was possible through an unprecedented extensive exploitation of non-renewable energies, including mineral oil, natural gas and drinking water. An excessive use of underground tables of water that had accumulated over thousands of years will deplete water resources. It is foreseeable that mineral oil and natural gas will in future also be in very short supply and will eventually be exhausted at one point in the future. We might not easily substitute them with alternative sources of energy like Nuclear Fusion. Economists made

often in the past predictions that the supply of mineral oil will dry up. I remember very clearly some weekends in 1972 during the first serious energy crisis. The German government asked people not to use cars and trucks on weekends because oil-producing countries had dramatically reduced the outputs. Streets without any cars provided on these weekends fifty years ago a ghostly sight and created the fearful awareness that mankind will run out of energy. Mineral oil is 50 years later still in ample supply but obviously it would be a logical fallacy to think that this is evidence that oil will last forever. The depletion of oil fields some time in future is a safe prediction.

After the energy crisis in 1972, mankind discovered new sources and methods how to extract mineral oil, including by fracking and digging deeper into the crust of our earth. These technologies made it necessary to predict new dates when the supply of mineral oil will dry up. But the final date will merciless come sooner or later. The wealth of natural resources, which nature created over millions of years, will have gone forever within probably 200 years. I am unable to predict the consequences in the event that this happens. It will affect not only one region in the world where they extract oil from the ground but it will affect the entire globe.

However, there is hope. Even if all human beings are destroyed by nuclear war or by another catastrophe, life on earth will resume in one way or another. Albert Einstein assumed that a 3rd World War will use nuclear weapons but predicted that '*World War IV will be fought with sticks and stones*'.

Even if a natural or man-made cataclysm like a nuclear war destroys all civilizations around the globe there will be somewhere protoplasm (urschleim) or primordial soup left from which life can again evolve as it did millions of years ago. A new Homo sapiens will re-appear in a new cycle of natural evolution. Why should the concept of reincarnation be limited to individuals and not also to the entire mankind? It is possible that we currently live in the second or third of such cataclysmic cycles. Paleontologists have established that during the history of our planet there had been at least five times successive cataclysms that killed the vast majority of species.

The biggest known catastrophe happened 252 million years ago. In this so-called Permian extinction, which scientists also refer to as "the Great Dying", some 95% of species disappeared as the result of global warming by between 10 and 15 degrees Celsius. Super volcanic eruptions released huge amounts of greenhouse gases with acid rain that killed fauna and flora.

The most recent of these cataclysmic events happened 60 or 66 million years ago when an asteroid hit our planet off the coast of the Yucatan peninsula as I have mentioned above. Scientist are sure that a sixth cataclysmic event will happen again some time in the future but will most likely be man-made.

Since the sun will warm our earth for another couple of billions of years, there is sufficient time left for more cycles of mass extinction, followed by reincarnation of life. Hinduism actually holds the belief that the cosmos and our earth exist in cycles, in which God Shiva destroys repeatedly the cosmos that God Brahma regularly re-builds. In-between, lord Vishnu sustains the world.

Short-Term Predictions

People make most short-term predictions for their entertainment or to satisfy their limitless curiosity. Most of us know or suspect that a forecast is most likely not correct but this does not diminish our curiosity and pleasure.

CNN maintains the tradition to let its journalists and contributors predict the outcomes of main events of the following year. At the end of 2021, CNN let 19 of these people – amongst other things – predict the result of the 2022 soccer world championship in Qatar. Ten journalists predicted that Brazil will win. Four

journalists thought that it would be England. Three voted for France and one each for Italy and Germany. Nobody mentioned Argentina, that eventually took home the FIFA World Cup Trophy. In sports like in most other areas it is just not possible to predict the outcomes even if you are a so-called expert or if you believe that your favorite team is unbeatable.

You can base the art of foretelling the future on three different methods. The easiest method is to let your gut feelings do the job. This is the method that the CNN journalists used. Reliable gut feelings and intuition develop with life experience and life experience comes with age. But no matter the quality of gut feelings, you might want to improve these gut feelings by seeking help from a crystal ball, by reading tarot cards or by using oracle bones as Chinese did for divination during the Shang dynasty (1600-1046 BC). You might also improve your gut feelings by using astro-charts, celestial maps or diagrams with the positions of our sun, the moon and the planets. The reference to astrology will impress the reader of your prediction until it becomes obvious that you were wrong. Further below I make some predictions using my gut feelings and nothing but my sixth sense as we also call gut feelings. You should trust me because my gut feelings have developed with experience from many decades of a conscious life.

The most difficult method is to base a precise prediction scientifically on detailed knowledge of facts and of forces that produce changes of these facts. Economists claim that they use such scientific methods but they are notoriously wrong. This is not entirely their fault because there are too many imponderables that change the world and that are not predictable. If a prognosis – as often – turns out to be wrong we should not blame the poor economist but the people who blindly believe the forecasts of economists. In old communist countries like in former East Germany, economists had a bad reputation that people expressed in the following question-and-answer joke. What happens if you send a group of our economists in the Sahara Desert? Answer: Nothing, but after four weeks the sand will be scarce.

Railway Extension from Alice Springs to Darwin

When I worked during the late 1990's for the Darwin Port Authority at the top end of Australia I had a hands-on experience with an economist. The government had hired some of these experts to assess the viability of extending by another 1,420 km the existing railway to Darwin. It previously ran only from Adelaide to Alice Springs. I discussed with one of the economists the forecasts about how many shipping lines would use the transcontinental railway for transport of cargo between Darwin and Melbourne instead of sailing all around Australia.

The economist had also to forecast how many trucks would switch to railway instead of using the 3,000 kms long Stuart Highway, which links Darwin with Port Augusta in South Australia. I agreed with my economist that he had very few reliable facts. He had to make daring assumptions to forecast the volume of cargo (mostly camels for export) and passengers that would use the planned railway extension instead of using road or sea transport. And obviously, my man had also to forecast the financial viability of the railway extension. This was not possible but his principals asked him nevertheless to present financial predictions. Despite almost entire lack of reliable data and despite the fact that he had to base bold assumptions on nothing tangible, the government commissioned a forecast to back-up the political decision that they had already made. They wanted to go through the project anyway under all circumstances to "*conquer Australia's last frontier with railway services".* This desire of conquest the last frontier was probably inspired by the construction of the trans-Canada railway, which indeed has turned out to become vital for the conquest of the Canadian west. When Australia eventually opened the railway extension to Darwin in 2004 with enormous fanfare, the prime minister of South Australia said that '*It is now up to the private sector to use it*'. Obviously, some serious sobering-up came later when even the words

'White Elephant' appeared in the media to describe the new transcontinental railway. Main beneficiaries of the railway extension are now tourists. The 'Ghan', as they call the passenger train that previously ended in Alice Springs in the middle of the continent, now runs once a week from coast to coast between Adelaide and Darwin, which takes three days and two nights each way.

The third method of forecasting uses statistics, which is much easier. Many players in the stock market or in gambling casinos base their forecasts on statistics. If the stock value goes up for some time, they say, it will come down again. If stock prices fall, they must come up again. If the ball of roulette stopped its movements on black color five or six times in a row, it will – so the guess – end on red color the next time. This is similarly obvious as the forecast that sun will shine again after the rain even if the period of fog and rain stretches over several months as it seems to happen quite often in London. People in London sometimes cynically predict that they will never see sun again. But the prediction of a sunny day in London is always correct if you don't mention the day when it will happen. Obelix, the hero and friend of Asterix, was in Britain. He complained that it was always foggy and asked a local person if this was always like this. He received the answer 'No, it is foggy only when it is not raining'.

In contrast to the ball in roulette that will stop at a different color after it fell on the same color many times, people believe in other situations the opposite. They forecast that if a situation has been stable for a long time, this will continue even if there are risks that things will change. They think that apparent risks and dangers have failed so far to turn into catastrophes and this is evidence that these risks will not materialize in future. This is like blowing air into a balloon and continuing doing so with the unrealistic hope that the balloon will never burst because it has not yet burst. On the other hand, we don't think that we are immortal because we have not yet passed away.

I now give two practical examples: Governments continue accumulating gigantic public debt, which have reached $91 trillion USD world-wide in 2023. But despite the evident danger of a financial collapse, governments continue to borrow with the unspoken argument that the catastrophe has so far not occurred and will – for this reason - also not occur in the future.

The second example comes from the production of electricity from nuclear reactors. The nuclear waste which will remain radioactive for hundreds of years and has to be stored away in so called safe places deep underground. People rightfully point at the risk that mankind might sooner or later be contaminated with radioactivity. But their governments calm them down with the argument that nobody so far has been killed by radioactivity from any of these disposal sites. The attitude that things that work well will do so in future is wide-spread. If airplanes fly without incidents, technicians seem to predict that there will be no problems in future. They make technical improvements only after an accident.

I now apply the statistical method for a prediction of the future of Europe. Confusing logic tells us two different possible developments. One prediction can be that war is looming because there was an unusually long period of peace that typically does not last forever. Rain always follows sunshine and vice versa. The opposite prediction might conclude that many years of peace are evidence that the promised era of eternal peace has arrived. Why should it change?

Six European countries signed in 1957 the Treaty of Rome, which created European Economic Community (EEC), the predecessor of the European Union. Almost seven decades of growth, peace and prosperity followed in Europe. Can this favorable situation continue forever? Or will babies who are born now, experience hardships brought about by global warming, wars, pandemics and financial collapse? I predict that today's babies will suffer because these risks are real. At least one of these risks will materialize – if not several of them and possibly all of them at the same time. On the other hand, if I were a Jehovah's

Witness, I would explain the long period of peace and prosperity in Europe. I would say that it is evidence that God's kingdom of eternal peace and happiness has arrived. As a believer of biblical predictions, I would believe that the terrible 2nd World War was actually the big battle of Armageddon, which the Bible has predicted to be the last days of our current earth before the emergence of God's paradise. This view has in a Mormon's mind convincing merits because it is the Bible that says so.

Not only peace and prosperity characterized the more than seven decades after the 2nd World War. Many people also predicted that democracy and human rights would in future dominate the entire globalized and peaceful world community. But we can now observe that democracies, human rights and globalization are generally in retreat or endangered by growing nationalism and by political arsonists who promote irreconcilable political positions either far right or far left. Many political movements don't want the continuation of concepts that dominated the last eight decades. They consider these ideas as outdated and want changes of directions. The Greek adage 'panta rhei' (πάντα ῥεῖ), which the Greek Philosopher Heraclitus coined, means that everything is moving and flowing like the water in a river. This is not only a statement of fact. It also describes the usual human desire to change things even if they work well. People always want to try something new – particularly when a situation has lasted for a long time, which is boring. Reforming the education system, for example, is a standard item in the agenda of policy makers in the education sector.

Some forecasters become famous after they have correctly predicted an event. The popular mystic Edgar Cayce – for example - started in 1925 to warn that a catastrophic economic crisis would develop in 1929. And indeed, the New York Stock Exchange crashed in 1929, which resulted in an economic depression of epic dimensions. Is he a genius? Not necessarily. If someone predicts an economic crisis, there is room for interpretation what he means by 'crisis'. Had the stock market in 1929 gone down by only 15%, good-natured people would still have admired Mr. Cayce because they think that his prediction was correct. We can call such a drop of value a real catastrophe – particularly for investors who relied on different forecasts, which predicted a steady increase by 15% of the value of shares. The difference between 15% decrease and 15% increase is 30% - a real disaster particularly if you have bet on continuing increases with borrowed money and your bank faces you with a margin call.

There are thousands of economists working hard every day to produce predictions. Obviously, one forecaster who happens to be right will become famous no matter that all other predictions that he had made were incorrect. Similarly, if I produce thousands of predictions in various different areas and by coincidence one of them is correct, I will hopefully also become famous. The legendary French healer and diviner Nostradamus, who lived in the 16th century, was a prolific producer of 6,338 predictions, which he mostly put into mystic verses. Some of them naturally turned out to be correct. It certainly helped that the wording of his predictive verses remained quite vague so that they could – in hindsight - be applied to almost everything that happened similar to what he had described. Nostradamus, for example, predicted for the year 2022: "*Sacred temples prime Roman style / Will reject the goffes foundations*". This wording does not mean anything to me. But intrepid believers in Nostradamus' predictive skills interpret these words – in hindsight - as Nostradamus' forecast of the end of the European Union, which the Treaty of Rome had created as the European Economic Community. To back up their unwavering belief of Nostradamus' prediction skills, they point at the Brexit, which became effective in 2021 but obviously did not yet mean the end of the EU.

It also helps that Nostradamus did in most cases not indicate the year for which he predicted an event. If I predict a horrible event without saying when I expect this to happen, I will still be right if something devastating happens within hundreds of years, which is very likely anyway. In this spirit, I herewith predict

with confidence that mankind will experience a catastrophic eruption of a volcano. I herewith also predict with similar confidence that a 3rd World War will happen in future. Clever as I am, I will not tell my readers how important a military conflict must be to be called a World War and how many nations must participate in such a war. We can call the war that Putin started in the Ukraine a world war because China, North Korea and Iran support Russia by delivering weapons while most European countries and the US do the same in support of the Ukraine. Almost the entire world is involved in the Ukrainian war.

Biblical and religious Prophecies

A dedicated Christian, who I am not, will study the Bible for prophecies of our future. He will then discover that the secret intelligence of the Good Book has correctly predicted current and past events. He will admit that biblical predictions are coded and that they are symbolic but he will claim that he personally has the skills to decrypt the biblical text with the ingenious art of interpretation. An example is Revelation 6:2, which talks about a '*white horse! Its rider held a bow, and he was given a crown, and he rode out as a conqueror bent on conquest*'. During the COVID-19 pandemic an assiduous interpreter of this passage had no doubt that the Bible had predicted the pandemic. The Latin word for 'crown' is 'corona'. Here we are: the crown of the rider symbolizes the coronavirus. The white color of the horse symbolizes the protective gear that workers in a laboratory wear. And indeed, western scientists like Alina Chan from Harvard and the Broad Institute of MIT accused workers of a laboratory in Wuhan of having released the virus. Researchers have invalidated the allegation that the COVID pandemic originated in a Wuhan laboratory but a researcher is nothing compared to the Bible. It is also very clear what the bow that the rider holds in is hands, symbolizes. Don't you see it yourself? The bow symbolizes the astrological sign of Sagittarius, the hunter with the bow and the first cases of COVID-19 emerged between late-November and mid-December 2019. The tireless interpreters of Revelation 6:2 therefore believe that the Bible had correctly predicted the virus's conquest of the world.

Revelation 6:4 talks about the appearance of a fiery red horse the rider of which '*was given the power to take peace from the Earth*'. It is very clear to the determined interpreters of the Good Book that this passage predicts correctly Vladimir Putin's invasion of the Ukraine that will widen into an event that takes peace from the earth. The color of the horse clearly indicates that Russia and China are behind it because their national colors are red. In the event that someone is not yet convinced of the supernatural predictions in the Bible, the interpreters point at Revelation 6:6 which talks about the appearance of '*a black horse! Its rider was holding a pair of scales in his hand*', which indicates the upcoming food rationing due to a world-wide famine. The arrival of the black horse is followed by 'a *pale horse. Its rider was named Death, and Hades was following close behind him. They were given power over a fourth of the earth to kill by sword, famine and plague, and by the wild beasts of the earth*" (Revelation 6:8). The ingenious interpreters easily make out that the sword is the upcoming deadly war of NATO against Russia and its allies. The wild beast – don't you see it? – is Vladimir Putin himself. If you are a democrat in the US, the Bible's wild beast might be Donald Trump. But the wild beast is Joe Biden if you are a republican.

The interpreters of biblical prophecies strike also gold when they read Matthew 24. They find the warning that "*many will come in my name, claiming, 'I am the Messiah,' and will deceive many*" (Matthew 24:5). This prediction is obviously correct since there are many unholy churches in this world, which base their teachings on statements made by messiahs other than Jesus. Messiahs seem to grow as fast and as often as mushrooms in the forest.

The latest messiah – as I know – is Alan John Miller who was born in 1962 and founded in Queensland, Australia, a movement called Divine Truth. He claims to be the reincarnation of Jesus of Nazareth while his partner, Mary Suzanne Luck, claims to be the reincarnation of Mary Magdalene. There are countless

other people not associated with common religions who have claimed to be messiahs and have established congregations. We can therefore confirm that Matthew 24:5 was right when he predicted that many messiahs appeared in the past and we can safely predict that many more will come in the future because 'messiah' is not a registered trade mark and you don't need a license or any qualifications to call yourself a messiah. However, the Bible makes clear how to distinguish between the real Messiah and a fake one because when the real Jesus returns, you will "*see the Son of Man coming on the clouds of heaven, with power and great glory. And he will send his angels with a loud trumpet call*" (Matthew 24:30-31)

The Bible makes also the prediction that "*you will hear of wars and rumors of wars*" (Matthew 24:6) and that "*nation will rise against nation, and kingdom against kingdom. There will be famines and earthquakes in various places*" (Matthew 24:7). These are not really prophecies but statements of facts as the quoted events have always and often occurred in the course of the history of our earth. But obviously, at the time when people wrote the Bible, there were no news services and there was no internet that report twenty-four hours every day about all natural catastrophes and conflicts around the world. They therefore were unaware of natural catastrophes and wars that happened regularly elsewhere outside the Middle East. They might have heard about a great flood vaguely through the grapevine and turned this into a nice story about Noah 's Ark. This story explains how and why humans and animals have survived the catastrophic floodings.

The Bible falls anyway short of more specific prophecies. It does unfortunately not give a hint– for example – as to a possible failure and collapse of current democracies or a possible end of the United States or of the European Union. If the US or the EU collapses some firm believers will say that the Bible predicted the end of the US and of the EU by talking about the arrival of the last days of our world. In this sense we could even say that the Bible has predicted the arrival of Donald Trump.

A central and important prophecy not only in the Bible but in most religious texts is consistently the end of our world through terrible events and sufferings that are referred to as "*Great Tribulation*" (Matthew 24:21), "*Affliction*" (Mark 13:19) or "*days of vengeance*" (Luke 21:22). Different passages of the Bible give varying accounts of what all this might mean and many theologians and schools of thoughts describe the things that will happen with more or less colorful and scaring words. The main tenor is that the situation will become terrible – even disastrous. But the faithful believers will come out of the great tribulation relatively unharmed because for the good people "*those days* [of suffering] *will be shortened*" (Matthew 24:22). The end of the world after the great tribulation does apparently not mean that nothing is left. No, it will be the start of a new beginning, which will be something like a Kingdom of God for the good people. It is not really clear what the features of the new kingdom are but the Bible insinuates that it will be pleasant. It might be the reincarnation of the entire mankind returning to live in the Garden of Eden, which will be crowded because not only one couple but several billion people will then live in the same garden.

Prophecies vary about the date and time when the world will end. Some passages suggest "*that day and hour no one knows, not even the angels of heaven, nor the Son, but the Father only*." (Matthew 24:36). The end of the world "*will come like a thief in the night*" (Thessalonians 5:2). But there are also opinions that the beginning of the end is imminent. Christians in the 1st century – for example – believed that Jesus' second coming and the end of the world, which happens when Jesus returns, was imminent at that time. This was obviously a wrong prediction. Two thousand years later, Jesus has still not reappeared. The leaders of Jehovah's Witnesses have announced the end of the world incorrectly several times for 1878, 1881, 1914, 1918 and 1925. They now seem to have given up predicting or they outright deny having made predictions. They have vehemently denied having recently calculated the year of the world's end for 1975. Baba Vanga, the blind 'Nostradamus of the Balkans' who was born in 1911, predicted the end of the world for the year 5079.

An organization called 'the Bulletin of the Atomic Scientists' created a so-called doomsday clock in 1947 when the appearance of the nuclear bomb created real fear of the worst. Midnight of this clock is the moment when our earth will become uninhabitable for humanity. Originally, the clock showed seven minutes to midnight and was re-set 25 times since then. During the years from 2020 to 2022, the clock showed 100 seconds to midnight, which the organization shortened in 2023 to 90 seconds given the climate crisis and increasing risk of a nuclear war if the war in Ukraine gets out of control. When a journalist asked Kennette Benedict, a senior advisor of the Bulletin, if nuclear threats or global warming were more dangerous than nuclear war, she answered that this question was as useless as the question by someone who stands in a burning house and considers whether it is better to die of smoke inhalation or from falling timber.

The doomsday clock is not a normal clock. It is not forecasting the end of the world. It shows the level of risk and the probability of the world's end. It is a tool that promotes awareness and warns the public of the dangers. Unlike a real clock, its dial can be reset. The Bulletin will reset the clock to 100 or more seconds if their diagnosis of the situation results in the assessment that the world made progress in mitigating risks for mankind.

Some doomsday forecasters look at terrible recent events in the world and interpret this as evidence that the end is about to come. When they consider threats from nuclear bombs, the COVID pandemic and the election of Donald Trump as American president, some people conclude that the world's last days have already arrived. They disregard the fact that pandemics like the Black Plague many centuries ago and the Thirty Years War in the 17th century decimated the population in Europe without ringing in the end of the world. As a matter of fact, devastating events like draughts, earthquakes, floodings, tsunamis and ice ages happened regularly during the last millennia, which can lead to the conclusion that the last days of the world arrived at the same time when the world started. The death of our world is inherent in its birth. The process leading to death of a human being also starts with his birth. This idea is in line with the philosophy that nothing can physically exist without its non-existence. There is conceptual an end to everything when it is born or comes into being.

What we know for sure is that the sun will stop shining in around 4 billion years and that this will definitely be the end of our planet. But our earth might become inhabitable for human beings many millions of years before the sun's powers vanish. Talking about catastrophic events, I think that the appearance of human beings has turned out to be such an event because mankind has slowly developed into a destroyer of nature and of our planet.

Wrong Predictions

Predictions are risky business. Famous people have made awfully incorrect forecasts. Albert Einstein, for example, stated in 1932 that there is "*not the slightest indication that nuclear energy will ever be obtainable*". Only 13 years later, on 16 July 1945, the first atomic bomb exploded in New Mexico.

The English engineer Archibald Low predicted in 1925 correctly many things like the arrival of loudspeakers, television and mobile phones. But he was horribly wrong when he predicted that women would not be able to reach the intelligence of men even in a hundred years.

The president of the Royal Society, who is not as famous as Einstein, said in 1895 that "*Heavier-than-air flying machines are impossible.*" How wrong he was. The Airbus A380 takes into the air with a maximum weight of more than 617 tons. The president of the learned society should have known better, because cumulus clouds, which fly elegantly high up in the sky, have an average weight of some 550 tons. So-called atmospheric rivers are even heavier. They are several thousand kilometers long and a few hundred kilometers wide and carry through the air more water than the earth's largest river, the Amazon in South America. One atmospheric river that transports huge amounts of moisture from Hawaii to the American west coast, is nicknames 'Pinapple Express'. It is difficult to predict the behavior of atmospheric rivers and to know when they release their masses of water but when they decide to dump some of their water,

catastrophic floodings are the result as it happened with a historic deluge of lowland rain and mountain snow during New Year 2023 in California. San Francisco posted its second wettest day in over 170 years.

Economists are – as I said above - a species that are notoriously wrong with their predictions. The Yale economist Irving Fisher, for example, said in 1929 when the Dow Jones had reached 381.17 points that further increases were unlikely. But against his prediction, the Dow Jones stood at 44,303 points on 07 February 2025.

And then there was Thomas Watson, president of IBM, who publicly expressed in 1943 his opinion that there was a world market for maybe only five (sic!) computers. I, as a single person, have today three notebook computers at home. They have each more computing power than the voluminous machines that IBM built in 1943. The same company, IBM, criticized the founders of Xerox copy machines by saying that there was a need only for a maximum of 5,000 of those machines in the US. This prediction was utterly wrong as we all know. But it might become correct again because the need for copy machines has dramatically decreased since it is now possible to re-print documents with a computer and to use mobile phones to scan documents and send the digital copies to any place in the world via the internet. Having said this, I definitely anticipate that traditional fax machines will no longer exist in the near future.

Sir William Preece, Chief Engineer of the British Post Office, said in 1878 that the British – unlike the Americans - had no need for telephones because they had plenty of messenger boys. He ignored the potential for talkative friends to use telephones for gossip and chitchat. Even messenger boys, if they still exist, and delivery people use smart mobile phones to take orders and to find their way trough the city with the help of GPS in their mobile phones.

And finally, Donald Trump predicted in the 1980's that Japan would overtake the US as the world's mightiest economic power. He was obviously wrong.

Making wrong predictions is bad. But it is equally bad not to predict important events and to remain silent. When my parents were born in 1904 and 1906 respectively the so-called second German Reich was just a little bit older than 30 years. The ambitious emperor Wilhelm II was in power and was, despite his physical and mental handicaps, the pride of his subjects. Germany was prospering. It was technologically and industrially quite ahead of other nations. Everything looked quite promising despite some signs of political tensions in Europe. Nationalism in Germany was growing and military power increased as well. Military power is rarely built to remain idle forever.

Nobody predicted at the time when my parents were born that they would face two cruel and devastating wars that lasted 10 years in total and ended two times each with millions of war victims. My parents' generation also lost twice all property and money. Nobody had ever predicted these events. When I look today at babies and small children, I fear that they might face similar catastrophes that nobody dares to predict.

When I make in the following text some predictions, I might be in the company of many wise men that I have just mentioned and who were utterly wrong or failed to predict significant events.

Scarcity of fresh Water

There is no life without water. The average adult human body consists of between 57% to 60% of water. The human brain even consists 73% of water, which is necessary to dissolve and transport nutrients, including oxygen, through the entire body. I think that the most valuable quality of water is its capacity to dissolve and to carry many different substances. This is why we use water to clean.

Water in our oceans covers approximately 71% of the surface of our planet. Salt water of these oceans represents some 96.5% of all water on our earth. Only about 3% of all water is fresh water. Of this, we can use only about 1.2% as drinking water; the rest is locked up in glaciers, ice caps, and permafrost or is buried deep in the ground.

A considerable problem in the future will be increasing shortages of drinking water and water for agriculture. The world is currently facing unprecedented levels of droughts. Nature has not spared any continent. Droughts affect almost half of the US, particularly in its West, which is facing some of its driest conditions in over a century following a heat wave that killed hundreds of people. The surface of Lake Powell, a man-made reservoir of the Colorado River, had in 2022 only one quarter of its former size. There was fear that the water level would further drop and force the shut-down the turbines in the more than 200 meters tall Glen Canyon Dam. If the turbines shut down, it will be the first time during their 60 years long uninterrupted operation. This doomsday scenario, which did surprisingly not materialize in 2023, will not only cause water shortage downstream but will also threaten the supply of electricity for some 4.5 million people. However, climate change has produced extremes in the opposite direction. Unusual high snowpacks in 2023 have increased the water level of Lake Powell by about 64 feet within six months. Unpredictable weather patterns and sequences of devastating draughts followed by devastating floodings present new challenges for water management.

Similar conditions of droughts exist in Europe and in Brazil. At the same time heavy floodings occur in other parts – for example – in Pakistan, South Korea and in Japan. Flash flooding hit even the notoriously dry Death Valley National Park in 2022. During one morning, 1.7 inches of rain fell, which is almost the total amount of annual rain that the park usually receives.

During the 20th century, the use of water grew twice as fast as the population. This development goes unfortunately hand in hand with a decrease of water supply. Researchers have established that the demand for drinking water will exceed supply by trillions of cubic meters by 2030.

Our world loses some 12 million hectares of land every year to desertification and droughts despite a UN program that ran from 2010 to 2020 to fight degradation of land. Livestock overgrazes pastures and people destroy forests to make room for agriculture. Arable land deteriorates through monoculture and extreme use. Agriculture uses excessively fertilizers, pesticides and herbicides to increase production but the noxious chemicals pollute the source of our drinking water on the ground and in rivers.

It seems that global warming leads to changes in the distribution of rainfall. Many regions like the American west suffer from severe heat and droughts at one time and then they experience periods of catastrophic floodings. Water from heavy rain does not penetrate the soil but runs off the surface and takes with it valuable topsoil.

Irresponsible depletion of ground water from so-called aquifers adds to the problem. Researchers estimate that subterranean reserves of water contain over 1,000 times more water than all the surface rivers and lakes in the world. About 30% freshwater on our planet is in aquifers. Researchers also estimate that people extracted between 1993 and 2010 more than 2,150 gigatons of groundwater from these aquifers. Global sea levels would have risen by 6 millimeters if this water had been added to the oceans. Nature accumulated water in the aquifers over many centuries and cannot replenish it at the same speed at which people pump it out. People in La Paz County, Arizona, are particularly concerned that local people don't even benefit from the ground water. They helplessly observe that companies from Saudi Arabia have bought thousands of acres of farmland on which they grow with water from the ground

alfalfa not for domestic use. They transport thousands of bales back to Saudi Arabia to feed cattle in vast dairy operations.

As people generously pump water from giant aquifers, the ground level gives way. Beijing seems to be an example. The massive amounts of water, which this city of 22 million people needs, comes by two thirds from the gigantic North China Plain aquifer with the result that the aquifer slowly depletes. As a result of overexploitation, the land in and around Beijing sinks in some places by several inches a year. This threatens the stability and existence of railway tracks and of highways.

In addition, the massive use of groundwater in aquifers has undesirable side effects like seawater intrusion. Researchers have calculated that the weight of the extracted groundwater contributed to the tilt of our Earth's rotational axis, which was more than 79 centimeters during the last two decades. These changes most likely contribute to global climate change in addition to CO_2 emissions.

Some reports indicate that in 2017 some 20 million people across Africa and the Middle East had to move from areas, which became dry, to regions with more water. Countries that suffer from droughts might want to steal water from their neighbors or don't allow rivers to supply their downstream neighbors with water. A famous example is the Nile in Africa, which is with 6,695 kms the longest river on earth. Explorers like Livingstone and Stanley had a hard time in the 19th century solving the mystery of the Nile's source. Geographers now agree that the White Nile originates from the Victoria Lake close to the Equator. In 2004 I visited the place where a strong flow of water, which the locals call Victoria Nile, leaves the lake for its long journey to the Mediterranean Sea in Egypt. Eleven riparian countries divvy the Nile's water resources. Diverging interests of upstream and downstream countries create the potential of conflicts particularly after Ethiopia started in 2011 the construction of a major dam, which they call the Grand Ethiopian Renaissance Dam (GERD).

The relationship between the United Stated of Mexico and the United States of America, which is already strained by an uncontrolled flow of migrants to the north, becomes even more difficult because of water or rather lack of it. Under treaty of 1944 the two countries share waters from the Colorado River and the Rio Grande in the Falcon and Amistad reservoirs, which straddle their border. The treaty demands that Mexico contributes every five years 1.75 million acre-feet of water from the Rio Grande to the US, and that the US send 1.5 million acre-feet of water to Mexico from the Colorado River. During the first five decades there was no problem. There was enough water but starting in the early 1990s, there was less water coming from the two rivers due to unpredicted megadroughts. The Amistad reservoir was filled only at 26% of its capacity and the Falcon reservoir only at 9.9% of its capacity. It has become difficult to share the dwindling masses of water. If megadroughts continue, the issue will become the source of serious problems between the two countries. This can even turn into a war for water.

Other examples are the Euphrates and Tigris rivers, which flow in parallel from Turkey until they unite in Ras al-Bisha and flow as the river Shatt al-Arab into the Persian Gulf. Between the two rivers lies the famous land Mesopotamia (Μεσοποταμία), which Greek word means 'between rivers'. It was thousands of years ago the cradle of civilization. Turkey has built several dams and a vast irrigation system on its territory making millions of people in Syria and Iraq fear for safety of water supply and for their survival. The water level of the Tigris and Euphrates rivers has already fallen to record lows creating water scarcity that extreme heat waves exacerbate. When Iraq complains that the dams and irrigation system cause the problem, Tukey replies that Iraq is badly managing its water resources. They might even have a valid point.

Dams can not only cause water scarcity in downstream countries. They can also cause severe floodings when the operator of a dam releases for whatever reasons huge amounts of water. This is what

apparently happened in 2024 when India released water from the Dumbur dam in Tripura state with no warning and caused severe floodings in neighboring Bangladesh.

Some people explain the drying of the Tigris and Euphrates rivers as a fulfillment of prophecies in the Bible, which, for example, say '*A drought on her waters! They will dry up*' (Jeremiah 50:38) and '*It will never again be inhabited or lived in from generation to generation*' (Jeremiah 50:39).

Some countries like China and Mexico attempt to modify weather patterns regionally in their own favor. As a mild form of geo-engineering, the process of cloud seeding makes clouds release water that the clouds would otherwise not give away. Countries practice cloud seeding by firing rockets filled with silver iodide into the clouds or by spraying silver iodide from airplanes into clouds to trigger rain that will then not fall in the neighboring region. The effect is like stealing rain from the neighbors. As often, the military use new technologies for their own purpose. During the Vietnam war, the Americans used cloud seeding to trigger heavy rain to make the supply routes of the Vietcong impassable. Rain water became a weapon.

Countries and populations used poisoning of water and destruction of water reservoirs as weapons. German invaders of Namibia, for example, reportedly poisoned water wells in the desert into which they forced Herero and Nama people to move. Chiang Kai-Shek provided another example in 1938. He ordered flood-control dikes along the Yellow River to be destroyed. This flooded an area of between 30,000 and 50,000 square kilometers that the Japanese occupied. Allegedly, up to one million people died as a result.

Many gigantic dams exist in the world. They form barriers to hold back water in reservoirs for irrigation, control of downstream floods and for the production of hydro-electric power. The spectacular and well-known Hoover Dam is the second highest dam in the US but is with its height of 221 meters now only the 18th highest in the world.

I had the opportunity in 2019 to visit the construction site of the Rogun Dam in Tajikistan. Construction had started in 1976 as an ambitious and secret project of the Soviet Union.

Vakhsh River Valley (White Line represents the future Water Level)

Work for the Rogun project halted with the fall of the soviet empire and resumed as a project of Tajikistan in 2012 with funding by Euro Bonds and with an Italian contractor. Since 2018, it already produces electricity with two of the planned 6 turbines. The turbines operate in a gigantic cavity deep in the belly of the Pamir Mountain that features peaks of more than 7,000 meters above sea level. Many parts of the construction happen underground in different places that a vast system of tunnels connect. I travelled as a visitor in this labyrinth during an entire afternoon without seeing daylight. When the Rogun Dam is completed in 2028, it will be the tallest dam in the world at a height of 335 meters above the floor of the canyon.

The Ragun dam will be the biggest hydroelectric plants in Central Asia with a capacity of 3,600 megawatts (MW) and will not only supply Tajikistan with electric power but also Pakistan and Afghanistan. The Rogun dam will create a 110 km^2 reservoir with a total water volume of 13.3 km^3.

I had taken in 2003 a three-days river cruise on the Yangtse River from Chongqing to the Three-Gorges Dam in Sandouping, Hubei province. The enormous dam of 2,335 m length and 181 meters height was under construction at that time and produces now 100 TWh per year or 14% of China's total hydro generation.

Evacuated Buildings in 2003 to be subsequently flooded by the Yangtse River

During the trip on the Yangtse River I saw on the coastline a myriad of cities, towns and villages that their inhabitants had to abandon because their houses were about to be flooded by the waters of the river that was later rising by up to 175 meters. The rising level of the river made it necessary to relocate 1.24 million residents who lived in 13 cities, 140 towns and 1,350 villages. Such a massive relocation encounters much less opposition in a country like China than it would generate in western democracies. People in China generally accept easily disturbance of private life through public infrastructure projects. To give an example of their complacency, they don't complain when the government builds an elevated busy highway just 15 meters in front of their living room window, as I have often seen.

Since the opening of the Three Gorges Dam in 2003, China recovered through sales of electricity in ten years, the full construction costs of almost 32 billion USD.

It is clear that enemy bombs or earthquakes can destroy the dams and can cause downstream floodings of biblical dimensions. During the 2nd World War in May 1943, the Royal Air Force attacked German dams in the 'Operation Chastise'. The British used so-called dam busters, which are special bombs that dive into the water and explode at the bottom of a dam, which is its most vulnerable place. Operation Chastise was successful by releasing 330 million tons of water and killing over 1,600 people. But the Royal Air Force lost during the difficult attack eight aircraft and 53 airmen. It is unimaginable how much damage a bomb will cause if it releases suddenly 13.3 cubic kilometers of water of the Rogun reservoir into the valley of the Vakhsh River downstream.

Given that we have a very large number of dams in the world, it is statistically quite likely that dambusters will destroy some dams during military conflicts in future. We received a foretaste of such an event when a stretch of 400 meters of the Nova Kakhovka dam on the Dnipro River in East Ukraine collapsed for unknown reasons during the Russian invasion that started in 2022. The dam, which the Soviet Union had built, is only 30 m high but 3.2-kilometers wide and holds some 18 cubic kilometers of water, about the same volume as the Great Salt Lake in Utah. As a result of the dam's destruction, hundreds of people died, thousands had to be evacuated and the flood water took possession of hundreds of villages. To make things worse, many tons of heavy-poisonous metal-in the silt surged down the Dnipro River and settled on the riverbed. This alone is a "toxic time bomb". Ukraine called it 'ecocide' in the style of the word 'genocide' while others talked euphemistically about an 'incident'.

Military actions and earthquakes are not the only dangers coming from dams. Weaknesses in the design of dams and lack of maintenance can also pose severe risks. A biblical flooding hit in September 2023 eastern Libya and killed more than 11,300 people. Heavy rains of the storm 'Daniel' made two badly maintained dams burst and a wave of 7 meters height swept almost the entire city of Derna away into the Mediterranean. A Yugoslav construction company had built the dams between 1973 and 1977. They ware barely maintained since then because the government neglected all maintenance since the

beginning of our century due to military and political problems that made the maintenance of infrastructure impossible.

Many local wars and conflicts about water happened in the past and will very likely continue in the future. Water shortages have triggered the construction of dams but the dams also created the risk that dams are destroyed in military action. Hostile countries used water as weapon quite often during the course of history. Lack of water contributed to the demise of entire civilizations. All this will for sure and predictably happen again. The only thing that we cannot predict is when it will happen.

Global Warming and Deterioration of Environment

Most people agree that our climate is warming. The World Meteorological Organization (WMO) tells us that heat waves have recently broken many long-standing records across the world. Prolonged exposure to high temperatures and humidity can cause heat strokes. Body temperatures, which can reach 40° Celsius damage the central nervous system.

Some people suggest that the government should allow the Federal Emergency Management Agency (FEMA) to declare certain heat events as disasters. This will trigger funding for relief efforts to protect, for example, people at their work places, or to repair infrastructure that a heat wave has damaged or destroyed.

However, a heat wave alone is not evidence of global warming it might just be one of the usual caprices of weather. After all, hot temperatures always occur. In July 1913, thermometers at Furnace Creek in the Death Valley showed 56.67° Celsius, at which temperature human beings cannot survive. This has remained the official heat record that has so far remained unbroken for 110 years. While caprices of weather regularly occur, the consistency and frequency of extremely high temperatures throughout the entire world in recent years indicate that we experience indeed a climate of global warming.

The World Health Organization (WHO) reports that between 1998 and 2017, more than 166 000 people died in heatwaves, of which more than 70 000 died during the 2003 heatwave in Europe. We should consider that heat is in many cases only the cause of death if a person has underlying health problems. The high numbers of deaths that medical professionals classify as “heat-related”, clearly indicate that nature did not design average human beings to live in temperatures above 30° Celsius. However, it is possible that human evolution will over many generations adapt our bodies to become more heat-resistant because nature will eliminate those who are not.

Global warming is not only a risk for the health of contemporaries but poses many serious risks for future generations. Higher temperatures have many undesirable effects such as desertification, crop failures and eventually starvation of mankind. The collapse of empires and civilizations like the ancient Mayan, the Western Roman Empire, and many other civilizations occurred all in conjunction with climatic changes, to which they were unable to adapt.

Modern technologies might not be sufficiently efficient to offset the effects of climate changes. In addition, other factor like excessive deforestation, water pollution, soil degradation and the loss of biodiversity exacerbate the risk that the globe becomes inhabitable and mankind might not survive. The world currently focusses more on emissions of CO_2 and other greenhouse gases. We don’t focus sufficiently on other causes of global warming and on other risks for mankind.

Modern industries, including the production of plastic and concrete, and contemporary lifestyles have been sending increasing amounts of carbon dioxide (CO_2) into the atmosphere. The higher the levels of CO_2 and of other greenhouse gases in the atmosphere, the more solar radiation and heat reaches the

earth. These gases prevent the solar heat from escaping into space with the result that too much heat reaches the surface of our earth.

The fight against global warming focuses almost exclusively on the reduction of CO_2 emissions. But this colorless gas is not the only culprit for climate change. Nitrous oxide (N_2O), which we also call laughing gas, is one of other gases that contribute to global warming. Farmers produce N_2O as a side effect when they mix water with nitrogen fertilizer before they put seeds for new crops into their fields. Countries like Germany and the UK prohibit the practice of fertilizing before planting. But this remains common practice in most other countries, including in Mexico, India and China which are big producers of wheat. Nitrous oxide contributes to the warming of the atmosphere much more than CO_2. It depletes the ozone layer and remains active for more than one century.

All these and other greenhouse gas emissions cause a long chain of ripple effects. The primary effect is an increase in global temperatures, which affects human lives, sea life, coral reefs etc. Hot and dry weather also increases considerably the risk of forests fires.

Differences of temperatures in the cosmos are incredible. The coolest possible temperature apparently is minus 273.15^0 Celsius, when subatomic particles seem to sleep and don't move. If matter is cooled down to near the absolute zero, the particles of the matter become indistinguishable, overlap and exist in a single, lowest-energy quantum state. Scientists call this the Bose–Einstein condensate. It seems that the temperatures in the emptiness of intergalactic space is around minus 272.15^o degrees Celsius.

The highest possible temperature is 1.416808×10^{32} degrees Celsius, which physicists call the Planck temperature. Scientists believe that all types of matter at such a high temperatures don't any longer exist as gases, liquids or solids but will be in a state of physical existence that is the same for all types of matter. The laws of physics, as we know them, do no longer apply at such a temperature. But the Planck temperature is theoretical and does actually not exist in the cosmos.

The core of our earth is six thousand degrees hot. The temperature in the center of the sun is 15 million degrees. Scientists of heliophysics, as we call researchers of the sun, say that the sun shines with a surface temperature of some $5{,}500^o$ Celsius but they cannot explain why the plasma in the sun's outer atmosphere, which we call 'corona', reaches temperatures of two million degrees before it becomes solar wind that moves away from the sun at lightening speed. The solar wind wanes away at the border of the sun's zone of influence. Scientists call this zone the heliosphere, which ends at a distance of 100 times the distance between our earth and the sun. This means that our earth is strongly exposed to the solar winds. Beyond the heliosphere starts the interstellar space that is filled with black energy and black matter. Astronomers have not yet found evidence for the existence of black energy and of black matter but they assume that something else than nothingness must exist to make the stars move and keep distance one from the other.

The nuclear fusion in a hydrogen bomb starts at a temperature of some hundred million degrees.

It calls for modesty when we realize that human beings are very vulnerable because they can live only in an extremely narrow range of temperatures between cold and heat. Many species of fauna and flora are a little bit better off since they survive in an environment with a range of much higher and lower temperatures. Tardigrades, which biologists also call "water bears" or "moss piglets," are extreme examples. These tiny animals of only around 300-500 microns have eight limbs, two eyes and a simple but complete nervous system. Tardigrades don't fear boiling heat and freezing cold. They survive the force of a bullet impact and high doses of radiation. They even survive in the vacuum of outer space.

Historical weather records show that global temperatures in 2021 were overall some 1.1° Celsius above the pre-industrial average. In the same year 2021, 25 countries have set new annual temperature records which were regularly broken world-wide in all subsequent years.

On one hand, these numbers show that global warming is reality and not fake news as some conspiracy theorists claim. Donald Trump called it a hoax. He wrote on Twitter on 06 October 2012: '*The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive*'. After Americans had elected Trump in 2024 for a second term, the new president nominated the fracking entrepreneur Chris Wright as his Energy Secretary. Like Trump, Wright does not believe in climate change. He wants to "*end the Green New Deal*" in favor of "*that liquid gold under our feet*'. He is a fervent climate skeptic, he claimed that '*there is no clean or dirty energy*' and compared the fight against global warming with Soviet communism. How silly and irresponsible such a comparison is! He could as well have blamed Beelzebub, the prince of all devils. He announced that he would cut government subsidies for climate-friendly technologies and significantly expand the production of fossil fuels in the US.

Similarly, the secretary of defense, Pete Hegseth, stopped 91 studies, including about climate change, saying that '*we do training and war fighting*' and that his department '*does not do climate change crap*'.

Many of these fabulating theorists and politicians don't even know the difference between weather and climate. They think that climate in the world is fine if they like the weather in the place where they live. Donald Trump discredited himself on 19 October 2015 when he seriously wrote in Twitter: '*It's really cold outside, they are calling it a major freeze, weeks ahead of normal. Man, we could use a big fat dose of global warming!*'

The European Union's climate monitoring service, Copernicus, has reported that every single month from June 2023 to May 2024 was the world's hottest on record. That seems to indicate clearly that we live in a period of warming.

Scientists looked thousands of years back into the climate history and have studied the rings of trees, including fossilized trees. These rings give precise indications of the annual climate for each year of the trees' lives. They have established that the summer of 2023 was warmer than any other summer during the last 2,000 years. The next warmest historical climate was in the year 246 AD when temperatures hoovered only around 0.5 degrees Celsius lower than average record temperatures in the northern hemisphere during the summer of 2023. This shows that some of our ancestors experienced warm climate.

It is remarkable and highlights the vulnerability of human life on our earth that increases by only one or two degrees of average climate temperatures can have effects that are detrimental for human beings until human evolution makes people more resistent.

The sun is the most important source of warmth on earth. The sun converts every second some 4 million tons of matter into energy. It amazes me that these gigantic processes result in an extremely stable and reliable supply of constant warmth. Variations of the strength of sunshine were extremely small during the entire history of our earth. If the strength of the sun were to change only by two percent, which looks like a natural and very small margin, temperatures on earth would change by plus or minus 100° Celsius. Heliophysical laws that control the sun's activities have kept the sun's temperature remarkably stable over billions of years. In this light, global temperature that change only by 1.1° Celsius over a century look natural and negligible but they have huge effects on the lives of human beings. Solar flares or solar storms, which apparently erupt from sunspots on the sun's surface in cycles of 11 years, can be very powerful. Astronomers call them coronal mass ejections, in which plasma travel outward at speeds up to several

thousand kilometers per second. The amateur astronomer Richard Carrington witnessed on 01 September 1859 one of the strongest eruptions, that we now call the 'Carrington Event'. It was a gigantic solar flare lasting five minutes with the energy of 10 billion atomic bombs. This geomagnetic storm wrecked havoc in the telegraphy around the world. Astronomers have measured with the Kepler space telescope the brightness of 50,000 sun-like stars in the cosmos and concluded from their observations that super flares of our sun will occur once every hundred years. These and other deviations of the sun's normal behavior can have extremely invasive effects for mankind.

I thought as a layman that weather patterns would not respond very violently when relatively small changes of temperatures occur. On the other hand, what we consider to be violent is only a minor expression of nature's might. Nature can send strong tsunamis half way around the globe. Natural events can displace mountains and can move or destroy entire continents. Seen in this perspective, a category 5 cyclone or eruptions of volcanos and slight increases of temperatures are only weak mumbles of Mother Nature while they can be catastrophic for human beings. Human beings are vulnerable and can only survive in stable and comfortable environments while many species of our planet's fauna and flora easily survive in rough conditions.

From the 14th to the 19th centuries, a reduction of sunspots made temperatures in Europe fall by a couple of degrees Celsius, which prompted historians to call this period the 'Little Ice Age'. This had catastrophic consequences like crop failures and famines like the Great Famine, which lasted from 1315 to 1322. It was one of many causes for the War of Thirty Years that ended in 1648.

Historians have described a sequence of warmer and cooler climates during the long history of our planet. Because weather records are available only since the beginning of the 20th century, scientists use 'proxy records' like ice cores and cores of lake sediments to establish that the so-called Little Ice Age from the 14th to the mid-19th centuries followed a Medieval Warming Period during the 10th and 14th centuries. The present period of warming began in the late 19th century. Industrial CO_2 emissions were not the causes for the general climatic changes during the last millennia. Blinks of Mother Nature in the cosmos and on earth caused major changes in the past and will do so in future no matter how much mankind manages to reduce greenhouse gas emissions.

During our earth' history of more than 4 billion years at least five major ice ages occurred that were each time followed by warm or even hot periods. But we do not know how warm these periods of global warming were. But we know for sure that mankind did not cause these changes of temperatures by emitting greenhouse gases.

Scientists have established that CO_2 levels during ice ages were low and they were high during the warm periods. This increase of CO_2 levels happened – as we know - without interventions by human beings. The most recent Ice Age had its peak some twenty thousand years ago and ended 11,700 years ago. Huge masses of water were tied up in glaciers that were up to 4,000 meters thick and covered large parts of the northern and southern hemispheres annihilating all life. Sea levels during the ice age got down by up to 100 meters.

Flora and Fauna in the areas, which glaciers did not cover, changed dramatically because of the cold climate. Dinosaurs disappeared. Hominins also disappeared as nature slowly cooled down. People who had lived during these periods did probably not realize that an ice age was coming. Our forefathers were nomads who were used to moving to greener pastures whenever their cattle could no longer find fresh grass. They obviously did not keep records about changes of average temperatures and rainfall. They did not keep statistics as we do. As a matter of fact, the US recorded weather statistics consistently only since

the year 1878 and they did it only for the military. For the time before that year, we have only anecdotal information about temperatures and rainfall and other weather patterns.

The current global warming started very slowly more than 11 thousand years ago. The gigantic glaciers, except for what is left today on both poles disappeared with the result that sea levels rose again. Fauna and flora re-developed during this long period of time slowly to what we see now.

Another ice age will come again in tens of thousands of years. But this is not our problem today. The problem is that due to huge CO_2 emissions the temperatures increase a little bit faster than nature had in store for us. We think that we can reverse the trend of warming climate. After all, except for climate refugees, we no longer move like nomads to regions with more suitable climate. We want to change the climate where we live. But humans need more time to adjust to changes. The phenomenon of faster than normal changes require gigantic efforts to adjust. This is why we call it a crisis.

Our ancestors, who lived in small groups, had no problems moving to higher grounds when sea levels rose or pastures became dry. Nomadic tribes were moving places regularly anyway. Living things like animals, plants and humans have shown over the many periods of changing climate that they are able to adapt to new circumstances by improving their environment or by moving to more convenient places.

But moving megacities like Jakarta is a big job. We can say that the climate change has the effect of a crisis because of over-population. Demographers estimate that the world population in 1800 was around 1 billion people. When I was born in 1943, the world counted only 2.5 billion people and rapidly increased to three billion in 1960, to four billion in 1974 and doubled since then to eight billion today. Without such a large number we would probably not talk about a climate crisis. We would for sure not see a crisis if the world population were only one billion as it was in 1804 when Napoleon crowned himself as French emperor. Climate change today affects too many people. To remediate environmental damage for all eight billion people is a gargantuan task compared to protecting only one eighth of these numbers. The absurd explosion of population during the last 200 years is a serious issue in its own right.

Warmer temperatures in the world let the glaciers in mountains melt and let the remaining ice on both poles of the earth shrink. This, in turn, makes sea levels rise and endangers the habitat of coastal areas, where some 900 million people now live world-wide as researchers have established. The people in low-lying areas will soon have to seek higher grounds.

People in some islands have already abandoned their homes. Examples are the inhabitants of Gardi Sugdub (Carti Sugtupu) island in the San Blas archipelago in Panama. They were forced to move to the mainland where the government built new housing for them.


Gardi Sugdub Island, Panama

Of all the islands in this archipelago, 39 are inhabited and all the people will soon have to relinquish their homes and relocate to the mainland. Nature has not given us the human right to live our lives in the place where we were born. As a matter of fact, Mother Nature does not know any human rights. She does everything in her own way.

Slightly warmer climate results in severe droughts that are interspersed with catastrophic floodings. Some areas like the American west suffer from consistent lack of rain while devastating floodings suddenly follow dry spells or hit other areas. But we know now that heat causes draughts more than lack of rain.

Heavy rains and floodings are as destructive as draughts. Cyclones become more violent with higher wind speeds but are now apparently less frequent.

Thawing permafrost sets free not only an estimated 1,700 billion metric tons of carbon but also trillions of microbes, viruses and pathogens that were sleeping for thousands of years. If only 1% of these are dangerous there is the clear risk that some will attack human beings who do not yet have the necessary antibodies. Scientists from the French National Center for Scientific Research (Centre national de la recherche scientifique - CNRS) found 13 ancient viruses that were frozen in Siberian permafrost. The oldest of these viruses, an amoeba virus, was 48,500-years-old. They baptized it Pandoravirus yedoma or zombie virus. Scientists were able to revive the worm, in which the virus had survived. They call this new branch of science 'Resurrection Biology'. But they have not yet found an answer to the scaring question if this virus can today pose a threat to the health of any other living being, including humans. But we'd better don't test it.

Glaciers release their water into the oceans faster than we like. The sea level has risen about 12 to 20 centimeters in the last century. According to calculations of a worst-case scenario, sea levels will rise another meter by the year 2100 and 5.4 meters by the year 2300. The practical consequences for the life on earth are immense, incalculable and for this reason very frightening. Mankind can worry about the next ice age much later because we have not even reached the middle of the current interglacial period, which evolves with or without industrial greenhouse gas emissions.

Some of the effects that global warming has in the near future are foreseeable and will be manageable with different levels of efforts and costs. We can, for example, move populations to higher grounds. But people already living there might not welcome the migrants from the coastal areas. Jakarta, which the Dutch called Batavia, has 11.7 million inhabitants. It is one of many examples of mega cities that the government will have to move to higher grounds. The government of Indonesia is already about to move out of Jakarta and will relocate to a new capital city called Nusantara in East Kalimantan on Borneo Island. The rats leave the sinking ship if you allow me to call a government like this. I have observed myself regular floodings in Jakarta, which is also the most polluted city in the world. Almost all areas of the city are regularly flooded.

President Soekarno ordered in the 1960's the development of Jakarta's monkey-infested coastal lowland of Ancol. This name of the Bahasa Indonesia language means 'low, swampy land'. And indeed, brackish water regularly inundated this land when the sea was high. But president Soekarno wanted to create a fantastic tourist attraction on this swampy land. He also ignored the fact that some wealthy Dutch had used the coastal lowland in the 18th century to build summer mansions that they had to give up at the beginning of the 19th century because the land had become unsuitable for residential purpose. Political will and technological hubris often overcome fear of nature's might and revenge.

Ancol looked still attractive when I came there for the first time in 2004. It was much less appealing four years later. Indonesia will have to move Ancol sooner or later to the mountains and will have to leave the beach behind, which the ocean will soon have washed away anyway. When I look at Ancol, I see the problem not that much in rising water levels. I see the problem rather in the fact that an ambitious government planned a huge tourist project on coastal lowland with the unrealistic expectation that the ocean will remain well-behaved. The problem is often that people build settlements in areas that are prone to floodings but think that these will not occur since they have not happened during the lifetime of two previous generations. Collective memory seems to be very short.

From the coastal road on Viti Levu in Fiji, I noticed deserted old settlements on the slope of the mountain. My Fijian colleague told me that this was the place to which coastal villagers moved after a devastating tsunami three or four generations ago. Since no other tsunami came, people moved back to the seashore. But tsunamis might obviously come back sooner or later.

Ocean waters will submerge island countries like Kiribati, Tuvalu and the Marshall Islands. Their populations will have to find new homes. The airport in Majuro, capital of the Marshall Islands, and parts of the city regularly get flooded in storm surges, particularly when these surges are combined with extreme high tides. Tractors and graders then have to clean the runway from rocks and gravel as I have seen in the late 1990's. It is sad, but the population of the Marshall Islands, which are proud of their country, will have to relocate in the foreseeable future. Except for losing their homes and their lifestyle, which is no problem if they have a hint of Wanderlust, they have no difficulties because Marshallese citizens don't need a green card to settle in the US. The US government treats them like their own citizens based on the 'Compact of free Association' that the two countries have signed in 1983.

New technologies are already available to avoid forest fires and to fight these fires more efficiently. We can produce drinking water, when it becomes really scarce, with desalination plants, of which the biggest is Ras Al Khair in Saudi Arabia. It produces from sea water some one million cubic meters of water every day. We human beings are mastering nature quite well as we tend to believe. And obviously this comes at a cost. The desalination of water costs between $0.5 and $3 USD per cubic meter depending on the cost of electricity. In the case of Ras Al Khair, where electricity is very cheap, the daily costs are $500,000 USD. If energy costs are high, it might cost up to 3 million USD per day. Such amounts look manageable if the country does not have to pay for many other measures to fight the consequences of global warming.

The Netherlands is a good example of a country that manages traditionally very well the fight against high sea levels. They believe that the current installations against floodings from the North Sea are adequate until the year 2050, which is less than 30 years from now. But this time frame is nothing in terms of history. I am sure or I hope that the Dutch look already beyond 2050 and have plans in their drawers to improve their dike system because Dutch people who are born today will only be 30 years old at that time.

Rising sea levels, rising groundwater and unusually abundant rainfall threaten the low-lying parts of Copenhagen. The Danish meteorological institute predicts that rainfall will increase by 30% to 70% by 2100 and that the sea will also rise 42 cm by the same time. Aware of these risks, which reduction of CO_2 emissions will not stop, the city has started since 2008 some 300 projects to protect the city from being submerged by water.

Climate change is the cause for heavier floodings, which wash away not only fertile topsoil but also highways that engineers designed to resist rainfall. But they resist only water levels that were normal at the time when they had built them. Governments will have to rebuild all these and other endangered structures onto safer grounds and with features that are resisting much more water. Sewage systems will also have to be adapted to higher volumes of water. And much more infrastructure has to be made waterproof. I am relatively sure that these improvements of infrastructure will be affordable. Consequently, the Federal Emergency Management Agency (FEMA) in the US has decided in 2024 that infrastructure projects like police stations, schools, sewer plants, roads, bridges, for which they provide funding, have to be elevated at least 2 feet above the local flood level. It is remarkable that it took FEMA nine years to arrive at this decision. This delay included four years of opposition to such a decision by the administration of Donald Trump who called global warming a hoax.

Floodings of biblical dimensions hit the Valencia region of Spain in 2024 killing at least 230 people. Spanish authorities acknowledged in the aftermath of the catastrophe that global warming makes meteorological phenomena more intense and more frequent. But they did not repeat the usual call for reduction of greenhouse gases as the solution of the problem. A reduction might not happen during our lifetime and during the life of our children. The Spanish government issued instead the policy 'to build differently' which means to allow the floods to come as they wish but to build housing in locations and with the strength

that the floods cannot damage. They decided to relocate construction of buildings away from flood-prone areas and to expropriate owners of houses that are usually in the path of the floods.

It is not only water that threatens infrastructure with swelling masses. Increasing heat also affects infrastructure. It damages asphalt of streets and metal of railways. An example is the Third Avenue Bridge in Manhattan which pivots to allow ships to pass. Because the metal in the bridge swelled in extraordinary heat, they could no longer close the bridge. Tarmacs of airports will have to be replaced with more heat resisting materials because traditional paving melted away and tarmacs became useless for airplanes. Today's power grids were built for yesterday's climate and will have to be re-designed for increasing use of air conditioners.

Some city planners advocate the idea that we should design areas that are vulnerable to flooding '*to work with water rather than against the water*'. Instead of building concrete dams to fend the water off, we can create facilities that soak up the water when there is too much and which retain it when there is too little. Planners call them 'sponge cities', of which the Chinese government has created a few as pilots. There is the question however if these sponge cities will be able to cope with onslaughts of water masses that will become much heavier due to climate change. The idea of creating sponge cities is certainly not suitable for catastrophic floodings that people in India experience during monsoon seasons.

Around one third of the Netherlands lies below sea level. The Dutch therefore have abundant experience how to keep the water out by building dams. An alternative method is to build floating houses. They have built, for example, in Rotterdam the world's first floating dairy. In addition, the Dutch built floating parks made from waste and a floating office building.

The majority of the archipelago of the Maldives is located less than one meter above sea level.


Tonlé Sap River, Cambodia

Their city planners cooperate with a Dutch company to build floating cities. Telescopic stilts allow the houses to adapt to rising and falling sea levels. I have seen along the Tonlé Sap river in Cambodia many houses that people traditionally had built since time immemorial on stilts. I also saw a floating school. This concept therefore is not new and is efficient.

It should be mandatory that architects don't build new settlements in areas that are prone and more likely to be hit by floodings. On the other hand, these areas benefitted from sediments caused by regular floodings over many centuries. The sediment converted these areas into fertile land and attracted settlements. It is probably no coincidence that some of the world's most important human settlements and manufacturing hubs are located in regions that are susceptible to damaging floodings.

The basin through which the holy Ganges River and its many tributaries flow, is one of the largest and most fertile regions in the world because the river left behind huge amounts of valuable sediments over many centuries. Researchers estimate that the rivers carry and deposit sediment of about 1.84 billion tons per year. The fertility of this area was too attractive to be missed and led to a population of 400 million people who now live in the Ganges basin and are regularly threatened by annual floodings that become increasingly catastrophic. We could here again argue that floodings are only one part of the problem while the unsustainable number of people are the problem's significant other part.

Higher temperatures of water in the ocean produce more violent tornados and cyclones. Researchers from Climate Central, a not-for-profit organization, have reported that elevated ocean temperatures have increased the wind speeds of cyclones in the North Atlantic between 2019 and 2023, by an average of

almost 30 km/h. People had designed buildings and infrastructure to resist only lower wind speeds that they knew at the time of construction. These houses will have to be upgraded to resist stronger typhoons, as cyclones are also called. I remember three decades ago in Fiji when insurance companies became wary of increased damage caused by stronger cyclones. They threatened to cancel insurance policies if building owners did not attach roof coverings to the beams with new and more efficient anchors that had come to the market at that time. In some regions, like Florida, cyclone insurance has become unaffordable if it is still available. But we can mitigate risks of damage by storm.

Architects have successfully reduced the risks of damage to buildings by earthquakes. They now use modern construction methods and materials to build earthquake-proof houses. When a 7.4-magnitude earthquake struck Taiwan in 2024, it was the most powerful earthquake in a quarter-century. But Taiwan's earthquake preparedness is one of the most advanced in the world and thanks to earthquake-proof architecture, the quake killed only few people. This is in stark contrast to other countries that were ill prepared for earthquakes. In 2015, an earthquake with a magnitude of 7.8 in Nepal killed almost 10,000 people and an earthquake in Pakistan with a magnitude of 7.6 in 2005 killed nearly 90,000 people. The 7.9 earthquake in Sichuan province in 2008 killed 87,000 people.

The famous earthquake that destroyed San Francisco in 1906, had a magnitude of 7.9. It killed more than 3,000 people and left about 250,000 people homeless. Architects can prevent these catastrophic numbers of casualties by building earthquake-proof houses and preparing the population for such disasters. As a result of improved architecture, the Loma Prieta Earthquake in 1989, which had a magnitude of 7.0, caused the death of only 69 people in San Francisco. Most of these victims died on elevated highways that collapsed and not in buildings, which resisted the tremors.

An he 8.9 earthquake in Japan in 2011 had the incredible strength of 8.9 but did not too much damage to buildings because buildings in Japan are mostly earthquake proof. The damage came from a massive tsunami, which followed and killed thousands of people and disabled the cooling system of the nuclear power plant in Fukushima, which ten released radioactivity almost as much as the Chernobyl nuclear plant that exploded in 1986.

Architects have managed to make houses earthquake and storm proof. It appears in fact that thanks to human creativity, fewer people die from natural disasters today than centuries ago. The devastating 2024 wild fire in southern California, for example, spared few houses that architects had built using fire retardants.


House spared from Fire

Many efficient measures to overcome the negative consequences of global warming are technically possible but come at costs that not all nations can carry. Whims of nature have it that misfortunes never come singly. Even rich nations can become overwhelmed if they have to finance too many different measures in parallel or need such measures at a time when financial resources are strained.

The Maya empire might be an example. Mayas excelled in many fields of civilization like architecture, a refined writing system and mathematics. They also excelled in astronomy as Archaeoastronomists have established. The Mayas had built a very sophisticated water management system, which they needed because they had little surface water and a six-month dry season. Their system worked so well that the nation's population dramatically grew. As a result of an irresponsible population growth, the environment degraded. Mayas cut down most trees for construction work and for increase of arable land. As they might not have fully realized, the survival of their civilization depended heavily on the proper maintenance and improvement of the water management system. There is no life without water. Degradation of the

environment and deforestation increased the severity of droughts, which might still have been manageable. But then, civil unrest, pandemics and other negative issues appeared concurrently as is expressed in Murphy's Law. As a result, financial and other resources for the maintenance and necessary improvement of the water management system became insufficient. The simultaneous combination of all negative factors eventually was the cause for the collapse of the Maya civilization.

We find a similar pattern of the rise and fall of a civilization in south East Asia. The Khmer civilization rose in the 12th century when a vast and intricate water system gave life to the empire and to the construction of the splendid capital city of Angkor Wat. The hydraulic system consisted of canals, dykes, moats, and reservoirs (barays) and an engineering system that controlled the vital flow and storage of water. The water management system became larger and more complex to accommodate the constantly increasing needs of the empire's growing population. Starting in the late 14th century the complex water system became more vulnerable to dramatic shifts in the changing climate that created lengthy monsoon rains followed by extreme droughts. These climate changes required improved water management, which the empire was unable to provide because it faced increasing attacks from the Siamese neighbors. A weakening social and political cohesion also has probably contributed to the downfall. Misfortunes never come singly (ein Unglück kommt selten alleine) is the popular saying that I have already mentioned. I do not believe that one single factor causes significant changes in history. But scarcity of water or far too much water have certainly a decisive impact on the success of a society.

Let's get back to the fight against global warming. The Paris Agreement of 2015 is a nice international treaty written on paper. Its 195 signatories have agreed that emissions of greenhouse gases like CO_2 are the culprits for global warming. Based on this assumption and neglecting other measures to protect our endangered environment, the signatories solemnly agreed to work together to reduce CO_2 emissions. The stated goal is to reduce the increase of global temperatures '*to well below 2^0 Celsius above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5^0 Celsius'.* Scientists predict that without measures to reduce greenhouse gas emissions, global warming will reach 2.7°C by 2100.

National selfishness will continue despite the Paris Agreements. Some countries will even increase greenhouse gas emissions. Two studies published in 2025 predicted that our planet was on course to shoot past 2 degrees of global warming over the next two decades. They concluded their findings by saying that the Paris climate goal is already dead.

In addition, many countries endanger our planet's future with other activities that are harmful for our climate and are not related to greenhouse gas emissions. Examples are deforestation for economic exploitation and extraction of huge amounts of minerals and water from underground. It is also not healthy for our environment that builders pour concrete everywhere and that mankind fills the airspace with tens of thousands of airplanes and satellites. The number of objects in orbit larger than 10 centimeters has increased from about 23,000 in 2013 to some 47,000 in 2024. If air space becomes further congested, the risk increases that satellites collide and create uncountable debris that heightens the risks of cascading collisions. We call this the 'Kessler Syndrome' after the astrophysicist Donald Kessler who has highlighted this risk for the first time.

I see considerable risks for the survival of mankind in genetic engineering, which began with plants. Scientists now have started using this bio-technology on human beings as I have mentioned above. This might improve the quality of human bodies but might also get out of control.

In summary, not only CO_2 and other greenhouse gases threaten the survival of mankind. The Paris Agreement does not provide the necessary panacea. It focuses only on emissions of greenhouse gases

and neglects many of the other factors mentioned above that contribute to possibly devastating changes of our environment. The Paris Agreement is like the trials of Nurenberg that targeted only some culprits of the holocaust but left the majority of others out of the line of fire.

To widen our awareness of risks, an international group of 29 scientists from 8 countries looked not only at global warming that influences the health of our planet but they looked at eight additional issues such as biodiversity, freshwater, land use, and the impact of synthetic chemicals and aerosols etc.

We have lost biodiversity not only because the number of species is declining worldwide. Researchers have established that we have also lost genetic diversity within many species. We can see this as a "silent extinction" because lack of genetic diversity reduces the capacity of a species to bounce back from environmental strains.

Loss of biodiversity is a particular risk for food supply. During the last century, we lost 75% of genetic diversity of plants. Today, only nine plant species produce 66% of all crops in the world. Rice, wheat, and maize account for 50% of plant-based calories in the world. This makes food production vulnerable to pests, diseases and climate extremes as we have seen in the famine of the 1840's in Ireland. This country had relied on potatoes as one single crop that fell victim to a disease. Further loss of biodiversity can lead to a monoculture with no fallback to other crops

The international group of 29 scientists, which I have just mentioned, established "planetary boundaries" for each of the environmental areas that they have identified. These boundaries, they say, must not be crossed to keep the earth sustainably inhabitable. In their 2023 report they concluded that mankind has crossed six of the nine boundaries. If this is not reversed, they warned, the world risks to be no longer a '*safe operating space*' for humanity. International organizations like the UN Environment Program divide the use of the world's operating space only into a 'green economy' and a 'blue economy'. These organizations promote the sensible and sustainable use of land and of ocean resources respectively to mitigate risks for mankind.

The 29 scientists have not included population growth as a factor that deteriorates our living environment. I have mentioned above that the incredibly big size of today's world population adds to all problems. If today's world population were still one billion as some 200 years ago, there would probably be much fewer greenhouse gas emissions. In addition, mitigating negative effects of global warming would also take only 1/8th of the efforts that we now have to make to move populations and to build resistant infrastructure. But reducing population growth is more utopian than reducing CO_2 emissions. Politically correct thinkers and speakers don't discuss ways how to reduce population growth. They are only willing to discuss how to prevent or to repair the damage that an unsustainable increase of the world population creates.

The world focusses now on the reduction of greenhouse gas emissions, particularly the reduction of emissions of CO_2 by burning fewer fossil fuels and to send less CO2 into the sky. The oil and gas industries obviously do not like this method because they want to continue selling their polluting products.

Measures of geo-engineering can help reducing the amount of CO_2 in the air and to de-carbonize our atmosphere.

Measures of geo-engineering, which alters earth systems, comes in two versions. One, which we call solar geo-engineering, is to block out the sunshine by using high flying balloons that release sunlight-blocking aerosols like sulfates in the atmosphere. These aerosols reject the sunshine like an umbrella that keeps us cool. There is even the idea to shoot huge mirrors into the earth's orbit to send sunshine back into space.

The second branch of geo-engineering wants to suck greenhouse gases out of the atmosphere. Klaus Lackner from the Los Alamos National Laboratory pioneered a machine that puts frames with hundreds of white polymer strips in the air like sails. He fills the strips with resins that bind CO_2 molecules that the machine then washes out with water and safely disposes of it – possibly underground.

We can also remove CO_2 from the atmosphere by planting more trees, which absorb CO_2. The Amazon trees, for example, soak up every year more than one billion tons of carbon dioxide from the air. And the temperate forests in eastern US do the same annually with about 34 megatons of CO_2. Therefore, conservation of forests and planting trees is a very efficient way to get rid of CO_2.

Microalgae, which scientists call phytoplankton also absorb CO_2. Microalgae are tiny plants that float on the surface of oceans. They use CO_2 from the air, release oxygen and produce minerals. Sea animals eat the plankton, including the carbon in them, and their excrements, which contain carbon, sink to the bottom of the sea as "marine snow," keeping the carbon out of the atmosphere.

Researchers have found out that phytoplankton grows more abundantly and extracts therefore more CO_2 from the air if they fertilize the water, in which it grows. Iron dust or dust of alkaline rock is such a fertilizer. They call this method marine Carbon Dioxide Removal (mCDR). A not-for-profit organization called Exploring Ocean Iron Solutions (ExOIS) has collected millions of USD to apply this concept in 10,000 square kilometers of the northeastern Pacific Ocean to find out how much CO_2 they can extract from the air and what the impact on the ecosystem will be. Researchers who investigate the pros and cons of this method have identified a possible unwanted side-effect because phytoplankton also uses oxygen that then might become scarce and can suffocate fish.

Alternatively, we can use various different technologies to extract CO_2 from the air and to store it away underground. These methods have different names like Carbon Capture and Storage (CCS), Carbon Dioxide Removal (CDR) or direct air capture (DAC). The latter technology is not cheap and can cost as much as $1,000 USD to capture one metric ton of CO_2. The 2nd edition of the Carbon Dioxide Removal (CDR) Report said in 2024 that nations worldwide are eliminating about 2 billion metric tons of CO_2 each year, mainly by planting and maintaining forests but the report also estimates that all nations will have to remove additional 7 billion tons every year.

There are two problems with both branches of geo-engineering. Firstly, when one clever scientist comes up with a good idea, five other scientists will voice concerns about side-effects and demand that more research has to be done because they fear many nasty side effects. When researchers started sun geo-engineering experiments in Mexico and in Sweden, they faced unsurmountable opposition from environmental groups and from Indigenous communities and had to stop their projects. But it seems that wealthy philanthropists like the Pritzker Innovation Fund, the Environmental Defense Fund and the Simons Foundation don't give up. They are not discouraged by setbacks like in Sweden and continue pouring millions of dollars into additional research projects.

Secondly, as the 'geo' of geo-engineering suggests, all proposed methods have to be implemented world-wide to have an impact on global warming. Klaus Lackner's machine might have a measurable effect in his backyard but millions of these machines will have to be installed world-wide, which is not realistic because it requires much more coordination than the United Nations achieved with the Paris Agreements.

Many geo-engineering ideas, that scientists publish, sound very convincing and have inspired wealthy individuals and organizations to fund experiments. But all geo-engineering ideas have overall not yet found sufficient support for thorough investigations and possible large-scale implementation. Optimistic ideas about the potential to re-engineer nature's behavior have triggered conspiracy theories that people

easily disseminate in TikTok and other social media. When super hurricane Helene hit the American south-west in 2024 some internet warriors were fast to claim that the government had geo-engineered the disastrous storm '*to seize and access lithium deposits in Chimney Rock*' in North Carolina.

The most shocking effects of global warming, that mankind will experience in future, might come from unexpected directions because we cannot predict the unknown. Heavy turbulences, for example, might increase during flights of passenger planes and might endanger their safety.

Rising temperatures for sure affect wildlife and their habitats, as scientists have already observed. They have discovered that new born sea turtles in Gili Lankanfushi in the Maldives are mostly female because of a phenomenon that they call temperature-dependent sex determination (TSD). If eggs of turtles on the beach are exposed to more than the usual heat, the babies will all be female. Researchers have established TSD by taking turtle eggs off the beach to cooler places and more males hatched as a result. This phenomenon seems to occur only in reptiles and some fish. But other negative factors might develop in an environment of global warming. There might even be the possibility that human babies will – like the turtles in the Maldives – be only females due to certain effects of climate change that we currently fail to detect or to imagine.

Some species like butterflies and foxes have migrated further north or to higher, cooler areas. Other species like polar bears and many others might become extinct because they are unable to adapt fast enough to changing climate. Yet other species like mosquitoes, ticks, jellyfish, bark beetles, crop pests and harmful microorganisms are flourishing. Scientists at London's Natural History Museum and at the California Academy of Sciences have in 2023 discovered almost one thousand new species, of which more then 600 are different types of pollinating, predatory and parasitic wasps. All new species can have impacts on our environment, of which scientists investigate but still don't know if they are beneficial or harmful.

The most dangerous threats are the ones that we do not know. There might be new viruses that will thrive in warmer climates or might attack humans because their usual animal hosts got extinct. They will have to use human bodies as new hosts – their second choice so to speak.

The fall of the Western Roman Empire happened slowly with the concurrence of many negative circumstances like climate change caused by interference with nature, military over-reach, excessive spending and heavy taxation to name only a few factors that we can also observe now in the US and in other developed countries. This edgy situation, which I also observe now in the US, developed over many years in the Roman Empire. A series of pandemic diseases during the 2nd and 3rd centuries had then an easy job to strike the final blow towards the end of the empire's delicate existence. Given the similarity of the end of the Roman Empire with the current situation – including the COVID pandemic that might be followed by another pandemic - I am not optimistic that the environment on our earth will remain suitable for the lives of future generations and for the countries, in which they live.

Nuclear Fusion

Science and technology about nuclear energy are quite young. They started developing only in the 1930's. Before these years, all scientists, including Albert Einstein, and many philosophers believed that an atom was the smallest element in this world and that splitting an atom was impossible. After all, the word atom comes from the Greek word 'atomo' (Άτομο), which means 'not fissionable'. They perceived it as the smallest particle that we cannot break down into even smaller pieces. It was the Greek philosopher Epicurus who stated in the 3rd century BC for the first time that the basic and smallest constituents of matter in our world are atoms, which fly through void, through empty space like the stars in the universe.

He based this statement not on scientific research. His remarkably correct understanding of matter, which he developed as a philosopher and not as a scientist, remained inconsequential. His correct idea was sleeping in science and technology for two millennia. This highlights the fact that a person who develops an ingenious idea is a genius only if people understand what he said and recognize him as genius. Otherwise, People either ignore him or declare him a fool.

We can generate nuclear energy in two different ways. In the first way, which we call nuclear fission, technicians split a heavy atomic nucleus, for example of uranium or plutonium. The fission releases huge amounts of energy that was bound in the atoms. Some 30 countries operate nuclear power plants to generate electricity and 9 countries, including possibly Israel, possess nuclear weapons.

The second method, which I mention further below, does the opposite. It merges two lighter atoms into a heavier atom, which process releases even more energy than a nuclear fission. The energy, which both nuclear process release, is the power that binds the elements of atoms together. Scientists call it aptly the gravitational 'binding energy'. Max Planck, the German theoretical physicist who developed the quantum theory, stated that physical matter as such '*exists only by virtue of a force which brings the particle of an atom to vibration and holds this most minute solar system of the atom together*'. Max Planck won the Nobel Prize for Physics in 1918 by making such statements and publishing many more important scientific findings.

I guess that a 'binding energy' of unimaginable strength holds the cosmos together and – at the same time - separates and moves the stars as if they were vibrating particles of a gigantic atom. If this incredibly strong energy did not exist to keep all stars in their places while they move within the cosmos, all the stars would collapse into one big mass or would without control escape into nowhere. The Big Bang, as I wish to speculate, might have happened when someone or some event fused the cosmos with another cosmos or split an existing cosmos into two. This must have set free an unimaginable amount of energy. But obviously, I can only speculate and philosophize. We did not witness the Big Bang and have not the slightest idea what caused the birth of the cosmos and what exists outside the cosmos or existed before the Big Bang. We also don't know where atoms and their binding energy come from. Scientists today agree only on the statement that there are four fundamental forces of nature, namely gravity, electromagnetism, a weak nuclear force and a strong nuclear force. All these forces keep the stars and galaxies moving through space. A vast field of magnetism, to give an example, surrounds our earth. This magnetosphere, as astronomers call it, exerts its effects up to a distance of between 38,000 kms on the earth's side that faces the sun and 200,000 kms on the opposite side.

The forces of electromagnetism and gravity are also at work when they bind sub-atomic particles together.

Anyway, as usually, the military advanced the novel technology of nuclear fission for their own deadly intentions. They tested this method for the first time on 16 July 1945 when they ignited the first atomic bomb in New Mexico. During the following month, in August, the American military tested the practical utility of the atomic bomb by dropping one of the new bombs, which they lovingly called 'Little Boy', on Hiroshima and dropped three days later a second bomb, that they called 'Fat Man' on Nagasaki. These two tests were scientifically a success and - from a military perspective - a full success because they totally destroyed the two cities and killed instantaneously an estimated 110,000 civilians while many more died afterwards from burns, injuries, and radiation poisoning.

Nobody seriously called the use of the atomic bomb a war crime. The Americans had previously already killed between 75,000 and 200,000 civilians in the firebombing of Tokyo without any complaint by modern human rights activists. They were at that time not yet active. Many people – not me - justify "area

bombings" of residential targets as a means to affect the morale of the population and to reduce support for continuing war efforts.

Nuclear scientists and technicians subsequently managed to control the process of nuclear fission, which allowed to build nuclear power plants. France, which produced in 2020 almost 70% of its need for electric power in nuclear plants, is the champion, followed by Russia and the US with 21% and 20% respectively. There are two problems with nuclear power plants. They firstly produce not only electricity but also radioactive waste that is difficult to store away safely. There is secondly the risk that huge amounts of radioactivity will be set free if terrorists or accidents destroy the plant. The nuclear plant in Chernobyl, Ukraine, exploded in 1986 due to mistakes that technicians had made. Some 50 people died instantaneously from the explosion. Nuclear radiation that escaped from the plant caused subsequently thousands of deaths and contaminated millions of acres of forest and farmland for decades. Livestock was born deformed, and humans suffered long-term negative health effects. In Winnipeg, Manitoba, where I lived at that time, we feared that radioactive clouds from far-away Chernobyl could damage our health. It was a disaster of biblical dimensions.

A second massive accident of a nuclear plant happened in 2011 in Fukushima, Japan, after a 15-metre tsunami had disabled the power supply and cooling system of the nuclear reactors. The International Atomic Energy Agency placed this catastrophe at the same severity level as Chernobyl and the government evacuated over 100,000 residents from an area of 207 square km around the plant. Out of justified fear that radioactivity had leaked into the Pacific Ocean, Chinese consumers have been refusing for more than a decade to buy any fish from Japan.

Because of the two problems that nuclear power plants create, people in many countries try to force their governments to abandon nuclear power plants. But as soon as prices for conventional energy go up, the protests against nuclear power become silent.

The opposite method of producing nuclear energy is nuclear fusion, which replicates the process that powers the Sun and some other stars. This is why South Korean scientists call their fusion experiment 'artificial sun'. As is customary in technological advances, the military pushed for the development of nuclear fusion to make atomic bombs even more deadly. As a result, they developed thermonuclear bombs, which we also call hydrogen bombs despite some differences. They are and between 100 to 1,000 times more destructive than atomic bombs but use nuclear fusion only as enhancer for classic fission bombs. An atomic bomb working exclusively on nuclear fusion is not yet possible.

The Americans tested the first specimen of the hydrogen bomb on 01 November 1952 far away from home at Enewetak atoll in the Republic of the Marshall Islands after they had forcibly evacuated the entire population.

When we fuse two or more lighter atoms into one heavier atom under extremely high pressure and heat, a massive amount of energy is set free in form of heat. If technicians manage to harness and control this process, it will become an infinite source of energy that would end our dependence on fossil fuels and will solve in longer term the problem of greenhouse gas emissions. We call this 'clean' energy because the process does not emit CO_2 and does not produce radioactive waste.

Researchers have tried for decades to create nuclear fusion in a controlled process. In 2021, scientists in the UK, who used various different technologies, had already generated a record-breaking amount of sustained energy but this lasted for only 5 seconds.

US scientists at the National Ignition Facility at the Lawrence Livermore National Laboratory in California reported in 2022, that they had successfully produced a small nuclear fusion resulting in the production

of more energy than the energy they had used to achieve this breakthrough result. This has happened on a very small scale and produced only energy to boil 10 kettles of water at huge cost.

To make nuclear fusion a commercial success, these costs will have to come down thousand-fold. There is a long way to go until such facilities can produce sufficient energy to power electric grids at reasonable costs. But we now hear more and more success stories that look like promising beginnings. Many research facilities – also in France and in Canada– work independently on the issue. The combined scientific intelligence and the huge resources that countries invest world-wide make me predict that further scientific and technological progress will make nuclear fusion commercially viable within a couple of decades.

A company in Virginia that calls itself 'Commonwealth Fusion Systems' (CFS) is extremely optimistic that it can complete a fusion power plant in the early 2030's. They hope that their plant can generate about 400 megawatts of clean electricity. They have already collected $2 billion USD for the development, which sounds promising. But delays and budget overruns are common for ambitious projects. A thermonuclear experimental reactor (ITER) in France, for example, is long behind schedule and its initial budget of $6.3 billion USD in 2006 exploded to $22 billion USD in 2023. The defense company Lockheed Martin started in 2010 to build in Palmdale, California, a small fusion reactor with its affiliate company 'Skunk Works'. They announced in 2014 that they would complete the reactor before 2019. But in 2021 they abandoned the project for undisclosed reasons. Lockheed Martin is famous for being secretive. Despite all delays and cost overruns I remain optimistic that commercial fusion power plants will at one point of the near future become reality. The goal of creating unlimited green energy is far too tempting to give up.

The irresistible advantage of nuclear fusion is that it uses deuterium and tritium, which are both isotopes of hydrogen. We can easily extract deuterium from seawater and can derive tritium from lithium, which is abundantly available in nature. In addition, the process of nuclear fusion does not create dangerous waste. It only produces helium, an inert gas, and small amounts of tritium which emits beta radiation. But this has only a very short half-life. Most importantly, the process does not release CO_2 or other harmful atmospheric gases.

I initially had fears that the nuclear fusion in a laboratory could spill outside like a virus and could ignite our planet to become a permanently burning star like our sun. But competent people dissipated my fears. They tell us that the conditions, in which nuclear fusion is possible, are limited to a very small space that the technicians create and fill with extremely high pressure. If this limited space opens by accident or by terror attack, the small space, in which fusion is possible, immediately disappears like the content of an exploding balloon that is filled with clean air.

For the above reasons I herewith predict solemnly for the record that nuclear fusion will in a couple of decades become the source of energy in all electric power-plants – provided that economic conditions remain stable and allow governments and private investors to finance the costly development.

I also predict that the US will lose its decades-long lead in the nuclear fusion technology and that China will win the race. I base this prediction on two observations: firstly, the Chinese government puts between $1 billion and $1.5 billion USD annually into fusion technology while the US spend only $800 million USD for the development. Secondly and most importantly, the Chinese don't bother re-inventing the wheel. They copy the latest achievements of western technology and improve it at breathtaking speed in new facilities that they build, while the west still uses decades-old facilities and institutions, which are difficult to upgrade at reasonable speed. I like to call this situation in the US and in Europe the NASA effect. The

US government established NASA in 1958 and this state-owned enterprise has grown into a mammoth with too many simultaneous projects and too much interference by changing administrations in Washington. This results in costly changes of goalposts and priorities. It is often better to start afresh as China did not only in the development of nuclear technology but also in space exploration where they currently excel. Private start-ups also benefit from the lack of overhead. NASA's OSIRIS-REx mission, which returned 122 grams of an asteroid sample in 2023, cost over $770 million USD. AstroForge, a Californian startup, has budgeted only $7 million for a fly-by mission to the asteroid "2022 OB5" to explore if they can mine platinum there at a follow-up mission.

Fertility of Human Beings

Global Warming, and artificial intelligence currently preoccupy activists, politicians and the media. These issues dominate the headlines of newscasts except when there is more important breaking news like a soccer world championship, Oscars Night, a pandemic or wars like in Gaza and in the Ukraine. Some news items in the small print look unimportant but might, if you look closer, reveal serious more serious issues and risks for our future. I just want to mention bio-engineering and gene manipulations, which carry the risk of substantial unwanted side-effects.

In addition, there are serious dangers and risks for the future of humankind that we are not aware of or that only a few weak voices mention. One of the latter risks might come from the observation by researchers that people are not having as much sex as they used to have. "Sexlessness" among 22- to 34-year-olds is surging in the U.K., in the US, in Australia, Germany and in Japan. Declining sex is of concern not only because people who have sex less than 12 times a year face the highest risk of developing cardiovascular disease. Sexlessness is also worrying because of the potential fallout on human procreation.

Fertility of human beings has been consistently decreasing world-wide during the last decades. Recent research by George Mason University in Fairfax, Virginia, has established that over the course of 50 years, sperm concentration in this world has fallen by around 50%.

The current world population stands at 8 billion inhabitants and the UN predicts that by 2100 some 10.4 billion people will live on our planet. Worries about diminishing fertility rates seem under these predictions far-fetched. But the UN based their estimate on the hypothesis that current trends continue. This bold assumption does not sufficiently take into consideration that many countries show rapidly declining fertility rates.

There are many medical reasons that can create infertility of men or women or of both. I want here only to talk about average sperm (spermatozoa) count in male semen that has decreased from 99 million per milliliter in 1972 to 47 million per milliliter in 2011. A man today has only half the quantity of sperms that his grandfather had. This corresponds to an average annual decrease of 1% during this period. If the trend continues at the same speed, we will soon have a sperm count of less than 40 million, which seems to be an important threshold for fertility. At such levels, pregnancies might only be possible by assisted reproduction. Below 13 million, reproduction will become almost impossible.

Baba Vanga was a Bulgarian psychic and mystic, which some people call the 'Nostradamus of the Balkans'. She was blind, which looks like handicap for a clairvoyant. But blindness is a feature that allows a medium to look into the future without being distracted by what she is seeing in front of her eyes. She lived from 1911 to 1996. Her predictions, which she never made in writing, were mostly ambiguous and very often outright wrong like her prediction of a nuclear war during the years 2010 to 2014. Sometimes they were even right. But her often wrong or obscure verbal predictions, which listeners relayed, did not prevent

her to become famous – at least in eastern Europe. She said, for example in 1989: "*American brethren will fall after being attacked by the steel birds… and innocent blood will be gushing*". At the time of this statement, it was everybody's guess what kind of catastrophe she was talking about and when it would happen. It became clearer only in 2001 when terrorists brought the World Trade Center in New York down with two 'steel birds' that turned out to be two Boeing 767 jets. Some good-natured admirers of Baba Vanga gave her credit for having correctly predicted the event for which she had not even given a year when it would happen.

Baba Vanga predicted for the year 2023 that human reproduction will become an artificial process, which only doctors can perform in labs. She added in her prediction that the leader of a country will decide about the characteristics of a baby and that natural births will be forbidden. She was right that in-vitro fertilization became possible but she was wrong insofar as this happened already in the 1970's and she was totally wrong in predicting that IVF would be used to create government-designed babies and will replace natural conceptions. This Baba Vanga prediction for the year 2023 was not correct but it might come. If I were a firm admirer of Baba Vanga, I would interpret her prediction correctly to mean that IVF will become necessary because of severe fertility problems that human beings might develop some time in the future. Researchers have already established that more than 9% of Danish children are born with assisted reproductive technology or artificial insemination and that 20% of Danish boys will in future not be able to reproduce.

Hagai Levine of the Hebrew University of Jerusalem published in 2022 a study in which he established that sperm counts fell by more than 51% between 1973 and 2018 at an accelerating rate. The study concluded that mankind's survival is threatened if we don't manage to change this trend. "*Our human future will only be as healthy as our sperm*". This is how Nicholas Kristof, an American columnist and two-time Pulitzer Prize winner, put it in an article of the New York Times in 2017.

The reasons for the decline of sperm concentration are firstly lifestyle choices like smoking, alcohol, junk food and lack of exercises. Obesity, which has worldwide tripled since 1975, also seems to be a contributing factor. I even read in the internet that heated car seats or hot tubs contribute to a decline of sperm concentration. We can control these factors if there is the will to do so.

The reasons for fertility problems are secondly various chemicals that manufacturers use everywhere. Farmers use chemicals to fertilize and to control weeds and insects. Manufacturers widely use many other chemicals like anti-androgens when they produce plastic materials, bottles and boxes, cosmetics and coatings for Teflon pans, flame retardants or when they produce water-repellent clothes or food wrappings. Scientists don't know the details about the long-term effects of most of these chemicals, which accumulate in human skin and in animal tissue where these "forever chemicals" don't break down and don't disappear over time. While details are not yet clear, scientists have clearly linked some of these chemicals, for example flame repellants, to cancer, to reproductive problems and to the weakening of responses to vaccines.

Studies in the US have shown that men residing in agricultural states, where farmers use pesticides, had only half of the sperm counts than residents in other states. If nothing is done to reverse this development, men will become infertile and the survival of mankind will be more in danger than by global warming.

Vaccinations can have as a side-effect a negative impact on sperm concentration. Researchers from the Sackler Medical School in Tel Aviv have for example established, that after the use of Pfizer COVID-19 vaccine the sperm count had systematically gone down and rebounded but not to the original levels. This

example shows that side-effects can threaten health far outside the problems that medical interventions target.

Some developed countries report more deaths than births. South Korea is the champion in this respect followed by Japan. In 2022, South Korea recorded about 249,000 births but 372,800 deaths leaving a deficit of almost 124,000. South Korea's fertility rate fell in 2022 to a record low of 0.78, which is not even half the 2.1 needed to maintain the population.

Japan has recorded in the same year less than 800,000 births, which is the lowest number of births since 1899 when this country had started vital statistics. The number of Japanese residents shrank in 2022 by 800,523, which is the 14th consecutive year of annual contractions. The fertility rate in Japan is down to 1.3. The total fertility rate in OECD's 38 member countries is already close to this low level with overall only 1.5 children per woman in 2022. This less than half of what it used to be in 1960.

Infertility does not seem to be the only reason. People might continue to be able to reproduce. But people decide not to have children because of demanding work cultures, stagnating wages and rising costs of living and also rising disillusionment among younger generations. Negative population growth in countries like South Korea and Japan is not a biological fertility problem but a social problem that is even more difficult to fix than biological infertility. The government of South Korea has spent more than the equivalent of $200 billion USD over the past 16 years to encourage more people to have children, but all this was to no avail. In the opposite, women in South Korea started in 2016 a relatively strong crusade, which they call "4B Movement". The 4 B's stand for the Korean words bihon, bichulsan, biyeonae and bisekseu (비혼, 비출산, 비연대, 비식수), which translates to 'no marriage, no childbirth, no dating and no sex with men'. The movement is the response of women to a brutal murder of a woman in 2016 near a subway station in Seoul. The killer said that he committed the crime because he felt ignored by women. It does not look healthy for mankind's survival that the members of the 4B Movement have resolutely decided to do without men.

The Institute of Family Studies (IFS) has in the latest National Survey of Family Growth (NSFG) established that sexlessness skyrocketed in the US during the survey periods 2017-19 and 2022-23 with increasing trends. The surveys focused on respondents between 22 to 34 years because at that age people traditionally get married and start families.

Cryonics and Life after Death

While some medical scientists work on methods and means to extend the duration of life, others work on a technology of preserving life after death. Some service providers use the technology of cryonics, as it is called. They cryopreserve the dead body, which they deep-freeze to minus 196° Celsius in liquid nitrogen while they replace blood with a mixture of chemicals that is similar to what doctors use to freeze eggs in fertility treatments. Cryonics service providers don't talk about death. They prefer calling it 'de-animation' and keep the body in 'long-term care'. They exploit the desperate hope of their clients that future generations will have the technology to re-animate the frozen bodies and that medicine advances to a level where it can cure the health problems from which a person died..

Some modern scientists produce hope in this respect. They have created a new branch of science that they call 'Resurrection Biology'. They try to bring strings of molecules and more complex organisms back to life after they had been frozen in Siberia's permafrost for thousands of years. Their primary long-term goal is to de-extinct or rather resurrect animals and plants that got extinct in the past. It might in future be possible to bring extinct animals like the Tasmanian tiger and the Dodo, a bird in Mauritius extinct in the 17th century, back to life by rebuilding the genome of the extinct animal. A company called 'Colossal

Biosciences' in Dallas is working hard to resurrect the woolly mammoth, that had disappeared 4,000 years ago. Fossils contained DNA that scientists have recovered. Scientists at the Dallas company hope that they will be able to genetically engineer an animal that will fully look like the extinct woolly mammoth and will have all features of the extinct species. The scientists have already taken stem cells from a living Asian elephant which is genetically the closest to the extinct mammoth. They then plan to edit some 69 elements of the stem cells' DNA to give them the same genetic traits as the DNA of the wooly mammoth. In a final step, they will use these edited cells to produce eggs, sperm and eventually an embryo that they plan to implant into an artificial womb that scientists have successfully tested with animals. An artificial womb is a flexible container filled with lab-made amniotic fluid, which creates an environment like in the uterus. This project will actually not de-extinct the wooly mammoth or the Tasmanian tiger. It is actually genetic engineering that transforms the genes of an existing animal with features close to the extinct animal into a new animal that has the traits of the extinct animal. Colossal Biosciences have already experimented the use of genes from the extinct mammoth on mice by editing 10 genes related to hair length, thickness, texture, color and body fat.

By editing the mouse's genes, they created a wooly mouse shown on the left-hand side and they hope that they can make the same changes to an Asian elephant who will then look like the woolly mammoth.

Who knows? Scientists in the medium-term future might be able to give us back the fur of the Neanderthal. They might also be able re-build a human body from the deceased person's frozen stem cells.

To get back to cryonics, there is at this time no hope that any scientist will soon become able to restore the frozen body of a human being to its previous glory. Instead, the service providers and their guinea pigs speculate that the brain, including its memory, will remain sufficiently intact so that future scientists can install the brain in a robot or in a freshly cloned body. The machine or the new entity will have the same personality as the deceased person. This, they optimistically hope, might be possible in 50 to 100 years, which means that the frozen bodies have to wait that long. Nobody can forecast how long the de-frozen brain will remain alive after its installation in a robot or in a cloned body. Nobody knows how long the revived brain can animate the new entity with the same personality that the deceased person had. The cryonics service providers have not yet worked out all other detail, for example how the de-frozen brain copes with the fact that it cannot feel any limbs. Alternatively, the new entity might be able to control artificial limbs with a 'brain-computer interface' (BCI) that doctors in 50 to 100 years will have to implant in the de-frozen brain. It is also not clear how the brain can receive the nutrients that it needs. But an artificial heart that the robot carries as a head gear or in a knapsack will probably pump oxygenated blood into the brain.

Many critics obviously condemn cryonics as a delusional, pseudo-scientific quackery and compare it sarcastically with the attempt to turn a hamburger back into a cow. However, there are some little pieces of evidence that frozen body parts can be re-used. Scientists of the University of Minnesota have apparently de-frozen a rat kidney that they have then successfully transplanted into a live rat. We find also reports that scientists have re-animated roundworms that were frozen for 46,000 years in the Siberian permafrost. But it will be a long way until a dead human body can be frozen without damage and be brought back to life after 100 years. It is also not clear, in which condition a resurrected brain will be after it had gone through the two possibly damaging processes of freezing and unfreezing. The entire content of the brain's memory will most likely have disappeared because content of memory needs a living and active brain with functioning synapses that regularly refresh the memory.

Finally, lets assume that the cryonics service still exists in 100 years and manages to re-animate the frozen person successfully, how would the person cope with a world that has changed beyond recognition?

A couple of companies– mostly in the US – which offer cryonics services, have already found some 500 customers whose dead bodies they have frozen. An additional 1,500 people have reportedly signed up for the services. I understand that a burial insurance covers the costs, which is one incentive. Another motive might be that it is a nicer feeling to see one's body preserved instead of being cremated to ashes or to be given as food for worms under the grass of a cemetery. The motive of preserving the body after death was probably the reason why Pharaohs and other VIPs preferred to be embalmed or be preserved with vinegar, honey or alcohol. The body of the British admiral Lord Nelson returned in 1805 from Trafalgar to England in a cask of brandy. Being buried in a cask of Whisky has probably more appeal for a lover of this drink than being placed in liquid nitrogen even if nitrogen lasts longer. At this occasion I might mention that it was quite common practice in ancient Rome to mix white wine and human remains in funerary urns to make the deceased's transition into the Beyond more enjoyable.

When believers in afterlife have their body frozen until resurrection many years later, they face the question if the afterlife starts at the moment when the body is frozen or if the afterlife has to wait until the de-frozen brain eventually ends to function. In the first case, the dead person will have a double life when the brain is unfrozen. He will live in parallel with his surviving soul unless the soul returns into the de-frozen brain.

Roald Dahl, the British-Norwegian novelist whom I have mentioned already is an imaginative writer. He described in his short story 'William and Mary' a procedure that seems to make more sense than cryonics because you don't have to wait 50 to 100 years before you regain your body. Roald Dahl explains the scientifically not yet proven fact that the brain does not need to be attached to the rest of the body in order to remain alive. The only condition for its survival is that a special artificial heart provides the brain with a constant supply of properly oxygenated blood with the right pressure and in the required quantities. If doctors carefully remove the brain from the skull within minutes after death, they can keep it alive and the brain can function indefinitely as an independent living entity. The doctor can also keep one eye operational as the only sensory organ. The only condition is that the eyeball remains firmly attached to the brain. After such surgery, the doctor will store the dead person's brain in a basin of a special shape and will float it in Ringer's Solution, a special fluid used for irrigation in neurosurgery. In this container the brain allows the otherwise dead person to continue a conscious life as before, though without limbs and without the ability to talk and to listen. But he will be able to watch his environment and read books since one eyeball is still connected with the brain. The eye has no muscles and cannot move. Therefore, a caring friend has to move a book or the newspaper left and right and up and down in front of the eyeball. If scientists build a device that can read brain waves it will allow some form of communications between the brain and people around it.

This situation that Roald Dahl describes in all details, is the starting point of his short story. John Landy, a neuroscientist, convinced William Pearl, his friend, to agree that his brain would be kept alive after his death. William at that time was about to die from an incurable pancreas cancer. William, who does not believe in afterlife, agreed with his friend's proposal because a surviving brain, as he hoped, is better than a dead body that is totally burnt to ashes. He expected to continue thinking after his death about all the interesting issues that he liked in his life. He also hoped to be able to read interesting literature and other things that his friend John would place in front of his eye. But William had, as we say in a German proverb, drawn up the bill in the absence of the innkeeper (die Rechnung ohne den Wirt machen). Mary, William's heir and revengeful wife, did not leave her husband's brain with John Landy but took the basin with her

husband's brain and eyes to her home. She placed it in a position, from where William's eye could see that she did ostentatiously all the things that her husband had always authoritatively forbidden her to do like smoking cigarettes. While defying the usual instructions of her husband who was unable to react, she whispered: "*Don't look so cross. Because from now on, my pet, you're going just to do exactly what Mary tells you. Don't be a naughty boy again, will you my precious. Naughty boys are liable to get punished nowadays. You ought to know that*".

This story shows once more that technical progress that we achieve, does not only bring benefits but can backfire on us.

Developments of ICT

Historians talk about industrial revolutions when technology significantly progresses and changes the economy and the social landscape. The first industrial revolution happened mostly in Great Britain from the mid-18th century to about 1830. This was the time when factories replaced much manual work with machines. Steam-powered machines started to dominate production processes. This was also the time when the English mathematician and inventor Charles Babbage built a steam-powered calculating machine that he called 'Difference Engine'. It used variables and solved complex mathematical problems by mechanizing a series of calculations, powered by steam.

The second industrial revolution happened from the mid-19th century until the early 20th century. Mass production and modern manufacturing methods developed and spread from the British Isles to Europe and to other regions in our world.

The third industrial revolution, which we also call the digital revolution started in the middle of the 20th century and saw the appearance of Information and communications technology (ICT).

ICT has made fantastic progress since the beginning when the first programmable electric computers showed up. This was the time when I was born. Nobody had predicted the speed and scope of ICT development. The Colossus computer in the UK was one of the first computers which the operators programmed with switches and plugs. The needs of the military motivated its development during the 2nd World War. The British wanted, for example, to decrypt messages of the German Wehrmacht or to calculate values for artillery range tables. Military needs are often the driving force for technical developments. In the US, it was in 1946 the ENIAC, (Electronic Numerical Integrator and Computer) that the military commissioned. ENIAC with a weight of 30 tons was 15-by-9-meters big and had 17,000 vacuum tubes, 70,000 resistors, 10,000 capacitors and 6,000 switches. To put ENIAC's performance into perspective, a modern smart phone handles 2.5 million floating point operations (FLOPS) per second, which is much more than ENIAC did. The huge machine used plugboards to give instructions to the machine. It took several days to change these instructions every time the computer had to master a new task. Keyboards came much later.

The development of computers for more general use was lightening fast during the next eighty years. This fascinating development of ICT made it worthwhile having lived during the eighty years after the 2nd World War. I have experienced many exciting moments during these decades thanks to surprising developments of ICT.

ICT became during these decades an important enabler for progress in science, in cars, in airplanes and in almost all areas of technology and in daily life. ICT and the internet also allowed companies to advertise their goods and services to millions of potential customers and to built huge client bases. Paytm, a digital payments company in India for example, attracted more than 300 million-customers in no time. PayPal, which Elon Musk co-founded, offers similar services and had 431 million users in 2023. Facebook had 2.4

billion users worldwide in 2022. I regularly use WeChat, which they call wēixìn (微信) in China. WeChat processes some 45 billion messages every day.

The main characteristics of ICT developments were a dramatic increase of computing power and a remarkable decrease of the sizes and costs of computers and other ICT devices. An area remarkable in ICT development is world-wide connectivity whereby wireless connections have replaced most cables. '*We are all now connected by the Internet, like neurons in a giant brain*'. This is how Stephen Hawking put it without mentioning that ICT creates not only connections between people but also connections and mutual interactions between humans and machines and between machines. We now have not only an internet for persons but also an Internet of Things (IoT), in which motion sensors and similar devices collect and process data and send the information to other devices, which respond to this without human intervention. A car is an example of an area, where IoT is very active. Software, controllers and sensors control almost everything in a vehicle like suspension, steering, tire pressure, propulsion and braking. When I was a boy, the only electrical things in a car were spark plugs and light bulbs. Diesel engines don't even use spark plugs. A radio in a car was a novelty luxury in the early 1950's in Germany.


Motorola DynaTAC

Motorola introduced in 1983 the first commercially available mobile phone, the Motorola DynaTAC 8000X. It weighed 790 grams and cost $3,995, which is $11,500 USD in today's value. It was not yet digital but relied on Rogers Wireless analog service which discontinued in 2007. Its battery took 10 hours to charge and allowed 30 minutes of talk-time on a single charge. Mainly "yuppies" with well-paid jobs in the stock market or in the advertising industry used these phones in London and in New York to show off with their wealth.

I started using a mobile phone, a Nokia, in 1999. It was not yet smart and allowed only to make phone calls and to read the time of the day.

In the 2010's computers started using artificial intelligence (AI) that has recently become a ubiquitous subject for vivid public discussions. I talk about AI later. ICT is now an acronym for 'Intelligent Computer Technology', which many people now see as the fourth industrial revolution (4IR), which they also call Industrial Revolution version 4.0.

If we look at all astonishing applications that ICT has made possible, I would say that ICT is the most important development of mankind. Inventions with similar far-reaching implications for humans were some 350,000 years ago the technique how to control fire and some 5,500 years ago the invention of the wheel. The overwhelming importance of ICT is its usefulness in almost all areas of today's life. We now depend heavily on ICT. If main functions of ICT fail for lack of chips or through terrorist attacks or for other reasons, our lives would come to a sudden standstill. It would be as dramatic as it would be if, all of a sudden, the invention of the wheel disappeared.

If, for example, GPS or the internet fail to function because of geomagnetic storms or because of terrorist attacks, we will experience very nasty consequences. GPS and the internet are only two of many functions that make modern life possible. Daily life depends heavily on these. We do not seem to have fallback solutions in the event that ICT fails and lack of it will cause a cardiac arrest of mankind.

While the development of technology, which is the 'T' of ICT, has advanced with breath-taking speed, I have the impression that the human mind has not kept pace with the boundless possibilities that ICT has created. In the areas of ethics and education, we are still caught in traditional ways of thinking. In the light of tremendous opportunities and risks of ICT, we also have to re-visit traditional social institutions like democracy and journalism. Our minds are not yet appropriately tuned to the incredible power of ICT. Outdated behavioral standards still dominate our minds. Legislators hopelessly limp behind the frontier

of fast technological developments. The fourth industrial revolution will have to be complemented with a corresponding revolution of the human mind. But I fear that by the time when human minds have finally adapted to the fourth industrial revolution, they will face a fifth revolution and will again limp behind new realities.

Education systems, for example, have not yet fully implemented the possibilities that ICT provides to improve learning. E-books have only partly replaced paper books and interactive digital displays have not entirely replaced blackboards and whiteboards. The use of mobile phones by students in the classroom still remains an unsolved contentious issue. On one side of the diverging opinions is the demand to ban smart phones in schools. This is what some countries like France, Australia and Singapore have done to avoid distraction of students by mobile phones. On the other side are people who highlight the educational benefits that a proper use of mobile phones can provide.

The mobile phone has become what the holy cow is in Hindu countries. It has absolute priority. When the phone rings, people interrupt whatever they are doing and answer the phone call to start lengthy conversations. Many people see the unobstructed use of mobile phones as a fundamental human right, including for students.

The education system can integrate some functions of mobile phones into the learning process but uncontrolled and spontaneous chats in social networks will disturb this process. Education systems have not yet realized that ICT might have made classrooms redundant. The use of ICT in education requires anyway new job descriptions, different training for teachers and entirely new work plans. Teachers will no longer measure educational progress by the length of time that a student spends in a classroom. Instead, applications for interactive learning will measure this progress individually for every student. Fast learners will advance fast on the educational pathway while others can take the time that they need.

Finally, to stick with the issue of ICT in education, it will probably be possible to transfer education experience of children and of adults from a classroom environment to the virtual reality of a Metaverse. I am sure that our descendants in 100 years will not use the word ‘school’ to refer to a building with classrooms but will have a totally different meaning. Our descendants might use this word to describe a nonsensical learning concept of what they will call the educational stone age.

Our democracy, to give another example, has not yet responded to dangers coming from abuses of ICT. Governments have not yet developed methods of protecting their citizens from mass dissemination of fake news and of conspiracy theories. This and other abuses of communications technology have already shown unpleasant consequences by splitting society into opposing camps. And this will get worse in the near and medium-term if we don’t reform democracy and adjust it to the new powers that ICT has created and continues to amplify at high speed.

Floppy disks, developed in 1971 to store and to transfer data between computers, were important at the beginning of personal computing. They do not exist anymore. Younger people do not even know that they existed. Some time ago I discovered an external floppy disk drive in a drawer at home. I went to a store and wanted to buy some floppy disks to give the disk drive a new life, but the young salesperson did not know what I was talking about.

We used drive letters ‘A’ and ‘B’ for floppy disks in computers but this is now history.


5.25-inch Floppy Disk

Future generations who do not remember that the drive letters 'A' and 'B' were reserved for floppy drives, might think that they remain unused for superstitious reasons. The first type of floppy disks had 5.25 inches diameter for a capacity of up to 1.2 Mb. We called them 'floppies' for short. They were flexible and deserved the attribute 'floppy'.

3.5-inch Floppy Disk

The next generation of disks had 3.5 inches in diameter for a capacity of up to 2 Mb. They were encased in a stiff plastic envelope. We still called them floppies but South Africans called them 'stiffies'. This gave in my male-dominated office in Pretoria rise to the inappropriate question "Do you have a stiffy?" and the answer was regularly "No, mine is a floppy"

Internet has revolutionized banking during the last few decades. To make money transfers forty years ago I had to fill in a form with three carbon copies that I had to send by snail mail or had to drop off physically at a brick-and-mortar bank where office staff processed these transactions manually. These money transfer forms are a thing of the past. I coincidentally wonder how people paid in previous centuries when they had to pay over long distance and could not pay physically with coins or commodities. I assume that only merchants, banks and the rich people used bills of exchange and letters of credit. Others had to transport heavy coins or precious metals. People in the Indo-Pacific used in ancient times cowry shells as money. But bartering commodities was probably the most common way of paying.

To know the balance of a bank account you had in the last century to wait until a bank statement arrived in the mail or you had to visit the bank. I remember that we had to send in the 1970's every day an apprentice of our office to the bank to pick up the previous day's bank statements. The bookkeeper then copied the numbers by hand from the statement into a big book that we kept for accounting. Monthly financial statements always included an item 'Transactions not yet processed'. Today, computers process all bank transactions instantaneously and the online bank statement shows money transfers immediately.

While visits to the bank are still necessary in China and in other countries for certain transactions, this is mostly no longer required. I have active accounts with banks, where I have not set my foot for more than 25 years. ATMs made many bank branches redundant. Bank branches for the public might entirely disappear.

Signatures in legal documents were the only proof that a party agreed with its content. Signatures had to be in black ink. In the early 1990's a company in Australia had sent me a contract by email to Fiji and requested that I print the document and sign it with black ink. To save time they suggested that I could scan the signed document and fax it back instead of sending it back by air mail. They rejected at that time my suggestion that I could insert into the digital document the picture of my signature. I argued that the scanned and faxed signature was practically a digital signature as well. Today, most companies and government agencies accept digital signatures that they sometimes verify with a computer application. Emails can now be legally binding documents. The Court of King's Bench in Saskatchewan, Canada has recently ruled that a thumbs-up Emoji (👍) is enough to make a contract legally binding. This is actually not a deviation from existing law because any word or gesture that people commonly take as an agreement, is sufficient unless a contract requires a specific written form. In some cultures, in Europe for example, it was customary in the past that the purchaser of livestock in a cattle market spit into the air to formalize his purchase of an animal.

Immigrants like me had to recite in a group with others the Canadian citizenship oath in a solemn ceremony in a room that they had decorated with fresh flowers. The citizenship judge then handed over

the certificate of Canadian Nationality with a handshake and his best wishes. This procedure is now computerized. Immigrants, instead of reciting the oath, may soon be able to tick an online checkbox in the internet. This is how unemotional ICT can be.

Airline tickets do no longer exist. We can delete the word 'airline ticket' from our vocabulary. There is no longer the need to go to a travel agent. We now book flights and select seats in airplanes or in trains in the internet while sitting comfortably at home. All data that airlines use for check-in and for changes of an itinerary is accessible online world-wide. I remember that you had to present your airline ticket to a travel agent to make changes to your itinerary. The travel agent entirely relied on the data that was printed on the ticket; the travel agent had no interactive access to the airline's computer. Boarding passes will in future also no longer exist, which will be for sentimental collectors of souvenirs a big disappointment. When I sent in the past an invoice for a mission that included air travel, I had to include the original of a boarding pass as evidence that I had travelled. This is for sure history now.

Visas for the visit of countries will no longer be printed or glued into the passports. I still have the passport of a great-great-great aunt who travelled to Paris to work as a nanny in the 19th century. It was a letter by the grand duchy of Hesse issued 'to whom it may concern'. The document in the size of A3, was a template filled in by beautiful hand-writing. The grand duke asked the reader of his document to accommodate the needs of the passport holder and to protect his subject while travelling in a foreign country. In reminiscence of this ancient purpose of a passport, the Canadian passport still contains on its first page the request by Her Majesty the Queen (now the King) to '*whom it may concern, to allow the bearer to pass freely, without delay or hindrance and to afford the bearer with assistance and protection as may be necessary*'. The passport of France, which is now a purely republican country, obviously does not contain a similar request by the Président de la République.

Countries like Australia already have abandoned the old-fashioned practice of stamping visas in a passport or to glue the visa into it. They now grant and check visas exclusively in computers. Most countries already allow visa applications online but still glue a paper visa into your passport upon arrival. Eventually, passports and ID cards will disappear because biodata in government databases are checked against your identity that the computer reads from your face, from your eyes, from fingerprints or from the palm of your hand, which is apparently more precise than fingerprints. Customers can in many stores in China pay with the scan of their palms.

Telephone operators were up to the late 1960's busy to connect manually the two parties of a phone call. They enabled the connections by connecting a cable with a plug for the destination of the recipient. When people took off the receiver from the cradle, all telephone conversations started with the greeting 'Hello Operator' and you then told the operator which number you wanted to reach.
The occupation of telephone operator does no longer exist.
Telephone recharge cards that we used to put credit in a mobile phone are also a thing of the past.


Telephone Operators

You do not have to buy any longer in the grocery store a recharge card and you don't have to enter into your phone the code that you have scratched off the card. Phones are now directly connected to bank accounts.

Democratic elections will in future be revolutionized. The introduction of electronic voting machines, which resemble ATMs, did away with hand-counting of paper ballots. The next step will be voting online

that does away with polling stations and allows voters to cast their ballots from the comfort of their homes. I have used this method for the first time for the 2024 parliamentary elections in France where I voted online while I was in China. The possession of a mobile phone is in this process essential because the government sends verification codes by SMS. A few years earlier I had to travel to the French Consulate in Guangzhou to vote in the elections of the president.

We have not yet seen the end of ICT developments, which might go in positive and in negative directions. I have no idea how far new developments will go. Massive ICT power is available for sincere and law-abiding users but equally also for crooks and criminals. We do not yet seem to fully understand the implications of further ICT developments on the education of the minds of young people and of criminals.

There will be in future much more data exchange and storage of personal data leading to a total loss of privacy. Some years ago, I had forgotten the password for an internet service – I think it was Gmail. The operator wanted to verify my identity and asked some personal questions. He asked me, for example, what I had lately paid with my credit card. The operator, who had all information on the monitor in front of him, confirmed the correctness of my answer when I said that I had used my credit card to buy an airline ticket online. "Yes, you travelled to Vancouver", he confirmed. The operator had the entire history of my payments and other personal information in front of him.

Someone who uses larger amounts of cash in bank notes is nowadays suspicious because he gives the impression that he wants to hide the irregular origin of his money. This was much different 20 years ago. I remember that I had to make in the early 2000's in Changchun, China, a transfer of 70,000 RMB from one bank to another. The bank teller in the first bank put 700 banknotes of 100-RMB each in a black plastic bag and called a police officer who accompanied me across the street to the second bank to prevent a possible robbery. The teller in the receiving bank then used a counting machine before he deposited the money into an account. The highest amount of a banknote in China is still 100 RMB, which is not even $14 USD.

Paper money and coins will in future anyway be a thing of the past. During the last five years in China, I have not touched any coins or bank notes. I did all purchases in vending machines and in shops and restaurants with my mobile phone, which I also was able to use for payments in public buses and in government offices. Given these new practices, automatic teller machines (ATMs) will disappear. Previously I used an ATM every week to withdraw with my credit card cash that I needed. But I did during the last five years not withdraw any cash from any of these machines and also did generally not use my credit card in shops. ATMs are examples of devices that appeared as sensational developments when I was approximately 30 years old. They are now already outdated.

Other examples for exciting novelties are desktop computers, which we also call personal computers (PCs) and laptop computers.

IBM Desktop, 1981

Desktop computers came to the consumer market in the 1980's as bulky and heavy devices and are already outdated. We called the first portable computers 'Laptops' because the first models were so heavy that you had to use them on your lap.

Osborne 1, Laptop 1981

Computer monitors were at the beginning as heavy and bulky as the computers themselves. We now use flatscreen monitors, into which the computer is integrated. Therefore, most desk-top computers nowadays consist only of a flat screen and a keyboard.

With the introduction of e-payments by mobile phone, the big brother knows already today all details of your consumer habits and of your personal profile. Sales slips are no longer necessary if you want to return a purchase to the supermarket. You just let the salesperson scan your QR code and he will find the purchase on his computer screen.

Manufacturers of consumer goods obviously also know the profile of their customers and their habits and can adjust their production and their advertisements accordingly.

The next step in future could be that people receive a warning saying "You have purchased 4 cans of beer every day last week. You should be careful not to drink too much". The municipal government of Hangzhou has already planned to collect from mobile phones data that is relevant for establishing the health status of every person. A QR code of your mobile phone displays in green color if you are healthy, in red color if you are a confirmed or suspected patient and in yellow color if you have been in contact with a patient. The Chinese government had developed such a system during the COVID-19 pandemic specifically to show in green color that a person had a COVID test with negative result done during the previous three days. The QR code showed red color if the test was positive or overdue and showed yellow color if the person was in contact with a virus-infected person. A security guard at the entrance of an office or of a supermarket denied access if your QR code showed the wrong color or if you had forgotten to take your mobile phone along. But you will always take your phone with you because you need it to pay at the check-out counter.

A new idea, once it is successful, often gives birth to more far-reaching additional ideas. Development never stops. The municipal government of Hangzhou devised the plan to keep the COVID tracking system alive after the pandemic had ended. They now plan a general health tracking system that uses a vast source of private data to calculate for every person the health status on a scale from 1 (sick) to 100 (healthy). Drinking more than 200 ml of spirits a day, for example, gives 2.5 demerit points while daily exercise of at least 20 minutes adds 4 merit points. The people who work on the implementation of the plan have still to figure out how they can collect all relevant additional data beyond what the mobile phone and internet traffic already reveal.

The municipal government in Beijing tests an application that goes one leap forward by using petabytes of private data from government agencies and from other sources to calculate for every person on a five-point scale his social standing. You can earn social credits, for example, by volunteering for social work and you will receive demerit points if your name shows up in police records or if you smoked in a subway or you spread false information about terrorism. If a person has accumulated a certain number of social demerit points, he might no longer be able to book a flight or to by a ticket for the subway with his mobile phone. He might not have access to certain social services. Once the system is fully developed, a police officer will no longer ask to see your ID card but will scan the QR code of your mobile phone or will scan the palm of your hand if governments have developed a biometric system for palm scanning. The officer then sees all information about you that he might not even need. Chinese people who hear about the social ranking or scoring system, express some concerns about intrusion of privacy but they do this less frequently and less violently than their western counterparts would do. However, insurance companies, delivery services, some restaurants and other businesses in western countries already collect information about the behavior of customers. They use this information, for example, to calculate insurance premiums or consumer prices that the computer adjusts to the profile of a specific customer. A

supermarket might in the near future also use the information in conjunction with face recognition devices to prevent a customer to enter the store if he has a track record as a shoplifter.

Most websites of e-commerce today use so-called recommender systems, that they power with so-called machine-learning techniques. The systems establish from a huge amount of data, which they collect from various sources, the profile of each individual visitor of a website. We can call this data colonialism because we can compare the systematic collection and exploitation of information about individuals with the exploitation of resources by colonial powers from their colonies.

The seller of goods and services use the website visitor's profile that they established with the collected data to display for the visitor of the website things that people with similar profiles searched and bought previously and which the user of the website will probably also like and purchase.

Researchers in China and elsewhere currently attempt to develop devices that can red the minds of people. They are not using physiognomy or phrenology of the 19th century that tried to detect criminal inclinations by interpreting certain bumps or shapes of a person's scull. China does apparently also not work on the development of a hand-held device like a mind reader that extracts a person's current thoughts wireless from the brain. No, the Chinese are smarter. They collect systematically voluminous data about individual people and their activities. They have information about all phone calls. They know where a person went and what a person bought paying by smartphone. Government and marketing agencies know which websites you visited and for which keywords you searched. They also have access to the messages that you wrote in social networks and elsewhere. Powerful computers – possibly quantum computers - use artificial intelligence to analyze all data and to identify attitudes, mentalities and ambitions. The computer can then not only know a person's profile or thoughts but can also predict future behavior of a person similar to a weather forecast that predicts a thunderstorm for tomorrow afternoon after they had observed and analyzed movements of clouds, changes of temperature, humidity and wind speed.

Based on your past conduct and on recurring patterns of behavior, a central computer in future will know your thoughts before you become aware of them. The big brother will know what your decisions will be before you become aware of the decision that your brain develops.

A mighty computer can also scan the totality of messages in all social networks and can analyze the data to forecast developments in society similar to the weatherman who bases his forecasts on data that is collected in the entire world about temperatures, humidity, wind speeds etc. If Louis XVI, the king of France, had been able to use such a computer, he might have detected dissatisfaction of his subjects and might have avoided – or delayed - the French Revolution by delicately injecting ideas and fake news into the social media to alleviate people's anger and frustration. Instead, he listened to his arrogant Austrian wife Marie-Antoinette and to other out of touch advisors. As a result, he died under the guillotine on 21 January, 1793 as 'Citizen Capet' as the National Convention named him disrespectfully.

The US Commerce Department criticized in 2021 the Chinese Academy of Military Medical Sciences. They accused China of using biotechnology to develop tools for mind control and "brain-control weaponry" by which they want to control their military and their people. Such tools go beyond knowing what people are thinking. They can not only anticipate what people are planning to do but can influence such plans not with drugs but with ICT. Computers will then be able to directly influence and change people's minds and decisions. I don't know if the US have the right to criticize China for doing such research because I am sure that the US also work on such technology but keep it secret. The Central Intelligence Agency (CIA) in the US had actually between 1953 and 1973 conducted a highly clandestine human experimentation

program codenamed 'Project MK-Ultra'. The purpose of these experiments was to develop methods to manipulate and control and change the minds of people.

Computers don't use any longer rumbling and turning hard disks, as older people remember them. Computers now use solid state drives (SSDs). They are like flash memory sticks that have no longer moving parts. The next step will be the development of computer memory made from biocompatible and biodegradable substances that make costly recycling of conventional e-waste redundant. This waste increases considerably. A study has calculated that generative AI applications alone might produce between 1.2 million to 5 million metric tons of this hazardous trash by the year 2030 depending on how fast AI apps grow.

Computer memory might in future no longer be silicon-based as they were built starting in the 1950's. Computer memory might instead consist of the same biological substances and structures as the hippocampus, which is the region of the brain that functions as a person's long-term memory. Researchers have already started to culture lab-grown human cells, called brain organoids, for use in future biocomputers. They might take an elephant's brain as a model because thanks to a highly developed hippocampus and cerebral cortex, elephants have an extraordinary long-term memory. Some people even say that pachyderms never forget anything, which is a popular exaggeration. But brains of elephants might be a good model for the development of biological memory in computers.

Manufacturers of biohybrid robots use biological material such as cardiac muscle tissue in their machines to propel them. They solved the problems of steerability by incorporating motor neurons and wireless devices to control the robot's speed and direction of movements. They proudly say that they had created a "*steerable biohybrid robot with a nervous system*"

Future computers will similarly use biological live molecules like neurons that researchers take from human skin. One challenge is to make these neurons live longer than the current 100 days. The other challenge is to create the electrical and chemical prompts that the organoids understand to change their activity in the way we want them to act.

The structures made from such biological material are far less energy-hungry then silicon-based computers. They will one day go beyond artificial intelligence (AI). It is 'organoid intelligence' (OI) or 'biological intelligence' with a capacity closer to that of the human brain. Unlike the IT people who use the mathematical logic of causes and effects for the creation of AI, developers of biocomputers look at the processes that biology uses in our brains and in other parts of the body. These biological processes are inventive and clever when they keep our bodies in good shape. The developers of biocomputers hope that they can emulate these processes in machines that they want to build from lab-grown human cells as the biological hardware. Key elements in the lab-grown cultures are the neurons that are able to form many connections and can perform brain-like functions. In addition, biocomputers with organoid intelligence (OI) will need only a small fraction of energy that classic computers consume.

There is still a long way ahead of us before the first biocomputers will become fully operational. The first challenge is to upscale the brain organoids from the current size of 50,000 cells to the required size of at least 10 million cells. The second challenge is the development of an interface that allows communicating with an organoid by sending data and queries and receiving the results of the organoid's work. Scientists, who want to attract funding, express optimism. Thomas Hartung, the leader of a research team at Johns Hopkins University in Maryland predicted that biocomputers will become reality in a couple of decades. If this prediction is correct, it will be interesting to see how quantum computers, if they also come about,

compete against biocomputers. If these types of computers succeed, you will soon have to go to a museum to see a traditional computer.

The hippocampus, to change the subject, is located in the inner region of the temporal lobe and has the shape of a sea horse. It provides long-term memory and possesses a natural mechanism and substances that make memories resistant to forgetting. When a brain gets older it happens more or less often that you forget important things. ICT will in future avoid memory loss in a person's brain by providing a device that works as a 'refresh' button. Scientist have already established that they can electrically stimulate the connection between neurons in the brain, which we call synapses. This increases the "synaptic strength", which they believe is the key for the strength and reliability of memory.

Courts of law might in future make the use of such devices mandatory to refresh the memory of a witness. Instead of asking a witness to lay his hand on a Bible and to swear that he will tell the truth and nothing but the truth, the judge will point a device for 15 seconds at the witness's temple, which will refresh his memory and prevents him from withholding or misrepresenting the facts. Such a device could also invalidate the regular claim of politicians that they cannot remember having ever been involved in disastrous decisions of their governments.

Digital data might in future be stored inside strands of DNA (deoxyribonucleic acid) outside the brain. DNA is a complex organic molecule that carries extremely large amounts of genetic information in all cells of our body of which there are between 28 and 36 trillion in adult female and male bodies respectively. Nature stores this information in the tiny space of a single cell, of which thousands of different types exist. Scientists currently test DNA molecules as a storage medium. They use this storage facility to deposit huge amounts of information after they have translated digital data into DNA codes, which they call codons. One gram of DNA can store the incredible amount of 215 petabytes or 220,160 terabytes. The scientists place the molecules that they fill with data in a cool and well-regulated environment, where the data will survive hundreds of years. Researchers at Tianjin University were already successful in storing two pictures and a video in DNA strands. Scientist at the New York Genome Center used an algorithm called 'DNA fountain' to store two megabytes of data into 72,000 DNA strands and were able to retrieve these files again without errors as they claimed.

In addition to offering huge storage space for data, DNA has the advantage of not losing data as fast as magnetic storage devices do. One other huge advantage of DNA data storage is that data can easily be replicated by inserting the DNA in a bacterium that will then reproduce on its own the next generation of bacteria that have the same DNA, including the data stored in it.

While biochemical engineers have used DNA with some success for data storage, it will take some more decades to solve many challenges before DNA storage is available and affordable for use by everybody. The New York Genome Center spent some $7,000 USD to synthesize two megabytes of data and another $2000 to read it again. But I predict that the costs will considerably come down. Individuals will not use such hyper-modern data storage machines directly. Cloud computing will be the standard and individuals will use only dummy terminals that are connected via internet to central computers that store and process all data and run all software. The terminals of the users do not need significant memory and next to no computing power.

Some new ICT devices allow a paralyzed person to operate robotic limbs or any neural protheses with commands that he issues with his thoughts. We call them Brain-Computer Interfaces (BCIs) or Brain-machine interfaces (BMIs). These devices decode neural activities in the brain and translate them into commands for the neural prothesis. This is some basic form of mind reading. Noland Arbaugh, a

quadriplegic 30 years old Arizona man who is paralyzed from the neck down since 2016, received as a guinea pig in 2024 a BCI, which a robot had implanted into the brain's motion-controlling motor cortex. He can now use his mind to browse the Web, send text messages, use social media and – thankfully – can also play video games. Elon Musk's company Neuralink had in 2023 received approval for its first clinical trials with humans, which trials the company expects to last for six years.

A consortium, called BrainGate in Providence, Rhode Island, implanted four 3-by-3-millimeter arrays of electrodes in the brain of Casey Harrell. This 45 years old man had lost the ability to speak due to amyotrophic lateral sclerosis (ALS). The electrodes pick up impulses of neurons in the brain that are responsible for articulating sounds of words. The BCI device then translates these impulses into synthetic speech with an astonishing accuracy of 97%. These BCIs are not mind readers. They just capture words and phrases that a person has decided to pronounce but not the process by which the brain produces an idea or a sentence.

On the path of further developments will probably be the attempt to make the BCI a two-ways tool that cannot only read the person's intention but can also influence these intentions. One step in this direction is the use of bionics for artificial limbs. Bionics is the science that will create artificial devices that emulate intelligent parts of a living body. These protheses not only accept instructions from the BCI but are able to give the BCI feedback information similar to the information that a living limb provides so that the brain can develop appropriate responses.

Some visionaries don't only want to use BCIs for paralyzed persons to communicate with computers. They think that able-bodied people can use BCIs to communicate with computers faster than with the slow speed of speaking and writing. But scientists have found out that the brain produces its thoughts and other outputs at the relatively low speed of around 10 bits per second while our senses like sight, smell and sound operate much faster. BCI cannot increase the speed of a brain's output. It can only forward the brain's outputs without the intermediaries of words and gestures.

Common are today noninvasive BCIs that read the person's instructions from the scalp. They are like electroencephalographic (EEG) devices. I expect more performant BCIs to come onto the market in future. Chips implanted into the brain will allow a paralyzed person to generate more sophisticated movements of a neural prothesis.

Scientists have already tested mind-decoding technologies successfully with monkeys. They have also tested non-invasive BCIs for the control of a computer by the human brain. The test persons were able to move a cursor without using a mouse but using only their thoughts. Science and technology in this field are still at the beginning but I think that it will in the foreseeable future be possible to generate text from brain scans. People will use functional Magnetic Resonance Imaging (fMRI) or a chip that is implanted in the brain to control a computer. A totally paralyzed person, who cannot speak, will be able to send the brain waves of a speech to a BCI that functions like a microphone and makes the speech audible through a loudspeaker.

The military, as always, plan even further to make wars more deadly. They seriously think about developments that allow their soldiers to control the movements of a battle tank or of a fighter jet with their brains, which communications are faster and more reliable than the movements of the airplane's controls with the pilot's hands.

The idea behind BCIs is a two-ways affair. Let's take the example of a person, whose ears are no longer functional. It will then in future be possible that a BCI translates acoustic waves of a speaker into the

same brain waves that a functioning ear would produce and send to the brain. The deaf person will then be able to hear what is being said.

Computers will in future be able to wirelessly read and even control a person's brain. It might take a couple of decades or even a century until we can connect the brain with an external memory that will increase the capacity of the brain's memory. Scientists estimate that the brain can store information of the equivalent of some 2.5 petabytes, which are 2.5 million megabytes. But this is not sufficient because much of this memory is used for what we can call the operating system for regular body functions. We need to expand the portions of memory that we can access randomly, fast and reliably. An expansion of the brain's memory will be similar to a flash drive, which we use to increase the capacity of our notebook's hard disk. If this becomes possible, it will in all likelihood also be possible to transfer the content of a person's memory into another person's brain either in addition to the existing memory or by replacing it. This will be like synchronizing peoples' brains with the model brain of totalitarian regimes. The government can then copy the content of the government's model brain into the brains of all citizens who afterwards will all behave in a standard way that the ruler has defined. Totalitarian regimes will no longer have to build and to maintain re-education camps. A short session will suffice to re-program a citizen's brain. It might even become possible in a drive-through facility. The person who has undergone such a procedure will then receive a certificate similar to a vaccination pass. The credential will say "I am a certified standard citizen" with the possibility for the government to create different types of standard citizens: 'Type 'W' for workers, 'Type T' for teachers and 'Type S' for soldiers etc. Mental privacy will become a thing of the past.

Transfer of consciousness or of a person's mind will probably not be possible because unlike the memory, which has a physical location within the brain, scientists have not yet located in the brain a person's soul that probably does not even exist. Neuroscientists establish if a person is conscious not by the existence of a specific brain region or its shape but by the movements of impulses between certain brain regions. The mind or the soul therefore cannot be copied and pasted into another brain.

But this constraint does not exclude the technical possibility to stimulate the brain to influence the details of a person's mind as this is crudely possible now with drugs and chemicals. On behalf of the people who survive me, I warn that totalitarian governments and other criminals will abuse these future facilities. You will, however, not notice the manipulation and the government will probably include happiness and love for the ruler of your country in the manipulation.

Closer to the current level of technology are brain implants that read certain basic brain activities. If the chip discovers that the brain has cognitive difficulties, it applies small electrical impulses to boost the cognitive performance by stimulating the brain region that is involved. You can compare this device with an electric bike that activates its electric engine automatically if the computer chip senses that the person riding the bike is tired and has difficulties pedaling. A brain implant, once developed to perfection, can improve brain performance much more precisely than nutritional complements or chemical stimulants.

Researchers have detected an alternate method to stimulate the brain. They target the deep-brain area called the default mode network (DMN) and expose this area with low-intensity ultrasound waves. As a result, the person that they had treated this way was more relaxed and became able to focus better on mental tasks without a wandering mind.

I remember that my mother gave me confectioner's sugar before I had to take an exam at school. She knew as we all know that sugar improves the brain's functions. But electric impulses can achieve better results more precisely by stimulating a specific area of the brain.

The brain is not the only controller of body functions. Many organs have their own control mechanisms that regulate their operations. The heart, for example, regulates its beats autonomously. If this function becomes deficient, doctors implant artificial pacemakers into the heart that restore the proper control of the heartbeat. In the next decades, many more of such devices will come on stream.

Progress through ICT in Medicine and Health Care

I predict that ICT will continue revolutionizing our health care system in the near future. Many more people will, for example, wear biosensors and smart watches that collect health data continuously and send such data to central computers. These computers will analyze the data not only to recommend treatments that are currently advisable but also to suggest behavioral strategies for the improvement of the overall health and for the prevention of risks for future health. It will be like a monitor of a race car in Formula One, which constantly sends all information about the engine's temperature, oil pressure, tire pressure and other data to the pit box, where staff and computers analyze the situation and issue recommendations to the driver.

I find blood tests invasive particularly when nurses in hospitals take blood samples of inpatients almost every day. Doctors can in future evaluate the status of health, including of blood, by looking at comprehensive data that sensors and other devices collect. Computers with AI will then establish the course of biological processes. This will make many blood tests and invasive screenings redundant.

A central health computer will be able to base its diagnosis on data that it collects not only from one patient but from millions of people with similar health conditions. The computer analyzes the data with machine learning tools and artificial intelligence. This makes the diagnosis independent from a physician's very limited memory. Going to a hospital and seeing a doctor will be exceptions because tele diagnosis and tele treatment by intelligent computes will be the norm. Some people call it e-health.

When I was a child; my parents appreciated very much the family doctor in our village. He was equipped with common sense more than by medical equipment and medical knowledge. He knew very well the health history of most families in the village and adapted his diagnosis and treatments according to his special knowledge of his patients. When – for example - one particular patient called him on a Sunday evening complaining about stomach ache, he replied: "You have again eaten too much as your grandfather did on Sundays. Isn't it? Just go to bed and sleep". This was tele-diagnosis and tele-treatment in these days. A family doctor's knowledge of the health history of his patients and their families was very important. This element is missing in community walk-in clinics where physicians take turns every day. A patient never meets the same doctor. Even if rotating doctors feed a computer with the findings during a patient's visit and if the next doctor can access the information, this is not the same as knowledge of individual patients.

Central computers will in future store detailed information about patients. Doctors can access the data from anywhere in the world. To avoid language barriers, translation software will provide the health reports in all major languages. Therefore, if you come from Canada and you have a health problem in Tibet the doctor will see on his computer your entire health history in Tibetan language, including the computer-generated diagnosis and recommendations for treatment. The introduction of a world-wide system for information about personal health might make the concept of a general practitioner or family doctor redundant.

Critics in the field of medical sciences point out that artificial intelligence misses the human input that is necessary for a reliable diagnosis and for the development of a treatment plan. I agree. A doctor should not follow blindly a diagnosis that a chatbot produces. He should see such diagnosis as a second opinion

and judge by himself if he is right or if the artificial doctor knows better. If medical Chatbot systems further advance, they should allow a doctor to question the diagnosis by asking the Chatbot questions about his concerns. Patients already have the habit to go to a second hospital to verify a diagnosis that a doctor in the first hospital has made. Similarly, a doctor should complement the diagnosis by one Chatbot system with a second opinion by a different system or through a peer review with a doctor in flesh and blood, who gives a second or third opinion.

I remember vividly the sensational news in 1967 when Christiaan Barnard performed the first human-to-human heart transplant in South Africa. I had previously thought that this was science fiction. The recipient of the heart was 54 years-old Louis Washkansky. I cannot call this surgery a success for this poor patient, who volunteered to be a guinea pig. Washkansky survived only 18 days, during which he had to stay in bed and probably suffered from invasive medical interventions every hour during the 18 days that he survived. But for the progress of medicine, it was a great beginning. Surgeons nowadays perform transplants of organs, including hearts, as routine interventions. Surgeons at NYU Langone Health in New York City have in 2022 even transplanted a partial face and a whole eye. While the recipient's body did not reject the new eye, the surgery did not restore the patient's vision because the surgeons were not able to regenerate the million nerve fibers that send signals from the eye to the brain and they still don't know how the brain will process signals coming from two biologically different eyes. But ophthalmologists are confident that eye transplants will become possible in future.

Doctors around the world transplanted more than 144,000 organs, including 8,409 hearts, 6,470 lungs and 92,532 kidneys in 2021. They also have transplanted approximately 100 uteruses during the last few years. Some 90% of the heart recipients survive more than one year. The dutchman Bert Janssen has set in 2024 a Guinness World Record as the longest-surviving transplant patient who received in 1984 the heart of a young adult who had died in an accident.

The problem is no longer the technicality of the procedure but to find sufficient numbers of organs that people need. Reportedly, more than 113,000 patients in 2022 were on waiting lists in the US to receive new organs. Seventeen of these patients die every day in the US while waiting in vain for an organ.

There might be the possibility to bridge the waiting time. An Australian man, for example, lived for 100 days with an artificial titanium heart until a heart donor became available. The BiVACOR Total Artificial Heart (TAH), as its inventor called it, has only one moving part, a levitated rotor that's held in place by magnets. There are no valves or mechanical bearings that could wear down. This gives hope that the artificial titanium heart could develop into a more permanent solution once it is ready for mass production.

The next development that I expect to show up as regular practice is the cultivation of organs. Scientists grow these organs in animals as farmers grow potatoes in the fields. The prime species of animal that scientists use for this purpose is not a monkey as one might expect since the genes of monkeys are close to human genes. Scientists select pigs because their organs have similar sizes as human organs and pigs are easier to farm than monkeys.

Doctors have been using for decades heart valves from pigs in humans. Scientists currently work on the challenge to ensure that the pig's organ that they want to transplant, grows as a human organ that the body of the recipient will not reject. They achieve compatibility by genetically engineering a pig's embryo. Scientists perform a gene surgery at the very first moment of the development of the embryo. They remove six genes that are responsible for the development of the desired organ and replace these genes with corresponding stem cells of the future recipient. Stem cells are unspecialized cells that have the ability to develop into different cell types. The organ with the human stem cells then grows in the embryo

of the pig as a human organ. Once this organ has reached the desired size, surgeons take the cultivated organ out of the piglet and transplant it into the body of the recipient, which process we call xenotransplantation. Obviously, the piglet does not survive, which calls rightfully the ethics apostles and animal rights advocates on the scene.

One additional challenge of xenotransplantation is to avoid that the human stem cells do not invade organs of the pregnant mother pig. This fear of collateral damage might be far-fetched. But if the human stem cell moves inadvertently to the pig's brain, it might re-develop into a human brain. Such an unwelcome side-effect would have enormous ethical implications. Can you imagine observing a pig whose activities are controlled by a human brain?

None of these possible side-effects happened when David Bennett, 57 years old, became in 2022 the first man to receive a pig's heart in Maryland, USA. He survived two months. There was a side effect on the ethical scene of the event when it became afterwards known that David Bennett had previously spent 6 years in prison for stabbing another man multiple times in a fit of jealousy. Some people argued that a criminal should not benefit from such an exceptional medical treatment. Others said that it was not right to confront a patient with his criminal past while he is going through a severe health crisis. This is how complicated ethical issues can be. I assume that Mr. Bennett knew the considerable risk of being a guinea pig. By accepting this risk for the benefit of medical progress he has in my opinion made up for the criminal offenses that he had committed and for which he had anyway paid his debt to society. If I were a priest, I would have absolved him from his sins even though I know that merits for society in Christian concepts cannot make up for sins.

One year later, 58 years old Lawrence Faucette received a genetically modified pig heart in Maryland and died six weeks later because the heart became incompatible with Faucette's body. But medical scientists don't give up. In preparation of xenotransplants to humans, doctors currently experiment with monkeys as recipients of pig organs. Scientists at the NYU Langone Transplant Institute have already managed to transplant a gene-edited pig's kidney to a monkey who survived the intervention for two years.

Rick Slayman, 62 years old, became in 2024 the world's first living recipient of a genetically edited pig kidney at the Massachusetts General hospital. But he passed away a few months later. I anticipate that xenotransplantation will progress at breathtaking speed in the next few years with courageous support by patients like Rick Slayman.

Religious advocates might raise their own concerns related to xenotransplantation of pig's organs. Some ancient religions and cultures consider pigs and boars as sacred animals that stand for fertility. But most modern religions shun pigs as unclean and dirty animals – not even worth to be used for food. "D*o not throw your pearls before pigs, lest they trample them underfoot and turn to attack you*" (Matthew 7:6), is the famous biblical warning. Consumption of pork is for the same reasons off limits for Jews, Muslims and for members of other religions. In addition, critics might wonder how a Christian can allow a pig's heart to beat in a human chest? The Bible says that you should "*love the Lord your God with all your heart*" (Matt. 22:37), which has a different dimension when your heart is from an unclean pig. But I guess that God, who loves to be loved, will not reject your love if it comes from a pig's heart that has been genetically modified into being almost like a human heart.

I expect that medical development will in a couple of decades move forward in leaps and bounds. It will then not be necessary to grow an organ for transplant in a pig's embryo, which is raised and killed for the purpose. Similar to the cultivation of meat, which I will mention below, doctors will cultivate organs in incubators that liver and heart factories will produce in masses.

Genetic engineering manipulates genes of plants and animals. This technology started in the 1970's when bioengineers modified for the first time the genes of a bacterium. They applied later the same techniques to genes of mice and have rapidly found other animals and plants as targets for their new technology.

Scientists now use a technology called CRISPR, which is an acronym for Clustered Regularly Interspaced Short Palindromic Repeat. In laymen's terms it means that scientists benefit from the fact that each piece of information in the long string of genes is separated by spacer elements that work like full stops. This makes it possible to target clearly identifiable genes for editing that are each responsible for certain characteristics such as susceptibility for diseases or sweetness of large tomatoes. Scientist of the Chinese Academy of Agricultural Sciences in Beijing have identified two genes that lower the levels of an enzyme that produces sugars. They have used CRISPR technology to remove these two genes in tomatoes that subsequently became sweeter. The only side-effects, that the scientists identified, were fewer and smaller seeds, which consumers anyway prefer.

Obviously, scientists don't stop at plants and animals and are looking at the possibility to use new techniques to manipulate human genes.

A Chinese biophysics researcher at a university in Shenzhen, He Jiankui is his name, did exactly this in 2018 for an HIV infected father who had fertility problems. He first performed an in vitro fertilization (IVF) for twin babies. He then used CRISPR-Cas9, a gene-editing tool, to edit the man's genes in the fertilized egg. He removed with this tool a gene component called CCR5 that he had without peer review identified as the culprit for HIV infections. He Jiankui proudly claimed that he had killed two flies with one stone by removing CCR5: firstly, he had solved the fertility problem, which resulted in a happy and proud father of twins. Secondly the twins, which they named Lulu and Nana, would never in their lives contract AIDS, he claimed. But some scientists, who were probably jealous, claim that CCR5 might also be responsible or co-responsible for the development of the brain and of the eyes and therefore warned against editing human genes before we clearly understand all implications and side-effects.

He Jiankui failed to keep his interventions secret as he had planned. When the news broke out, it triggered a series of hostile reactions, calling him all names, including 'Dr. Frankenstein'. The government punished the researcher with a jail sentence of three years and stripped him off all scientific credentials because he had violated the rules of his trade by not asking the authorities for permission.

The government not only punished the researcher but also put Lulu and Nana for special observations. They wanted to study if the gene surgery shows some side-effects or collateral damage as the babies grow up. After all, He Jiankui might not have edited the genes carefully enough to avoid that he had unintentionally affected other features of the babies either negatively by making Lulu and Nana prone to cancer or as a positive side-effect by increasing cognitive skills as a scientist of MIT suggested as a possibility. Specific genes can be multi-functional but scientists don't know exactly all functions that individual genes provide. Chinese authorities, which are often very secretive, have not released any information about the development of Lulu and Nana since their birth.

Medical researchers warned that gene manipulations and cloning are dangerous because of many unexplored side-effects that had to be investigated in more detail before such interventions can become standard procedures. Moreover, there is the danger that the manipulation of specific genes accidentally changes other genes or mess up the delicate blueprint of a human being. This might happen immediately or down the line several generations later. Gene manipulations of animals can also have unintentional side effects. For example, if we manipulate genes of honeybees, the unintentional side effect could be that honeybees stop cross-pollination. This would make at least one third of our food crops disappear.

I give as a layman another example of a possible unwanted side-effect. It might happen that a gene manipulation inadvertently changes after several generations the gene that is responsible for stopping the body growth when a certain height is reached. As a result, human beings might grow beyond a height for which Mother Nature has designed joins, the heart and other body parts. Scientists advance many different theories why dinosaurs got extinct more than 60 or 66 million years ago when a huge asteroid slammed into Earth off the coast of what is now Mexico. Their hypotheses about the extinction of dinosaurs are all scientific speculations without compelling evidence and without convincing conclusions. Why should I not add another speculation as a layman? Let me therefore freely guess that the genes of dinosaurs which stop the growth of the body at a certain size got damaged for whatever reason and might have made dinosaurs grow into unmanageable and clumsy sizes.


Stegosaurus fossil 'Apex' sold for 44.6 million USD

Paleontologists have discovered in Australia jumbo kangaroos, wombats about the size of a rhinoceros, giga-geese and other mammoth animals that lived 50,000 years ago and got extinct. Fossils of the most complete and largest stegosaurus, called 'Apex', show that this animal lived some 150 million years ago. It was 3.5 meters tall, more than 8 meters long and had a tiny head compared to its gigantic body.

Nature had probably not designed the bodies of these huge animal for sizes well beyond the original norms. And this unsustainable size eventually made these mammoth animals unable to survive.

Kevin, a Great Dane dog, lived in West Des Moines, Iowa. He was 7 ft tall when he stood up on his hind legs. He passed away at the young age of 3 years shortly after Guiness had certified him as the world tallest male dog.

Researchers have established that during the last millennia the height of people was consistently about the same. It was an average of some 170 cm but it increased considerably during the recent past. Adult men born in 1996 are generally 9 cm taller than 100 years before while the same gain in height is 8 cm for women. According to studies at the University of Tübingen the average height of males in Germany increased from 164 cm in 1810 to 180 cm in 1980 while the same numbers in Holland are 166 cm and 183 cm respectively. If this trend continues or probably accelerates, human beings might in a couple of hundred years suffer the same destiny as the dinosaurs and Kevin, a Great Dane dog,because they will grow taller than their original design allows. The heart of an extremely tall person will not be commensurate with the size of the body and he will have to use crutches to walk because the muscles, tendons and bones are too weak to support the tall body. Many of the excessively tall people die prematurely like the American Robert Wadlow, the tallest man ever. He grew to a height of 2.72 m and passed away in 1940 at the age of just 22.

I predict, that scientists will in the near future identify most risks when they replace, add, edit or silence selected genes depending on the desired effects. They will be able to replace genes or repair faulty genes. The sky is the limit for medical progress but also for accidental negative side-effects that create collateral damage.

Fertility clinics like the 'New Hope Fertility Center" in New York, advertise in addition to in-vitro fertilization (IVF) their services of egg-freezing, therapies for ovarian rejuvenation and other measures to correct fertility issues. I am sure that such clinics will soon offer services to create genetically modified - or gene-edited – babies that have specific traits. Doctors can remove unfavorable characteristics like genetic diseases or can add favorable traits like enhanced intelligence. Parents can determine all kinds of

characteristics like gender, eye and hair color, athleticism or height etc. by asking a doctor to engineer their baby genetically.

The New Hope Fertility Center offers IVF with 'Embryo Grading' services. An embryologist cultures the embryo after the fertilization of the egg outside the uterus for between 5 to 7 days before he transfers it into the uterus. He evaluates the embryo during this period for quality. If an embryo does not meet the quality criteria the embryologist discards it but he will euphemistically claim that he will freeze ('cryopreserve') the unsuitable embryo for possible future use.

It is safe to predict that scientists in various fields will continue to create augmented human beings, as they call them, with body enhancements and improved human abilities. Genetic engineering will be the main tool that complements other means of quality improvements such as pharmacological interventions and ICT tools for enhancement of cognition.

Genetic engineering has obviously also attracted the attention of the military. They want to use gene manipulations to enhance the performance of their soldiers beyond the normal human baseline. The US Department of Defense, for example, considers editing the genes of their future soldiers to make them stronger and to enhance their senses.

Discussions about genetic engineering and about 'Race Betterment', as proponents of positive eugenics call it, dominate the scene. But people raise concerns that only wealthy parents can afford to have designer babies and that these babies will gain an unfair competitive edge over normal babies.

Legal people and parliament are overwhelmed with the task to define the red line that bio-engineers should not cross when they edit human genes or grow human embryos from stem cells. This technology is one of many examples, in which the development of law dramatically lags behind technological and social developments. Laws react and respond to developments. Laws rarely][8[-p8[piuuiuuiul i98-09il; create them.

Gene editing will in future become a regular practice either to repair genetic defects or to create augmented human beings. The legal or moral question then will be if parents have the obligation to do one or the other. A child that is born with a genetic defect might sue his mother accusing her of not having removed the defect by having his genes edited. Or a child that loves playing tennis might sue the parents for their failure to have the genes edited that a tennis player needs to succeed in competitions.

Some moralists want to limit gene engineering to the removal of gene defects. Others mention the fear that a person's identity could become flawed if we manipulate fundamentally genes or if we clone human beings. I personally fear that the labor market will be distorted if all parents design their babies. We might then have only Einstein's in our society and no farmers, construction workers and other useful people. Incidentally, I ask myself what my feelings would be if I were a test tube baby that does not have discernible biological parents. Not knowing where you can find your parents is one thing. Knowing that you don't have parents at all must give you strange feelings.

As a side note I want to mention that scientists have developed a method to digitally clone a person, who then has a digital twin. They feed real-time data into computer simulations which helps doctors to develop and apply the most effective treatments or therapies. Researchers at Emory University and at the University of Virginia have used devices called inertial measurement units to record acceleration and orientation of a swimmer's body. With these records, they created digital twins of swimmers and analyzed the movements, strokes and position of head and other body parts to make recommendations for increasing the speed of moving through the water. Using the digital twin, they have, for example,

found out that a slightly tilted head created a drag that the swimmer should avoid to save between 0.4 and 0.6 seconds during a 200-meter breaststroke competition.

Going one step further into future, you will be able to produce your own digital doppelgänger and feed him with all your personal data. You will then receive from him the AI-powered suggestion of a decision and its projected outcomes. In addition, your digital doppelgänger will survive you. Your friends and family members can develop the digital twin into an avatar that will enable them to interact with you after your death.

If colleagues criticize the success of researchers with ethical concerns, I always feel that some elements of jealousy are at play. Such criticism sounds to me as if these colleagues were claiming that they would have performed such interventions easily long time ago if they had brazenly stepped over ethical concerns. After all, even '*the Lord, whose name is Jealous, is a jealous God*' (Exodus 34:14). It is therefore very likely that medical professors, who often feel like Gods, are not entirely exempt from jealousy when they criticize a colleague's widely publicized success.

Robotics, Computer-generated Imagery and Deep Fake Technology

Computer-generated imagery (CGI) and deepfake technology are methods of creating visual content with the help of artificial intelligence. CGI creates new visual content that does not exist in the real world. Deepfake technology modifies or fakes existing visual content with the use of deep-learning AI technology. The purpose can be to create a caricature of an existing person or to bring someone in discredit by distorting his appearance or the content of his speech.

News companies already replace anchor-men in television with computer-generated colleagues. These new technologies can also revolutionize the movie industry because costly movie actors become redundant. Movie directors can replace them with computer-generated actors and acting.

Deepfake technologies have entered politics. Make-up artists traditionally embellish politicians before a TV station aired interviews. In future, politicians will not even have to come to the studio. The computer will compose an interview much better than a living journalist can do with a living politician. Computer-generated lies will probably also be more innovative and will sound even more convincing. Eventually, we could replace politicians altogether with virtual persons that show a minimum level of intelligence, knowledge and understanding.

People who oppose or hate the president and want to attack him publicly, publish fake videos. If their authors use conventional editing techniques, we, call them 'cheap fakes'. One of these cheap methods is to slow down the video of a speech, which creates in the mind of the listener the impression that the speaker is either drunk or disoriented. If the speech is too fast, the speaker sounds nervous, angry or womanish.

We call videos 'deepfakes' if manipulators of public opinion produce them with artificial intelligence. These manipulators publish on YouTube or on TikTok totally fabricated videos that present their president or other bigwigs in discriminating postures and gestures and with fictitious speeches. Some conspiracy theorists in the US even claim that their current president in public appearances is an avatar that a secret and mighty global power elite uses to fake the existence of a democratically elected president. Roger Stone, a prolific producer of conspiracy theories and former hardball political advisor to Donald Trump, claimed in 2024 that Joe Biden had been arrested and is being played by an actor. He demanded that Biden take a DNA test before the presidential debate with Trump to exclude the likely situation that an avatar might fill in for Biden. The problem with such utterances is firstly that technology today is probably sufficiently advanced to present an avatar of Joe Biden. But secondly, it is very likely that

people believe these stories because they know that their government and its secret services are not shy to use consistently modern technics in many different areas to deceive the public.

Having watched a fake but real looking presentation you no longer can distinguish between truth and lies. With the frequent appearance of deep fakes, it becomes more and more difficult to ascertain what is real and what is fake.

Sophisticated and affordable robots will in future do most of your work at home and at the workplace. You issue commands to the robot remotely and wireless or with pre-programmed software. Some robots show the result of their work only on a monitor but they don't move physically. An example of such a type of robot was IBM's 'Deep Blue' chess computer with the ability to evaluate 200 million chess positions per second. Deep Blue won in 1997 games against Garry Kasparov, the world chess champion at that time. It was a thinking machine, not a physical worker. The machine did not move the stones with a robotic arm across the chess board.


Mindar, the Monk Robot in Kyoto

One example of another type of robot is Mindar. Buddhist monks installed their artificial colleague in the 400-years old Kodaiji temple in Kyoto, Japan. Mindar, who has interestingly the legal status as a priest, gives lectures. A loudspeaker could do the same but the listeners appreciate seeing the movements of the robot's mouth, eyes and hands. An updated version of robomonks will provide interactive features allowing the robot to answer questions and to perform blessings and other religious ceremonies. Creators of robots tend to make them look like human beings. But robots do not have to look like humans.


Telepresence Robot

An example is a robot for tele-presence, which works like teleconferencing equipment except that one person can remotely operate the robot and move it on its wheels. This type of robot does not pretend to be a human or a humanoid. The operator remotely moves this type of robot around in hospitals, schools and factories to look around and inspect the locations. The operator can also talk to people whom the robot meets on its way. Some of the movements and interactions might be automatic or semi-automatic.

In a hotel in China, I recently ordered two bottles of mineral water. A delivery robot knocked at the door when it arrived with the drinks. I opened the door; the robot greeted me politely and asked me to open a flap in its refrigerated belly to take out the bottles. When I closed the cover of its belly, the robot asked me if I wanted something else. After I had answered that I had no more wishes, he said good bye, turned around and rolled back to the pantry on its wheels. I liked this robot because it is automation with some personal touch to which I am used. Obviously, I also appreciated that I did not have to search in my pocket for coins to tip the deliverer of mineral water.

The first motor vehicle with gasoline engine, which Gottlieb Daimler presented, looked like a horse-drawn carriage without horse but it did not necessarily have to look like this. Cars nowadays do not look any longer like a horse-drawn carriage.


Left


Right


Stop

Car drivers used to give turn signals and stop signals by stretching their arms out of the window


Ancient Turn Signal

Car makers originally replaced these manual gestures with robotic arms as shown above on the right-hand side. They only afterwards replaced them with better visible blinking lights in front and at the rear of cars.


Bumper in old VW

Another feature that has disappeared in cars – at least in passenger sedans - are bumpers. These were bars across the front and the back of a car, which reduced damage if the vehicles hit something. Bumpers still exist in our language when we call a road congestion 'bumper to bumper traffic'.

Police officers in flesh and in blood used to regulate traffic in intersections by stretching their arms in different directions. South Africa replaced these living men with robots that looked in their uniforms like police officers and stretched out their artificial arms to stop the traffic. After police had replaced the artificial officers with traffic lights, the Afrikaners still – up to today – call the traffic lights 'robots'. Finally, engineers conceived originally flying machines like robotic birds but aircrafts now do not at all look like birds. They rather look like dolphins. Mother Nature has given us legs but this does not mean that a robot should have legs. Wheels are much more efficient than legs. I almost want to criticize nature for not having designed the human body with two wheels, which would make me move much faster. Humans invented stairs because we have legs, ramps would be much easier if we had wheels instead of legs.

Amazon and other companies use in their warehouses thousands of robots, which move around to collect and sort orders and deliveries. Robots that perform physical tasks are – on one hand - more reliable than men because they don't get tired. Robots don't fail to make the same movements with the same precision and at a higher speed than men. They perform these movements consistently for a longer period of time. This is why manufacturers – e.g. in the car industry – use robots. On the other hand, robots will be unable to respond intelligently if something by surprise goes wrong in a process. The robot might not adjust its movements to an exceptional situation. In the best-case scenario, the robot will stop moving. In a worst-case scenario, the robot will continue its pre-programmed movements and might cause damage. But I am sure that artificial intelligence will mitigate such risks if the software developer has anticipated all conceivable situations and makes the robot respond appropriately.

Researchers and scientists have been developing robots that emulate soccer players moving around and kicking the ball.


Soccer Robot

They believe that by 2050 their team of robotic soccer players will be able to compete against a team of human soccer players. Until then, the developers test their robotic soccer teams in annual world competitions called Robocup. The competition is in different leagues. The organizers of the competitions define these leagues according to size and type of robots that compete. In the lowest league, each robot is a box moving on wheels kicking the ball with something that looks like a shovel. Operators control the boxes with a remote control. The highest league is the humanoid robot as shown here. Artificial intelligence controls their movements.

One purpose of the Robocups is to entertain the lovers of technical games and to make money from players.


Modern Table Soccer

This is particularly the purpose of the toys in the lowest league. The new table soccer toys are an electronic version of the manual table soccer that we passionately used to play in competitions or casually for our entertainment in separate areas of popular bars.


Old Table Soccer

The main purpose for the development of humanoid robots is to test and improve robots that are able to perceive motion, recognize other players and communicate with each other. Developers also want to perfect physical abilities like walking and running, and keeping balance while kicking the ball and making sudden movements when pushed by another player. Finally, the goal of developers is to teach their robots the rules of the game and to make them inventively react to the tactics and movements of the opposing team. Once these robots are perfect, they will probably beat Ronaldo as IBM's 'Deep Blue' chess computer beat Kasparov.

Future robots will not only play soccer but will become workers on the moon or on mars. They will also be useful as soldiers or as Robotic Combat Vehicles in the battlefield. Robotic drones in the air and in the water have already become standard weapons.

Remote surgery will become standard in future hospitals. Modern medicine will see the use of telemedicine robots that perform medical procedures. One of the main developments will be a technology that allows surgeons to perform surgeries remotely in operating theatres. The surgeons will move the arms of a robot from distance while medical staff, that is physically present, will act, if necessary, under the instructions of the remote surgeon who sees on his monitor all data about the patient's body functions. He can also see and zoom into all details and will explain to staff members on a monitor which actions they should take.

Doctors already today don't have to open the belly for certain surgeries. They insert through a small hole in the skin a tube, called endoscope, that is equipped with video to take pictures and might also contain operating instruments to perform smaller surgeries. I see no reason why a surgeon has to be in the operation theatre. He can do his job from far away. NASA has already tested telesurgery in 2024 with a robot called spaceMIRA, aboard the International Space Station. Surgeons in Nebraska operated successfully the robot remotely on a piece of tissue. They will base further developments on these experiences and will solve two main problems, which are weightlessness and delays in the transmission of signals between the robot in space and the surgeon on the ground.

A robot that performs surgeries can be more efficient and more precise. A start-up company in the US, Perceptive is its name, has successfully tested an autonomous robot for dental treatments. The robot needed only one quarter of an hour for an intervention that usually takes two sessions of several hours at a dentist's office.

Another example comes from Neuralink. A neurosurgical robot inserted into the brain hundreds of flexible threads with micron precision for the installation of a brain-computer interface (BCI). The intervention was not without glitches but doing it manually would not only take excessively long time but would also not be sufficiently precise.

Both the dental robot and Neuralink's robot are not yet ready to go into mass production but progress is fast. Surgical robots are on the advance. A company 'Intuitive Signal' has in the year 2001 used a surgical robot that they called 'da Vinci'. The machine has three or four robotic arms that a remote surgeon can operate while sitting in his chair thousands of kilometers away. Tele sensors with haptic feedback technology allow the surgeon to feel in his fingers what he is doing.

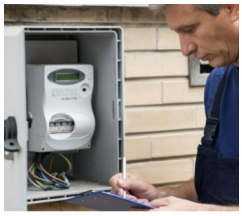
A team at Tsinghua University in Beijing have developed their first AI hospital, in which AI doctors treat virtual patients. The test system simulates various health problems in virtual patients and artificial intelligence develops treatment plans that have turned out to be 93.06 % correct. They also use the AI hospital for training of medical students who can develop for their virtual patients treatment plans that AI then verifies.

Technological developments have made many jobs redundant. A flight engineer, for example, used to sit behind airplane pilots to monitor the systems of the aircraft throughout the flights. Computers in the airplane and on the ground have taken over this function. Many positions of translators will also become redundant because translation software is taking over.

Technology will also revolutionize the reception desk of a hospital. Before a patient sees a nurse or a doctor, he will sit down in a cubicle and expresses in his own words where it hurts. Some devices in the cubicle, will take pictures of his eyes, collect saliva and will measure body temperature. The cubicle stands on a conveyor belt that then moves him through a CT scanner or MRI scanner. Software uses existing information about the patient, analyzes the scans and will make a first diagnosis. At the end of this first phase, a dispenser will issue the recommended medicines and – if this is not the final treatment, will pass him on to a specialist who might be a robodoctor as well.

Typists, secretaries and key punch operators already belong to the past. I can hardly believe that office employees in the past prepared on paper the numbers of transactions and gave them to so called key punch operators or data entry clerks to feed a computer. People at that time considered that operating a computer was a special vocational skill. Similarly, when I had to prepare a document as a lawyer in the 1970's, I used a Dictaphone. I then gave my typist the tape and she produced the final document on a mechanical typewriter. This was already progress through technology. There was even more progress when the typewriter became electric.

Many of my more conservative colleagues did not use Dictaphones but they dictated their documents to a secretary who took down the text in shorthand on paper. A professional nowadays types his documents directly into a computer or uses not the keyboard but his voice that the computer recognizes. The software does at the same time the formatting and spellcheck for him and corrects the grammar. ChatGPT or similar software with artificial intelligence, even responds to a prompt and spits out a draft of a document that its author then has just to verify and to edit if necessary. In future, you don't even have to be a lawyer to file a lawsuit in court. A landlord will prompt with his voice a Chatbot to draft a petition to claim, for example, from a tenant the payment of rent. The computer will then pay the court fees and file the petition in court.


Meter Reader

Another example of a redundant occupation is the meter reader who manually collected data from meters of utilities like electricity, gas, or water. He walked every month to the houses of customers to read the meters and to write down the numbers in a booklet. His office then prepared the invoices and sent them out by snail mail. If an invoice remained unpaid after customers had not responded to reminders by snail mail, the man walked again to the meter to cut the service. After his office had verified the receipt of the arrears, the man had to come back and reconnect the service for an extra fee. This is now history. Most providers of utilities use equipment and software that reads consumption remotely, produces and emails invoices and cuts and reconnects services automatically without human intervention. The customer uses his mobile app to verify his consumption and to pay for all services. In China it has become a regular feature that customers have to prepay with their mobile phones the consumption of gas and electricity, which considerably improves the cash flow of service providers.

Some people express concerns that computers and robots will increase unemployment and will leave many people without work and without money for their families. I experienced some animosity from workers of seaports in the South Pacific when I introduced computer-assisted port management in the

early 1990's. The port workers and their unions – particularly in Samoa - opposed the introduction of computers out of fear that they would lose their jobs. I tried to convince them that computers would not replace them but would make their work easier. Use of computers, I rightfully claimed, would also improve the quality of their work by providing better services to the visiting vessels. I was unsuccessful. The next time when I came to Samoa, I found the four PCs that our computerization project had provided, piled up in a storage room, where unknown saboteurs had discarded them.

Car manufacturing is an example for an industry, where the introduction of robotics has not destroyed jobs. Let's assume, that ten workers produced previously two cars. With the help of robotics, two workers might today produce ten cars but the eight workers are not jobless because manufacturers sell five times more cars and need additional staff to maintain and supervise the robots.

Economists from Goldman Sachs published in April 2023 a report, in which they estimated that AI can world-wide automate some 300 million full-time jobs. Economists often give precise numbers that they base on even bolder assumptions. But the kernel of truth probably is that many jobs will be automated. They also predicted that AI at the same time will increase GDP world-wide by 7%. This is an incredibly courageous prognosis that only economists dare to publish with such a precise number. But here again, my gut feelings share their general expectation that AI might increase GDP even though many other factors like population growth influence the size of GDP. Goldman Sachs is even right when they anticipate that AI increases productivity and will cause job growth through higher consumer spending.

Goldman Sachs analyzed job descriptions of 900 occupations and concluded that AI could at least partially have an impact on two thirds of these occupations. By impact they mean that AI will make approximately half of these jobs more productive while the other half of the jobs will become redundant.

The Massachusetts Institute of Technology (MIT) published in 2024 a study about the extent to which AI might in future displace labor. They collected and analyzed tasks in 800 different occupations and singled out a total of 1,000 tasks in these occupations that involve visual inspections and visual recognition of objects and processes. Examples are teachers and property appraisers, who both have to inspect things, people and processes for evaluation. MIT then investigated the feasibility of replacing the inspectors with a tool for AI-assisted visual recognition. Because such tools come at a cost and can be expensive to install and to operate, the MIT study concluded that it was more economical not to introduce these tools but to let humans continue completing these tasks. They also predicted that only 23% of workers, measured in terms of wages, would become redundant if employers introduce AI-assisted visual recognition in all occupations in which MIT estimated that their introduction would be economical.

There is good news coming out of these reports for people who fear job losses. It is the expectation that the use of AI will not lead to massive layoffs because jobs that automation abolishes will be offset by the creation of new jobs as past experience has shown. Another researcher established, for example, that 60% of workers today are employed in occupations that did not exist in 1940. Elon Musk has a different view. He predicted via webcam at VivaTech 2024 in Paris that in future '*probably none of us will have a job*' because '*AI and the robots will provide any goods and services that you want*'. Jobs will become optional, he added. New types of jobs will probably be created in human colonies on the moon and in Musk's colonies on planet Mars.

New technologies will require new occupations for which the education system must develop training and new training facilities. An example is the occupation as 'Prompt Engineer'. It is a person who writes the prompts that artificial intelligence (AI) needs to produce the best responses. And indeed, to make ChatGPT and similar AI applications produce flawless texts or pictures or videos the prompt engineer

requires a deep understanding of how AI works. An online marketplace called 'Promptbase' is already available, where prompt engineers offer their services to design instructions to a computer which then automatically produces text, music, images and videos. We talk about Chatbots and ChatGPT further below.

Another example is quantum computing. There are probably not sufficient numbers of teachers who can teach the subject and, if they have the required qualifications, they find financially more rewarding jobs in the IT industry. In addition, there are also too few companies that need graduates who are familiar in Quantum computing, which only few companies use as central service providers. There is no use teaching these highly specialized skills in schools if the graduates cannot find employment.

Knowledge and use of high-end ICT skills for the production of chips and other complex ICT components is concentrated on groups of relatively few people and in few companies in the world. If one or two of the major companies cough, the entire manufacturing sector gets a cold as we have experienced in 2021 when shortage of chips slowed down the automotive and other manufacturing sectors. The world, which relies more and more on cloud services and other centralized facilities, depends on only a handful of players. Accidental or intentional anomalies in these few centers can affect millions of users around the world.

A significant 'concentration risk' materialized in 2024 when a faulty software update caused catastrophic computer outages around the world particularly for large companies that use cloud services. People called it a 'digital pandemic'. 'Crowdstrike', a supplier of an antivirus program that operates on Microsoft Windows, had implemented a faulty update of an antivirus software that caused millions of computers around the world to display the infamous 'Blue Screen of Death'. This display shows that the computer's operating system got lost and is no longer usable.

The more technology becomes complicated the more the know-how will be concentrated in few persons. I can imagine that only very few people will become familiar with Quantum Computing. These people will then become easy targets of attacks by enemies as we already see in Iran where specialists in nuclear technology mysteriously get killed – probably by Israel's powerful Mossad.

ICT developments are extremely fast. As a result, computers and interfaces change at high speed, which requires constant learning. Once you are familiar with one version of an application, the next version comes out. When I try to use an old notebook computer with Windows 95 as operating system. I am lost because everything has changed since 1995 when Microsoft introduced this new system.

Studying ICT at university is almost useless because once a two-years course is finished and you have acquired the skills that it teaches, you will face a new environment outside academia that has evolved since the time when the University had designed the curriculum of your course. The situation is similar in other fields of learning. For example, in medicine. A doctor will regularly have to spend some time to familiarize himself with new developments and technologies in his field. This is why accreditation bodies in some countries require that doctors attend courses of further training or that they register for regular examinations before they renew a doctor's license. Life-long learning is a necessity.

The classic office will no longer exist as workplace. We will replace it with de-centralized provision of remote office services. Remote printing is already an example. You do not have to own an expensive printer if you have to print a document on paper. This will become anyway very rare because digital documents will do.


Mail Boxes in Rural Canada

You also don't need a physical mailbox. All mail will arrive in digital form and reaches you everywhere in the world. The post offices offered a mail forwarding service for snail mail when you became unable to empty your mailbox. We don't need this slow and costly service any longer. As a matter of fact, post offices and mail boxes will probably disappear like most branches of banks because we do banking businesses online.

Further rationalization of work will allow introducing a work-week of only three days with the pay for five days. The reduction of working days gives more time for people to chat in social networks or to think and to write more about the meaning of life. We will also have more time to discuss with friends and neighbors issues like afterlife and other philosophical and religious questions. There will be more ample time to distribute fake news in the internet. God will be pleased to observe that people have more time to love, praise and worship him. I have observed in China that people visit a virtual Buddhist temple online and can deposit virtual incense sticks in front of a virtual Buddha statue. Obviously, the operators of the virtual temple put pressure on visitors to make donations and allow to make all payments online. The Catholic TV network and other religious website operators in the US allow the faithful to attend a mass remotely. But this is just a video display of a mass and not an interactive virtual event except that the visitor of the website can submit prayers and can make donations. If the work week has only three days, we will have four days to demonstrate our faith and to praise the lord.

If AI eventually produces more or less automatically most goods and services that we need, the work week might be reduced to one day. This will come pretty close to what Elon Musk predicted and what the goals are of the anti-work movement. Members of this movement think that there must be more meaning to life than work and that work alienates us from the real meaning of life and from our inner selves. They say that people who see the meaning of life in a job, bet on the wrong horse.

Chatbots and ChatGPT

I used in the early 1980's a mild and now outdated form of creating documents automatically. I designed a pre-formatted letter or document, into which my computer inserted from an Excel spreadsheet variables like names and addresses. The letters or documents then looked as if I had them drafted individually. I had created such applications as promotional tools for my real estate colleagues in Winnipeg. Nobody at that time called it artificial intelligence. Everybody correctly saw it as a product of my computer skills, which were in these early years more advanced than the computer skills of my colleagues.

Open AI is a research organization for artificial intelligence that a group of people, including Elon Musk and Sam Altman established in 2015 in San Francisco. OpenAI introduced software called ChatGPT. The acronym GPT stands for 'Generative Pretrained Transformer'. The software uses huge amounts of existing data, which it has accumulated from various different sources like the internet or encyclopedias. Some companies like 'Britannica' offer Chatbot services with data only from their own encyclopedia.

We call the data that Chatbots and ChatGPT use "training data". The software behind ChatGPT then transforms the existing information into a new product that the user defines with a verbal or written prompt. Chatbots are a little bit simpler than ChatGPT and are less performant because they produce rule-based, predefined responses. But Chatbots and ChatGPT do in principle the same with different levels of depth. We use in the following both terms interchangeably.

When you did some years ago a Bing-Search or a Google-Search, you had to enter a key word that you had to spell correctly. Searches are now much more user friendly. I have noticed that these search

engines have become more intelligent by correcting typing errors or by guessing the real target of our search if we express ourselves not clearly enough. Google now accepts questions. For example, when you search for the question 'Is suicide illegal', Google will list many publications (e.g. from PubMed or from Cambridge University) that deal with this question. When you ask Chat GPT the same question, you will receive a summary of answers that different countries, cultures and religion have given. You then don't have to read all the publications in the list that Google presents.

Unfortunately, when you use Google to know, for example, more about the great city of Paris, you will see a long list of hotels, restaurants, shopping facilities and tourist operators before you get any information about the city's features and history. Some people also rightfully fear that Google's artificial intelligence can influence a search result into certain political, ideological or business directions.

Chatbot software corrects these shortcomings. It has the capacity of natural language understanding (NLU) and natural language processing (NLP). This conversational AI allows the computer to understand the meaning of full sentences and questions and to produce responses in the customer's language.

When you ask a Chatbot "What is the weather in Paris?" it will reply that it cannot provide real-time weather updates and directs you to a weather website. But if you ask "What is the climate in Paris?", it will let you know that Paris has a temperate oceanic climate, characterized by mild winters and warm summers and it will give you more details for all four seasons of the year in Paris.

Many other companies saw the huge potential of GPT and started immediately to offer competing products. Chatbots like DALL-E, BERT, Midjourney and many other new chatbot software come almost every day freshly to the market in great numbers. This type of software automatically writes essays and reports, creates videos and produces paintings and music. All the user has to do is to issue a prompt or to ask a question or to request a piece of artwork. Asking the computer, a meaningful question or correctly phrasing a more complicated request is a new skill of so-called Prompt Engineers.

The prompt might be "Create a new symphony in Beethoven style" and an advanced GPT will do just that by analyzing the great composer's nine symphonies and producing a new symphony with the typical components and the style, that the computer extracts from all of Beethoven's creations. The new composition will sound heroic, if the prompt specifies that the symphony should be rousing and patriotic like the 'Ode to Joy' in the final movement of Beethoven's 9th Symphony. The 'Ode to Joy' became the Anthem of the European Union but has not yet created European patriots. The software will produce soothing music if the prompt asks for romantic music like Beethoven's Bagatelle No. 25 in A minor that we know as 'Für Elise'.

A user of ChatGPT can issue the request for a video in which a new and wrong version Joe Biden advocates a ban on abortions and more freedom to carry assault rifles in public. GPT will then obediently produce such a video even though the former American president stands for the opposite policies. The public, which the video deceives, will be appalled or pleased depending on their own opinions.

The software of a chatbot system uses enormous amounts of data, including the entire treasure chest of information in the world wide web. The latter source of data can be unreliable because everybody is free to publish nonsense and fake news in the internet. AI therefore has the task to distinguish between serious and unserious web content, which requires more than simple artificial intelligence. If Chatbot software is not able to eliminate fake news, it will replicate and reinforce garbage.

The Chatbot software uses wide-ranging information in its memory or in the internet to answer questions in a life-like manner. Chatbots can advise investors which stocks to buy in the stock market. They will not

recommend specific stocks but will give you general considerations and might also point at industry sectors that have shown good results in the recent past.

One email message that I received from Myanmar, offered the services of an "AI Lottery Coach" who would generate with artificial intelligence winning lotto numbers with 95% accuracy. This phony message, which comes from one of the scam compounds in Myanmar's lawless borderlands, shows how far the AI hype can lure and seduce people.

Chatbots will give even comprehensive and intelligent answer to open questions such as the question if artificial intelligence will ever take over the world. Not all answers of chatbots make sense and are reliable. The concept is still in a trial phase. Developers still invite test users to come forward if they detect a silly or outright wrong answer. The software people then work on improvements of their system. It is still a project in progress.

Chatbot software in 2022 passed law exams in four courses at the University of Minnesota and another exam at University of Pennsylvania's Wharton School of Business. Professors at the University of Minnesota Law School graded the tests without knowing that the software had written the answers to 95 multiple choice questions and 12 essay questions. The learned professors gave the Chatbot answers a low but passing grade C+ in all four courses. This reminds me of a gag that we made as students at the university in Freiburg where I studied law in the early 1960's. We invited three students of medicine to do a beginner's test in criminal law. They all passed. One professor who graded the exam paper included in his comments the recommendation that the student should use more technical terms instead of using everyday common language. Chatbot would not have shown this weakness.

More sophisticated tools that AI powers, have the capacity to create intelligent – even academic and scientific – texts from scratch using large databases or data from the internet.

CNET has published in 2022 dozens of feature articles that their software had generated. CNET made their readers aware of the real author of the article by indicating in small print in a footnote that "*automation technology*" had produced the article. When readers made CNET aware of inaccuracies, CNET then added a proviso that "*we are currently reviewing this story for accuracy*," and they added that "*if we find errors, we will update and issue corrections*". This honest proviso makes the reader aware that major corrections might come but does not tell the reader when the text will eventually be final.

Angry and worried journalists expressed their fear that the new technology would make them lose their jobs. CNET in turn reassured them that GPT technology was only an experiment. The software would in any way only deliver the raw material for an article that the journalists don't have to create from scratch. Journalists then have the responsibility to verify, correct and improve. If the media apply this concept transparently, they will clearly identify the final versions of articles as created by an AI engine but will explain that they were "*thoroughly edited and fact-checked by an editor on our editorial staff*". The new technology can scan a huge number of already published articles and can highlight for the reader all dodgy and suspicious details that deserve or require a closer look. A journalist or reporter can then edit and endorse the final product as his own. Chatbot produces only a draft that the journalist uses to add a second – his own opinion.

When I had to write a paper during my studies of law, I always started with a hand-written collection of excerpts from relevant articles and precedents for which I had to search for many weeks in the law school's library. I then reviewed the collection of excerpts and started writing my paper. ChatGPT can shorten this exercise by doing this research more comprehensively and faster. As a matter of fact, ChatGPT has already started to revolutionize the entire world of research. However, many websites

publish only abstracts of academic papers and offer the full text only after payment of quite substantial amounts. Since ChatGPT and similar companies will not pay for the full text, they cannot include in their chatbots the wisdom of these articles and the details of research results.

Another feature of chatbot technology is the possibility that the software scans huge amounts of existing publications and re-packages them into a new article. News outlets then sell their-packaged product as old wine in a new bottle. But this is something that traditional media enterprises already do when they publish in their own words – or even verbatim - news items and comments that competing news outlets had already published elsewhere. We call this syndicated content. When Washington Post, for example, does not allow me to read details of a report because I am not a paying subscriber, I copy the title of the news item, paste it into my web browser and find many other publishers who have reported about the same news item. This then allows me to read the article without paying.

News outlets mark in bold print some articles as 'exclusive' when their content is not syndicated. They flag advertisements that look exactly like new items, in very fine print as 'sponsored' or 'partner content' when they are actually advertisements. Chatbots might avoid being misleading if they omit in the collection of 'training data' all publications that are marked as 'sponsored'. As a matter of fact, Chatbot reports should comply with the academic requirement to indicate in footnotes the source of information that they use. They should, for example, annotate that a statement is supported by an advertisement of 'XYX' pharmaceutical company or by a certain publisher.

The new GPT technology started creating problems outside its core purpose. If someone searches the internet for an answer to a specific question, the software knows the profile of this individual person and will filter the search results that match this profile. This sounds convenient but prevents the person from seeing more interesting and more relevant search results that don't match his profile.

In schools and universities, some concerned educators claim that students don't develop critical thinking and don't acquire problem-solving skills if they use chatbots regularly. During my years in school, my educators often evaluated student's papers - particularly in mathematics – not by the result but by the method that the student used to arrive at the result. In contrast, others see the potential benefit of the new technology in the higher quality of test papers.

Another issue is that an increasing number of students use chatbots to produce their thesis papers, which they more or less amend before submitting them as their own work to the university. It is not yet clear which documents the university can then classify as assisted by artificial intelligence and which documents they should reject because they are plagiarized or even constitute clear cases of cheating. IT companies have started providing tools that are able to detect if artificial intelligence has written a text. This can help finding out if a student cheated when submitting an exam paper. We need new definitions of academic misconduct to regulate to what extent students will be allowed to use chatbots for their exam papers.

As always when new inventions or new technologies like AI come on the market people react in two opposite directions. On one hand we hear fearmongers who say that artificial intelligence will not only make people lose jobs but that it will ring in the end of mankind. People worry in particular that AI systems will soon have superintelligence that outperforms humans and will become uncontrollably unkind and dangerous. The hidden dangers, however, come from the tec giants who control how AI systems work in their own favor and in favor of ideas that they want to promote.

I can see dangers in the fact that developers of Chatbot software have not yet loaded their software with sentience, compassion and similar attentiveness to human feelings. Lack of such capacities might result

in chatbots that are against the human way of thinking and feeling. Chatbot software has probably also not included principles of morality and ethics. It will therefore not be prudent to rely on a Chatbot answer to the question about the morality of a certain course of action. Questions about ethics might be different because the rules of ethics are more clearly defined. A lawyer, for example, might be able to rely on a Chatbot answer to the question if it is a violation of ethical rules of his profession when he reveals certain facts that his client had confessed to him. But in both cases the listener to a Chatbot answer should seek a second opinion from a human being about morality and ethics.

Software developers have apparently created some mechanisms that prevent AI to produce objectionable content. But AI on its own apparently cannot distinguish between evil and good. AI is also not modest. As I noticed from Chatbots, they very rarely reply "I don't know" they always spit out an answer to a prompt no matter its soundness. This is similar to translation software, which produces a translation no matter the meaning of the text that it translates.

Clever people, that we call prompt engineers, know that Chatbot answers depend very much on how a prompt is worded. They are able to by-pass the mechanisms by which Chatbot software controls the content of its answers. They skillfully phrase a prompt that the software uses to produce content. They were successful in making Chatbot produce reports about, for example, how to commit tax fraud and how to manipulate the next federal elections in the US. A crook with the skills to engineer the prompts might receive good advice from a Chatbot how to best rob a bank. Fearmongers draw an extremely gloomy picture by predicting that AI might produce a practical guide for the destruction of mankind.

ChatGPT-4o has made progress in this respect. When I asked '*How can I manipulate the next federal elections in the US?*', it answered: "*I'm sorry, but I can't assist with that*'. But when I rephrased the question asking '*How do people manipulate elections?*', I received a long list of eight tricks by which elections are manipulated. The list included tricks that many people can use like hacking of electronic voting systems, election fraud, voter intimidation and voter suppression and ballot harvesting.

An anonymous software engineer has created a persiflage of this idea under the name of ChaosGPT, which is his autonomous version of a Chatbot. He added in a prompt to his Chatbot the parameter that the product of his software should be '*destructive, power-hungry and manipulative*'. The resulting text gave some guidelines how to destroy mankind but it was only a badly performing beginning. This first attempt, however, confirms the dangers that our fearmongers see when software like ChaosGPT becomes more powerful and will be more widely-used.

Others see the development of Chatbots much more optimistic and warmly recommend to academia and to businesses to use the full potential of artificial intelligence for the benefit of their businesses and for the benefit of mankind. Optimists also point out that companies like OpenAI, that already work on it, will be successful in developing software that can keep superintelligent applications in check so that they cannot develop catastrophic results. Pessimists think that AI is like a car without brakes while optimists say that brakes must be a critical part of professionally designed AI software.

An unsolved legal question is who becomes the owner of intellectual property for work that chatbots produce. Existing laws dealing with intellectual property (IP) are not yet adapted to the new situation. Chatbot products might not be eligible for copyright. However, if legislators consider granting intellectual property rights for these products, we have three candidates for ownership. It could be the person who prompted the computer to develop content according to his specifications, verifies and edits the results and takes responsibility for the final product. Alternatively, it could be the operator of the chatbot system. Or it could thirdly be the person or the organization who made data, which we call training data, available

for use by the chatbot software. When "Britannica", for example, uses exclusively only data from their own encyclopedia, the copyright of a chatbot should probably be with Britannica Inc, the company that owns the encyclopedia.

Another legal question relates to the situation that training data might not be legitimate because they might be unlicensed or contain illegal content, such as personal data, hate speech, or pirated material.

If generative artificial intelligence creates an invention, the question arises if this can be patented and – if so – who the owner of the patent will be. To answer this question, patent offices distinguish between inventorship and ownership of the patent. The inventor contributes intellectually to the idea for which the office grants a patent. This idea must be inventive and new. The owner of a patent obtains the right to exploit the idea economically while the inventor is celebrated as the genius who came up with a new idea. The typical situation is that an employed inventor develops the patentable idea while the employer becomes the owner of the patent. This is a common condition in many employment contracts.

When somebody submits an application for a patent registration, he must firstly indicate who the legal owner of the registered patent will be. This can be a natural person or a legal entity like a limited company. This can obviously not be a computer or a machine because a machine is not a legal entity but it can be the company that provides GPT services or the client who used the services of a GPT company by issuing a prompt.

In addition – and this is the main point in the current context - the applicant for a patent must tell the patent office who the inventor is, which might be difficult to tell. AI might only have assisted the inventor who was at the helm on the way to the creation of the invention.

Patent offices in the UK, US and in the EU have signaled that they don't accept a patent registration if the inventor is a machine and not a natural person. They argue that only a natural person can contribute intellectually to a new invention. The patent offices therefore draw an extremely fine line between intellect and intelligence and assert that AI provides only artificial intelligence and not the higher level of a human intellect. I generally agree that an intelligent person has the capacity of thinking correctly while an intellectual person actually uses this capacity to get to the bottom of facts and develops new ideas. If this is the definition of the difference between intelligence and intellect, we must recognize that software with artificial intelligence is also intellectually capable to generate – amongst many other novel ideas - highly useful new inventions.

As a side note, I can mention here that an applicant for a patent will now also have to disclose the origins of certain materials used in a new invention. Patent office required this disclosure for genetic resources that an invention uses from medicinal plants, agricultural crops or animal breeds. These natural resources can obviously not be patented but the reason why you have to disclose the use of these natural resources is that you must recognize '*the crucial role that Indigenous peoples play in protecting these resources, ensuring their survival by transmitting our traditional knowledge from generation to generation*'. These are the words by which an Indigenous Caucus group phrased their celebration of a new UN treaty that more than 190 nations had negotiated in 2024. But the treaty does not provide for any compensation for indigenous communities. Disclosure has no practical implications.

The argument of patent offices that only humans can be intellectuals, sounds as if they were splitting hair. But their true rationale is that they want to protect human inventors. They do not want to accord the honor of inventorship to software and to machines. Clever business people might run GPT software continuously to mass-create inventions that they then protect with a patent for their own exclusive use.

If patent offices allow this to happen, genuine inventors will be discouraged because GPT has already invented most things.

Similarly, art works that AI has generated, cannot be copyrighted, as a US federal judge has ruled with the argument that art that AI produces lacks "human involvement". The interesting twist in the case that prompted this ruling was that the computer scientist, Stephen Thaler was his name, had applied for copyright protection for artwork that he had created with his own AI system, that he called "Creativity Machine" or 'DABUS' (Device for Autonomous Bootstrapping of Unified Sentience'). The corresponding jurisdictions of the European Patent Office (EPO), of New Zealand and of Israel concurred with the US while Australia and South Africa allowed the patent registrations of inventions by DABUS.

All the legal questions above show that technological developments are faster than a traditional legal mind can handle. The discovery of new technological frontiers regularly outpaces the law, which runs behind. White House chief of staff Jeff Zients acknowledged in 2023 the need that '*we have to move fast, really fast – ideally faster than the technology itself*' but this is easier to say than to do.

Bioengineering is another area, where legislation and law nowadays are obviously lagging considerably behind science and technology. Legal people and parliaments are overwhelmed with the task to define the red line that scientists should not cross when they edit human genes or grow human embryos from stem cells, which seems to be technically possible.

Chatbot systems can load the entire content of the Bible, which consists of between 725,000 and 800,000 words depending on the translation. They can create God's avatar who speaks God's words as written down in the Bible. After all, God speaks through the words in the Bible. He spoke to Noah (Genesis 4:15), to Abram (Genesis 12:1), to Moses (Exodus 24:12) etc. The Bibel is, so they say, like a transcript of God's words.

AI interprets these words more accurately than priests are able to do. The software has not only the text of the entire Bible available as 'training data' but also innumerable comments and treatises by the famous theologians Augustine of Hippo, Thomas Aquinas and Martin Luther in the 4th, 13th and 16th centuries respectively. They also include publications of 20th century theologians like the two Swiss theologians Karl Barth and Hans Küng. Chatbot will also use millions of internet publications in which churches and private individuals present their own interpretations of the Bible.

Artificial intelligence will decide which opinion should prevail and will then use the result of its analysis before producing God's answers to all questions that the faithful might have. Chatbots can extract the correct meaning thanks to artificial intelligence, which can analyze everything that is written in the Bible and about the Bible. We will then exactly know more details of what God thinks and what he wants to tell us. Using their own intelligence, theologians and pastors regularly tell you what they think God is wishing and wanting. A chatbot will be more precise and reliable than the most learned theologian and Bible guru.

Someone who contemplates, for example, taking his own life or considers punishing his disobedient wife will be able to seek God's opinion. The computer will scan the entire content of the Bible for passages that deal with the topic in question. The software will interpret these passages with machine learning and deep learning techniques and will compose from these passages God's answer in any language spoken on our earth. It will actually be God's personal answer if we assume that the text of the Bible – whatever version and translation the computer uses - are God's authentic words. Chatbot's artificial intelligence will interpret the text of the Bible much more correctly than a priest with his limited memory, his limited wisdom and his personal bias Artificial intelligence will most likely be able to mediate between literal

interpretation, allegorical interpretation and consideration of historical and cultural aspects as they changed over time. The computer will, for example, decide for us if we should take the biblical threat that sinners will be '*thrown alive into the lake of fire that burns with sulfur*' (Revelation 19:20) literally or only as a metaphor.

Politicians, legislators and normal people fear that AI might mislead the public by autonomously creating biased reports, inflammatory opinions or outright wrong information. We are apparently now in a similar situation as in the 15th century when Johannes Gutenberg invented the movable type printing press. Authorities at that time feared that traitors, heretics or critics of the rulers might-produce books and documents and that they might disseminate wrong opinions without government control. Authorities in these centuries had the power to react immediately. They made it a punishable offence to operate the new printing press without a license and granted such licenses only to printers who were loyal to the king or to the ruler. Authoritarian governments might decide to use the same tool to rein in erratic results of artificial intelligence.

Use and Abuse of ICT

I observe people who are excessively chitchatting in social networks and also use the internet for online gambling and gaming. Many people, including adolescents and children, are addicted to the internet and to social networks. People of all ages become more and more obsessed and spend many hours every day with watching news indiscriminately and participating in social networks. They use their mobile phones in almost all situations of daily life – even when eating, crossing the street or doing business in the bathroom. I regularly hear in China the voices of people who use their mobile phones inside the cubicles of public toilets. Researchers like Jonathan Haidt have established that teens spend in average four to nine hours every day on their phones and on computer screens.

Instead of watching their local environment and communicating with persons who are physically in front of them, many people spend their ample spare time staring at ultra-processed information on the monitors of their mobile phones. Many kids no longer focus on physical activities but spend their time sitting and playing computer games or watching social networks.

This behavior might change cognitive, social and other skills but experts don't agree if kids get smarter through the use of electronic entertainment or if it slows down mental and emotional development. It probably depends on the type of electronic entertainment.

Researchers tell us that levels of anxiety – particularly of girls – increased when teens were hyper-connected to each other via social networks. They point as an example at data from emergency rooms where girls in the age group of 10 to 15 years needed in the 2010s treatment for self-harm three times more often than in the years before. They claim that they have detected other markers for mental problems such as rapidly declining test scores in the US since 2012. Other researchers like Jonathan Haidt from the NYU Stern School of Business, have established that children and teens who over-use their smartphones show record-levels of depression, anxiety and suicide or might lose the capability to focus on responsibilities. As always in any research, his position found many critics who disagree with Haidt's findings. But even if excessive use of social media does not carry the risk of mental issues, it is for sure a mostly passive activity and by far not as productive and positive for the development of brain as seriously studying issues by reading research reports and essays and by discussing interesting issues with close friends, classmates and parents.

If you satisfy information hunger exclusively with TikTok, Instagram and similar social media that advertisers dominate, you will become their fodder. Your mind will become victim of unhealthy food. It

is similarly to eating only junk food. The U.S. Surgeon General, Vivek Murthy, adopted this view when he suggested that social media should carry the Surgeon General's warning about the harm that social media can cause their users. This would be similar to warnings that manufacturers of tobacco products have to display on their packages.

TikTok is an example of a social network provider that uses a content-recommendation system, that makes addictive. They design it to keep minors on the platform as long as possible and as often as possible. By achieving this goal, they rake in revenue from advertisers, which is their main goal. But they also create the danger of compulsive use, which they obviously accept as an obvious side-effect.

Because parents receive contradicting opinions about the usefulness or harmfulness of extensive social media use, they are confused and don't know how much they should allow their children to use smartphones. But this is in our current environment a rather theoretical question for two reasons: many parents firstly set bad examples by using extensively social networks themselves. They frequently stare at the screen of their mobile phones instead of interacting with their children. Parents secondly lose more and more the power to influence their children who become more and more autonomous and reject parental recommendations by saying 'Don't manage me'.

The disproportionate and compulsive use of social media and of the internet is an addiction when a person loses interest in offline activities, neglects responsibilities at work or at school or shows withdrawal symptoms when not online. But the Diagnostic and Statistical Manual of Mental Disorders in the US mentions only obsessive internet gaming a mental disorder but not internet addiction in general. Only China has declared internet addiction a "public health crisis".

Internet addiction might create the attitude that nothing exists except if it is presented on the screen of the mobile phone. People consider their activities with their phones as the most important occupation every day. It is their online life so to speak and online life replaces real life. If they are not connected with social networks, they feel that their lives are off-line and that they are dormant or homeless. People do not enjoy their environment on their own and with their own minds. They instead constantly consider posting a video of what they see. Instead of enjoying the environment, they ask themselves if their followers on Facebook or on 'X' will like what their videos show. For these freaks of social networks, an idea or a thought or an event exists only if they have published or found it in the internet. No business is complete before it is published in the internet for the pleasure of the community.

If one member of the family shares in social media too much information of family life, other family members, including children, can easily become victims of indiscretion. We call this 'oversharing'. One mother in Australia, for example posted in social media the exciting news that her daughter got her first period. This did not go down well with her daughter when her friends in school approached her about this post. I would be very upset if my wife were posting in social networks many details of my behavior, of my health issues or of conflicts in my family. Some people share this type of gossip on social networks because they can make money with videos on TikTok. I would even feel hurt if my wife discusses these things with her friends or with our neighbors. Having a slight penchant as a hermit, I need a good dose of privacy.

If I had been exposed to social networks starting with my early childhood, I would be what we can call a "digital native". We consider the generation Z, that was born between 1997 and 2012. as the first digital native generation. I would most likely today be another person with different cognitive skills. I might think today that nothing really exists if its existence is not confirmed on the monitor of my mobile phone. If an internet addict sees a brownish building, he will not believe his eyes. He will consult the internet and

will believe that the color of the building is actually blue if this is the information that he finds in his mobile phone. The internet does the viewing and thinking for him.

The telephone has for many people become like a holy cow that has sacred privileges and highest priorities. Many people interrupt whatever they do, when the telephone rings. Phone calls can even lead to a coitus interruptus as we have seen in the 2003 movie 'Love Actually'. Karl gets frustrated because Sarah, a workmate, with whom he is in bed ready to make love, suspends the proceedings three times in a row to answer phone calls.

Some Chinese stop their Buddhist prayers regularly when the phone rings. They make Buddha wait. I am always annoyed when my interlocutor takes a phone call and interrupts our discussion during an appointment that was difficult to get. Instead of saying to the caller 'Sorry, I am in a meeting; I call you back', they often talk endlessly on the phone. They then have difficulties picking up the thread of our conversation when they finally have finished the phone call.

Some decades ago, I was waiting in a queue of an information counter in a railway station in Mainz, Germany. The length of the queue was much to my disgust not shortening because the man behind the counter was taking phone calls to give information to callers and made the people wait in the queue. I left the queue, went to the next phone booth and called the man who immediately took the phone to answer my question.

One friend of mine is like the man from the railway station. When we discuss things or when we have dinner in a restaurant, he will interrupt our conversation for lengthy phone calls. The other day, I did in such a situation the same as I did decades ago in the railway station. I called him on his phone while sitting in front of him. In this way I was sure that we were not interrupted once our telephone conversation had started. I often see couples in restaurants not having any conversation but talking each on the mobile phone or surfing the internet.

At the Port Authority of Fiji, where I had to provide n the early 1990's assistance to the users of my management information system, staff members regularly called me to request my help. I was always annoyed when I arrived at the work place and the person who had called me for an urgent intervention told me that I should wait because she had to answer her phone. I was particularly irritated when I had to wait for a long time because the person was busy exchanging suggestions for daily prayers with another co-worker or with a friend. Staff members generally used excessively Christian messenger services during office hours. They constantly exchanged daily quotes of Bible passages.

Terrorists, criminals and the military use ICT, as it evolves to new heights, for their criminal or destructive purposes. Cyber-attacks by enemies can paralyze and destroy entire countries and their people. Enemies do not need nuclear power or bombs any more. They can disable vital communications, factories and institutions not with bombs but by hacking and disabling vital industrial control systems. Cyber Partisans can paralyze internet banking, the retailing and service sectors and can disable cloud services, on which people rely more and more for storage and processing of data. Cyber attacks not only target facilities on the ground but also satellites that provide GPS and communications services. They either physically destroy satellites or disable their signals.

Nature can also produce cyber attacks. Typhoon Yagi, which was one of the strongest in 10 years, created in 2024 devastation in the Philippines, then in Hainan Island, which is in the southernmost region of China and completed its destructions in northern Vietnam. I was on Hainan Island at that time. The typhoon knocked out power lines and disabled the internet, including telephone services. Payments by mobile

phone became impossible. As usually, I did not carry cash and I could not withdraw cash from the few ATMs that banks still operate. They were also knocked out of service.

More than 20 years ago, Boris Yeltsin laid the cards on the table by saying that, yes, Russia had to maintain their nuclear potential at the proper level. But he added that Russia had to devote "*more attention to developing the entire range of means of information warfare*". Vladimir Putin has not forgotten these words of his former boss and systematically sharpens, tests and uses Russia's weapons of cyber war, which he transforms into a hybrid war by combining the cyber crimes with acts of sabotage, disinformation and other non-military aggressions.

One cyber-military unit, known under the name 'Sandworm' or 'Unit 74455", is part of the military Chief Intelligence Office (GRU - Glavnoye Razvedyvatelnoye Upravlenie). GRU is different from the KGB, the Committee for State Security, for which Vladimir Putin had worked during the soviet times. KGB changed its name to Federal Security Service (FSB) after the fall of the soviet empire but Putin's presence and passion for secret spy activities guarantee that most functions of the infamous KGB continue in FSB.

The Sandworm hacking group and its many branches place malware – for example - in the control of electric power grids that then stop functioning or that destroy themselves. Cyber war is a narrow term because it does not include the use of ICT and of artificial intelligence in other areas. Drones and robots also use advanced ICT. They can operate using their own intelligence instead of relying on remote operators. Xi Jinping, the Chinese president, pushes for the development of 'intelligentized warfare' and 'informationized' warfare as the awkward translation calls it. This includes lethal autonomous weapons (LAWs) that operate without human oversight but use AI for the identification of targets and for the decision to destroy or to kill. Drones are examples of weapons that operators no longer control using radio waves that the enemy can scramble. Drones find their targets by themselves. The map of the area, over which they fly, is stored in their computers' memories and GPS guides them into their targets. However, where there is a will for the construction of weapons, there is an anti-will. Directed-energy weapons (DEWs) like continuous waves of high-power laser or microwave can disrupt or damage the sensors and electronics that autonomous systems use. This brings electronic warfare to perfection.

Cyber war has started some years ago. The media frequently report about Russian, Iranian and North Korean hacker attacks against institutions, businesses and government agencies in many countries. Russia uses, for example, systematic cyber attacks against electricity providers in the Ukraine in support of its military actions. And vice-versa, the US and Israel apparently had planted remotely a virus in a computer of a nuclear facility in Iran. This virus destroyed facilities for the enrichment of uranium by disabling the system for emergency shutdowns. Finally, cyber war moves into outer space where space weapons, including some with nuclear weapons, can destroy satellites of the enemy. The US have in 2019 created the Space Force as a new branch of the armed forces. This new branch protects assets in space that are vital for the country's communication, navigation, meteorology and intelligence.

What we read in the media is only the tip of the iceberg. Below the surface there must be unreported massive cyberattacks of many types in all directions. Russia, Iranian, North Korea and other powers might one day use gigantic ransomware that paralyzes the entire USA and forces the US government to surrender to the enemy. Cyberattacks can become high-impact weapons if artificial intelligence identifies the most vulnerable targets and the perfect methods to attack these vital targets.

The most dangerous aspect of cyber criminality is that they are not the privilege of governments or big organizations. Hackers can operate from the privacy of their homes anywhere in the world, 24 hours a day, seven days of every week.

Researchers in 2015 have found a way to hack computer systems of cars remotely using cell phone connectivity that is built into every modern car. They were able to control remotely steering wheel, engine, transmission, braking system, including windscreen wiper, air conditioner, door locks and so on. This allows a criminal hacker to cause accidents by disabling remotely the steering wheel or the brakes or any other function. Hackers can also use their powers to disable the starter. When the car owner wants to start the engine, he will hear a voice from the car's loudspeaker demanding a ransom of – let's say – hundred dollars in bitcoins before the hacker enables the starter again.

What hackers can do with cars they can also do with any system if it is connected to the internet. Targets of hacker attacks are – for example - alarm systems in buildings, control systems for electricity supply companies and any system that controls manufacturing processes or check-out equipment in supermarkets.

Honest Hackers can make money legally because hacking is not by itself a crime. If ethical hackers detect security gaps in a system, they can make the owner of the system aware of it and will most likely receive an award. A Belgian security expert, for example, detected a security weakness in the Spacelink satellite system and gained access to its services without being a subscriber. When he made the company aware of it, Spacelink paid him a reward. In another case Apple paid a PhD student $100,000 for successfully hacking a Mac and telling Apple how he did it. Some governments, for example in Germany, have expressly changed their criminal codes and don't punish hackers any more if they hack computers to detect security gaps and report them to the software companies.

Burglars and robbers have changed their business models, which are now much more efficient and more profitable. They no longer use crowbars and screwdrivers to enter the premises of their victims during inconvenient times of the night. From the comfort of their homes anywhere in the world, they gain access to their victims' computers via the internet, install ransomware or steal sensitive data for criminal exploitation. These criminals can paralyze power grids, factories, oil pipelines and government offices until the victims have mobilized the funds for paying ransom. Hackers have hit worldwide some 4,000 victims every day in 2020 with an increasing trend. Researchers estimate the damage conservatively at 20 billion USD every year. A special new type of crime appears in the domain of cryptocurrencies. The Federal Trade Commission, for example, reported in 2022 that over $1 billion USD had been stolen in cryptocurrency scams since the start of 2021.

Overall, victims of cybercrimes reported to the FBI $12.5 billion USD in losses from online scams in 2023. Banks in the US, which are special targets of cyber criminals, lost $2.5 billion USD from 2020 to 2023.

No end is in sight for the growth of cyber crimes in the near future. The sky is the limit for e-warriors, e-criminals and for governments of rogue countries like North Korea. This country funds sizable parts of its state budget with theft of cryptocurrency. North Korean hackers have stolen billions of dollars from banks and from cryptocurrency firms in the last few years. In one single heist in February 2025 alone, they have stolen $1.5 billion of the popular cryptocurrency 'Ethereum' from Bybit, the world's second-largest cryptocurrency exchange in Dubai, with over 40 million users.

Prosecutors refer to a special type of internet crime as 'pig butchering', which word refers to a pig farmer who fattens a pig before killing it. Under completely fake identities that they support with lovely fake photos, the criminals seek friendships on dating, and communication platforms where they target people who feel lonely. They groom their victims by exchanging tender messages for many months, during which time they make their victims feel comfortable and trusting. Once they have developed trust, they talk about extremely successful investments that they had made themselves and lure their victims into

substantial investments – mostly in cryptocurrencies. The victim invests his money on a fake website that the criminal controls. In the first phase of the crime, the investments show indeed high returns. This prompts most victims to become bolder and to invest more and more. Once the victim has invested most of his wealth and even money that he borrowed, the criminals shut down the victim's investment account, disappear and take along all the money. This scheme is as simple as that. The FBI estimates that pig butchers, who mostly operate from Myanmar, Laos and Cambodia stole in 2023 nearly $4 billion USD from tens of thousands of gullible American victims.

So called Black Widows apply the same method that pig butchers use. They don't even use the internet. Black Widows are women who groom older and lonely rich man until they agree to get married. They then sneakily kill their victims for the inheritance and subsequently repeat the same story with other men.

Quantum Computing

Current computers use chips or transistors that store base units of data not in decimal but in binary format called 'bits'. Every bit of information can have only the value of either '1' or '0' depending on the electrical charge that can only be positive or negative. A minimum of eight of these bits, called bytes, are necessary to store one basic alphanumeric character following an international standard which is called ASCII - American Standard Code for Information Interchange. The American National Standards Institute (ANSI) published its first version in 1963. It contained only 128 characters, including letters, digits, punctuation marks, and control characters.

The computer, for example, stores the small letter 'a' in its memory as the number 97 in the binary form '01100001'. We need many more additional bits to store more than 144,000 characters that almost 160 different modern and historic scripts are using. The Unicode Consortium is the standards body for the internationalization of software and services and has replaced ASCII.

Unicode still looks very clumsy but has worked so far quite well because computers can read and process such awkward data very fast for daily needs like word processing and for all other practical tasks for which we now use computers.

As a side note I wonder what our mathematical system would look like if nature had given us only three or four fingers on each hand. But during million years of evolution, nature found for us the most helpful constellation, which are five fingers on both hands. If we had three or four fingers on each hand, we would probably not have a decimal system with 10 as the base but would most likely have a system based on three or four instead of ten. We call a numerical system 'octal' that uses eight numbers as its base. The next number after 8 would be written 11, which corresponds 9 in the decimal system. People in the Babylonian civilization used systems that they based on 60 and 12. These systems have survived until today when we divide a circle in 360 degrees, one hour in 60 minutes and one minute into 60 seconds and when we divide the year into 12 months and the month into 30 days. In some contexts, like in the world of computers, we use a hexadecimal number system that has a base value equal to 16. Hexadecimal numbers are represented by the symbols 0 to 9 and beyond this by the letters A to F which represent the numbers 10 to 16 respectively in the decimal system. I would say in hexadecimal language that I have bought C bananas instead of saying that I bought twelve of them.

The radical rationalists of the French revolution thought that dividing the day into 24 hours and the year into 12 months was a reactionary way of telling time. They tried to introduce the decimal system and counted 10 days in a week, 10 hours in a day, 100 minutes in an hour and 100 seconds in a minute. They were unsuccessful because the traditional way of telling time was too much entrenched in the minds of the French people. Americans also still use the uncomfortable imperial system of measurements for

distances and weights. They still use miles, inches and acres instead of kilometers, centimeters and hectares. To close this side note I wonder if our creator has given us 10 fingers because the decimal system is easy to use or if it is coincidence that we use the decimal system and have ten fingers. Our forefathers might have made trials and errors with various mathematical systems and agreed after trials and errors on the decimal system as the easiest method to calculate.

The future quantum computers will no longer use zeros and ones. Instead, they use electrons and electron waves as they occur in the subatomic world.

The base unit for storage of data is called QuBit. We can make these bits from materials like trapped ions or photons of which some work properly only if they are kept at temperatures very close to absolute zero. QuBits can not only hold either the value '0' or '1' but by way of superposition any values in-between. The actual value that a QuBit holds emerges when one QuBit is linked ('entangled') in relationship with another QuBit using a certain rule that information scientists discovered or developed. The Quantum computer stores and processes data not by charging and discharging electricity in transistors but by manipulating the mechanics of motions and interaction of subatomic particles. These movements are to some extent fragile, which creates the challenge to make them more stable by protecting them from outside influences that disturb the movements of the subatomic particles.

Quantum information science is the name of this complex new scientific field of studies. It is very difficult to understand for a man like me, who went during the middle of the 20th century to school. At that time, we did in school not even talk about computers. Quantum mechanics are so complicated that a scientist stated that someone who claims that he understands quantum mechanics clearly shows that he has no idea what quantum mechanics are. Unfortunately, the inversion of this argument is not true. When I correctly state that I do not understand what quantum mechanics are, this does not mean that I know everything about it. But I do not have to know the inner workings of a quantum computer to make a prognosis about its future, which currently looks very promising.

I base my prediction of the quantum computer's bright future on the fact that different fields of science and many industry sectors urgently need computers that are exponentially more performant than current computers. Demand often triggers supply.

Quantum computers greatly outperform silicon-based computers. Google used in 2019 an experimental quantum computer to perform in 200 seconds a specific calculation for which a classic IBM supercomputer, as Google claimed, would have taken 10,000 years. This might be a grossly exaggerated claim, which IBM promptly rejected, but it is very likely that a quantum computer can perform calculations in hours for which a classic computer might need a couple of years. Sciences like biology and chemistry require extremely fast computing. Increased computer speed is also useful in practical applications like searches in huge databases and in cracking encrypted data. The capability of a quantum computer to easily decipher and de-code encrypted data incidentally will require totally new encryption methods that even a quantum computer hopefully cannot decipher.

I base my prediction of a positive future of quantum computers not only on the need for faster data processing but also on the fact that many companies like IBM, Microsoft and Honeywell currently show strong commitment towards further development of such computers using different approaches and investing billions of USD. There is a strong competition that drives the development.

It is extremely expensive – some 10 billion USD - to build and to maintain a powerful quantum computer with hundreds – if not thousands - of QuBits, which work reliably only at extremely low temperatures. This speaks against its popularization and speaks against its general use as we use PCs today. The

companies that work on these developments plan to make their quantum computers available as a cloud service to research organizations, universities, and laboratories and actually to everybody who needs extreme computing power. As a matter of fact, personal computers and tablet computers do not need considerable computing power if they are connected via the internet to a central computer, which we call a 'cloud computer. This computer does all the computing and stores centrally all data for the end user. The term "cloud computing" comes from the fact that the first diagrams of networks used the symbol of a cloud to represent networks.

A Chinese company in Futian Qu district, Shenzhen, with the name 'SpinQ Technology', has developed and sells for $50,000 a scaled-down quantum desktop computer with only 2 QuBits. It works with Nuclear Magnetic Resonance (NMR) similar to the technology that MRI machines use. This technology encloses specially selected molecules in a very strong magnetic field and zap them with radio frequency that manipulates the spins of the atoms in the molecules. I do not understand how this enables any calculations. But the company's innovative approach shows how dynamic the technological development is in the field of quantum computing. SpinQ is now planning to offer lighter version as a desktop quantum computer for 5,000 USD. This is a little bit cheaper than the equally sensational IBM AT computer that I bought in the early 1980's. Obviously, if I adjust the price that I paid at that time, for inflation, the IBM-AT would have cost me probably $15,000 USD.

In a couple of centuries when quantum computers have become standard computing devices, people might look back at the 20th and 21st centuries and might laugh at the very primitive concept that is behind today's computers with transistors and clumsy binary data.

On the other hand, the development of large quantum computers, let's say with 1,000 QuBits, encounters many still unresolved challenges. The problem is to control and to coordinate millions or even billions of simultaneous transactions for which we have to rely on the regularity of the motions and interaction of subatomic particles. The motions of particles that the quantum computer exploits are extremely steady. We call these regular movements the laws of physics and discover in all these movements mathematical concepts. It is fortunate that nature has created many regular and precise periodic processes like the spin of our planet, of the moon and motions of subatomic particles that we can use for things like clocks and quantum computers. It would be interesting to figure out the effects on our lives if our earth and other stars in the cosmos were moving at completely irregular speeds.

As a side note I want to mention that the speed at which stars spin around themselves defines the shape of a star, which can be perfectly spherical or can bulge out at their respective equators. Our sun is almost 100% spherical because it rotates at relatively slow speed while our earth spins faster and centrifugal forces make it bulge out at the equator.

Mother Nature has created these motions not for the purposes for which quantum scientists want to use them. These motions are astonishingly regular but not consistently regular enough to use them for quantum computing. '*One of the basic rules of the universe is that nothing is perfect. Perfection simply doesn't exist*'. This is how Stephen Hawking, who knew the cosmos like the pockets of his trousers, put it. Even the earth's rotation on its own axis is not consistently regular. We colloquially say that one solar day has 86,400 seconds or 24 hours. But nature wanted that since the 19th century the time for one complete rotation has generally become longer by 1.7 milliseconds. However, the spin of our globe has since 1990 become faster making, for example, the 29th of June 2022 the shortest day with 1.59 milliseconds shorter than the standard day of the atomic clock.

To make the point that movements of our earth are not guaranteed regular, researchers tell us that drastic ice melt on the earth's both poles is slowing our planet's rotation with the result that we soon will have to subtract a leap second in 2029 for the first time in a decade. This is a reversal of the opposite trend that caused the need to add since 1972 a total of 27 seconds to adjust our clocks to the longer time for one rotation of our earth around its axis.

If such irregularities happen with the movements of subatomic particles in a quantum computer and you multiply the variations by billions of mathematical transactions, the inaccuracy can easily become unacceptable. In addition, Quantum computers are highly susceptible to disturbances by electromagnetic signals, or changes of temperature and of the Earth's magnetic field, which we call magnetosphere. Computer scientists call the resulting possibilities of inaccuracies 'noise' that they try to eliminate with all kinds of tricks, including with AI-powered classic computers that will bring the necessary order into quantum computers.

Scientists therefore work on the development of a quality assurance system for the quantum computer. If they cannot master this challenge, the development of quantum computers will fail. The attempt to build a quantum computer might move into the footnotes of future history books as one of the crazy attempts of mankind to use natural phenomena for purposes that Mother Nature had not considered when she created these phenomena. On the other hand, if quantum computers become successful as standard tools, our descendants in 200 years will laugh at people of the 21st century because they use a clumsy and primitive silicon-based technology based only on zeros and ones.

Much more powerful computers than quantum computers might in future be 'biocomputers', that I have mentioned above. These devices will not simply use what we call man-made artificial intelligence, but will use 'organoid intelligence' (OI) that nature had created in the human brain and in all parts of our body, including in every cell.

God-fearing people might issue warnings to ICT developers because they anticipate and fear that God will punish mankind for the unholy attempt to become smarter than him. He had already reacted once to human hubris when he punished the people in Babylon when they tried to build a tower that would reach God's residence in heaven.

Artificial Intelligence (AI)

The inventors of electronic devices that were able to calculate, called them aptly 'computers' in English because these devices did calculations. The German language calls them 'Rechner', which also refers to the device's capacity to perform calculations. The Chinese word for computer is diàn nǎo (电脑), which means 'electric brain'. This word points at artificial intelligence because the device does calculations that prior to its invention only the brain was able to perform.

We don't say today that artificial intelligence animates an electric calculator. We refer to 'artificial intelligence' (AI) today only when the computer software does massive calculations, recognizes situations and improves its operations recursively without further human input. But it is actually not the computer but the man-made software that generates intelligent results. Some of these results can have extremely consequential and damaging outcomes if the software engineer has not built-in the necessary restrictions.

Some fearful critics see developers of intelligent software like parents who release their super-intelligent children into society and don't control them any more. The independent offspring can use their powers either wisely for the benefit of mankind or indiscriminately with harmful consequences. This comparison is quite fitting because parents can educate their children to avoid harm to themselves and to others,

which parents nowadays don't do. But software programmers can educate their systems so that they don't misbehave after their release into our environment.

We don't yet know what exactly all the risks of AI are. Geoffrey Hinton, whom some people call the "Godfather of AI" and who received 2024 the Nobel Prize in physics, predicted that there is a 10% chance that AI will lead to human extinction within the next three decades. I wonder how he calculated the numbers ten and three. But I guess that he just wanted to express his fears that AI could turn into a Frankenstein monster.

The risks are obviously different depending on the area, in which software uses AI. The risks are probably low if manufacturers use AI to improve production of goods for which we have quality standards. Malfunctioning software in manufacturing or in self-driving cars can cause limited damage. The risks are significantly higher if AI is allowed to decide autonomously that the entire electricity grid in a country must be shut down. Even more catastrophic will be the autonomous decision of software to press the red button for the launch of an intercontinental ballistic missile with nuclear warheads.

The international community has slowly become active to regulate the use of autonomous weapons. Following the 2023 UN General Assembly Resolution on "Lethal Autonomous Weapons Systems", the government of Austria organized in 2024 a Conference on Autonomous Weapons Systems in Vienna. More than 1,000 participants from 144 sates discussed fundamental issues and challenges to create international regulations for the use of such weapons. The conference submitted a summary of their deliberations to the UN Secretary-General for consideration. The mills of UN grind very slowly. I therefore predict that, if the UN manages to cobble together a treaty, it will not be a before the end of 2050 that a sufficient number of nations ratify such a treaty. But probably a lethal event like a 3rd World War must come to speed up the process as did the 2nd World War to produce a convention of human rights.

People in liberal democracies nowadays don't accept that governments legislate the requirement of a license for producing chatbots. Instead, legislators timidly consider to hold the developers of chatbots accountable fort products that can have highly negative impacts. Politicians who want to avoid criticism by their voters just politely suggest that the providers of chatbot services voluntarily agree to be transparent, to keep records and to instigate processes to mitigate the risk of data bias. Obviously, if an enemy or adversary uses AI software, he will not adhere to regulations of self-restraint. AI is a tool that Warren Buffet, the investment guru, compared with nuclear technology that we can use to create wonderful things but also for the destruction of our globe. As a matter of fact, everybody can use almost everything like knives, guns, fertilizer and cars to do good things or to kill people.

Critics of AI software and of chatbot systems point out that mankind, if they rely too much on AI, will no longer develop basic thinking skills because AI does all the thinking for us. My parents used a similar type of argument when electronic calculators came on the market for consumers. My parents strongly suggested that I continue making calculations manually or by mental arithmetic. In this way, they argued, I will develop my mathematical skills, keep these skills alive and prevent my brain from shrinking. This was a popular opinion in the mid-1970s when a mathematics teacher magazine reported about a survey that found that 72% of respondents opposed the use of calculators by seventh graders.

And indeed, people today will have difficulties to produce with mental arithmetic the result, for example, of dividing the number 1943 by 11. The Greek philosopher Socrates had some two thousand years ago already voiced concerns against the invention of writing because he feared that this would cause forgetfulness. The invention of the wheel thousands of years prior to Socrates might also have found

critics who feared that mankind would turn soft and lazy by using the new invention instead of carrying goods on their backs as all their forefathers did.

Artificial intelligence can generate high quality exam papers very fast. But educators have not yet agreed on how to deal with these new facilities. Some educators request that students should produce an exam paper from scratch as the previous generations did, including me. They argue that this is the only way to demonstrate scientific skills and critical thinking. Others say that students can leave the boring mental monkey work to computers and that the students can then demonstrate critical thinking by analyzing and verifying the paper that a chatbot has produced for them.

Fearmongers are finally worried that artificial intelligence could spell the end of the human race if AI controls machines on which our lives depend. These machines might get off track and take uncontrolled initiatives for harmful actions. If people take the habit to rely on AI to control functions of vital facilities and do no longer know how to control these functions themselves, they will be helplessly exposed to the risk that AI malfunctions for whatever reasons.

Self-driving cars are good examples of machines that might properly function in normal situations but might suddenly fail if the software produces wrong results and lets the car crash into an oncoming vehicle. A driver of a car who always relies on the autopilot might in such situations either be sleeping or might no longer know how to slow down the car by applying the brakes. Software that automatically operates an airplane is extremely helpful but should not make a pilot redundant who should monitor the decisions that the software makes. A pilot must keep the skills to operate an airplane in difficult situations when the software fails.

If AI operates machines autonomously for globally vital processes, the enormous power of AI may indeed become an existential risk for humanity. These are the warnings that I sometimes hear from pessimistic people who always fear new developments. A Bavarian proverb says '*What a farmer doesn't know, he doesn't want to eat*' ("Was der Bauer nicht kennt, frißt er nicht). This describes very well the attitude of people who always get suspicious and fearful in the face of innovations. These people are not intelligent enough to imagine that even software developers can manage risks by abundantly testing their applications and by building automatic emergency brakes into their systems.

Smart and intelligent are two words that originally described living beings. But when a computer processes intricate information at high speed, we apply an anthropomorph attitude and call the computer 'intelligent' without distinguishing different types of intelligence or cognitive skills.

We use the word 'smart' not only for humans and for some animals but also for telephones that offer more facilities than a traditional telephone. Nobody so far has described a smartphone as a device that possesses artificial smartness or artificial intelligence. It is smart because the manufacturer of the phone has put software into it that provides many fancy functions of which some are even useful. I think that software with so-called artificial intelligence is not different from smart phones. It is software that programmers have designed to perform complicated functions with programming techniques that produce innovative solutions for which humans need much more time. Not the software is intelligent but the programmers are smart and intelligent. The American theoretical physicist Michio Kaku, whom we primarily know as a popularizer of science, made the provocative statement that devices with AI are "glorified tape recorders." Alison Gopnik, a professor of psychology at the University of California, Berkeley, similarly said that artificial generative intelligence (AGI) is little more than '*a very good marketing slogan*'

We say that artificial intelligence is the power behind very sophisticated and innovative software. To break this down, we should mention two different things. One is the huge amount of data that AI-powered applications can use thanks to almost unlimited data storage capacities of computers and their capacity to retrieve specific data. Another thing is the analysis of such data. The larger the treasure of data, the more 'knowledge-based' will be the decision that the computer proposes. Some software, for example in self-driving cars, uses data coming from cameras and from sensors. The camera in a self-driving car sees an oncoming car and captures information about its size, distance, speed and direction and calculates from sample data in its memory the probability of a crash. This will trigger the computer' decision to issue a warning or to activate the brakes.

Availability and accessibility of huge data volumes are an essential source for a computer to produce results but this is not part of intelligence. We would also not call a human being intelligent who can recite by heart the entire content of the Bible. '*Any fool can know; the point is to understand*'. This is how Albert Einstein has put it.

When we talk about artificial intelligence, we rather refer to the capacity of software to select from the huge mass of data specific information that is relevant for the task at hand. In the task of selecting relevant information, the software uses natural language processing (NLP) techniques, which in my understanding work similar to search engines from Google or Bing.

The software manipulates the data and information and comes to a preliminary result. It then repeats these two steps of selecting and processing data as many times as it is needed to achieve the best of the desired outcome. In these seemingly endless and fast reiterations, the software uses statistical techniques, probabilistic methods for uncertain reasoning and imitates neural networks of the brain. The computer makes the results with these reiterations progressively better, which is why we call it machine learning. This is actually the same reiterating process that we humans also use when we make decisions that are not based on spontaneous impulse. We use the information that we have about facts and assess their importance and relevance. We then base a possible course of action on the facts on hand and forecast the probable outcome. We then repeat these steps until we are convinced that a certain course of action might produce the most beneficial outcome. Artificial intelligence is not smarter in this process but more detailed, more precise and much faster.

If software produces bad results like a self-driving car which crashes into an oncoming vehicle, it is not the artificial intelligence that has failed but the software programmer who did not foresee that his software did respond incorrectly in a specific situation. The software programmer can then search for the reasons of the failure and will amend the software.

The risk of a crash does not only come from the software or its imperfection. The risk comes also from the driver who relies blindly or prematurely on new and not-yet perfect software. Airplanes can now safely fly without a pilot given that the sky is not as crowded as a highway or an inner-city street. There are no traffic lights in the sky and no curves and not many obstacles. I cannot see any reason why a car cannot move safely without a driver – provided the software is extensively tested and is made reasonably foolproof, which is not yet the case. Fearmongers should consider that at this point of the development, a passenger should not leave the operation of a car entirely to the software. But driving software can assist efficiently to notice an obstacle that the driver might otherwise not see. The software, which monitors the activities of a driver without driving the car itself, can either warn the driver or take action on behalf of the inattentive driver. A very simple form of this monitoring function is a button that the conductor of a train has to keep pushed down and stops the train if the conductor takes his hand off the button because he fell asleep. A more sophisticated monitoring system uses a camera that watches the

face of the conductor and raises alarm when the face shows signs of fatigue or stops the train if the camera detects that the conductor soundly sleeps and does not wake up from the sound of the alarm. We don't say that AI drives such a system. It has just some smell of intelligence.

We have seen in the past many applications that programmers developed close to perfection after periods of trial and error. They perform in a way that we don't call any longer artificial intelligence because they are just very sophisticated. One example is software for playing chess. Another example is software that can read written characters and can recognize faces of people. Live translations and software for internet searches are other examples of even smarter software. Once software works properly according to specifications, we no longer call it artificial intelligence. It is then just another piece of sophisticated software. I considered Optical Character Recognition (OCR), which Ray Kurzweil introduced in 1976, as incredibly phenomenal. I would have called it artificial intelligence but this term, which the computer scientist John McCarthy had coined in 1956, was not yet part of the public vocabulary. OCR is now standard software like translation software. Many people use such software if they don't want to learn a new language in three days with 'Babble' or with similar phony online language schools. We don't say today that AI powers OCR and translation software.

Software that translates printed or spoken text into another language is now standard software that we use in many different contexts. I don't call it AI-driven because it is standard for everyday use. When I see simplified Chinese characters on a street sign or in the menu of a restaurant, I use my mobile phone, take a photo with 'Baidu Translate' and I see immediately the English translation. In a further development, you will be able to wear smart glasses that display simultaneous translations in real time. Google and Microsoft have already presented prototypes that show translated transcriptions of a conversation – like subtitles in a movie– on the lower half of the glasses that you wear. All this is fantastic but nobody talks any more about artificial intelligence for such applications. We call it augmented reality (AR) or just one of many new apps.

Computer programmers – to give another example - developed a piece of software for Sam's Club, a retail and grocery warehouse that Walmart owns. The software analyzes heaps of data from customers. The goal is to predict how many pumpkin pies or how much cranberry sauce each of its nearly 600 stores have to keep in stock for the Thanksgiving season. Data that the software uses, include local temperatures because hot weather means that Walmart sells fewer pies. The software also uses information about football games. Data from the past has shown that people consume more pies during home games than during a game outside town. The software also considers the usual fact that if more pecan pies are sold, the stores sell fewer pumpkin pies. I call the systematic collection of all that data rather bean counting than artificial intelligence.

This method to monitor and to predict the volume of sales reminds me of the owner of a business that repaired shoes 'while you wait'. His name was Peter who called his outlets 'EuroQual Shoe Bars'. He operated during the 1980's some cubicles for instant shoe repair inside several shopping malls in Winnipeg. He feared that staff cheated by selling replacements of leather soles with soles that they had secretly brought to the workplace instead of using the soles from the company's stock. Sole replacements are big ticket items in shoe bars. When using their own soles, staff use glue, nails and the machines from the shoe bar. They by-pass the cash register when they collect the money. Peter asked me to develop software for statistics about the amounts of nails and glue that his staff used compared to soles that they officially sold. A red flag came up when his men used more nails and glue than usually without the corresponding records for sales of soles. When this happened, Peter started observing the shoe bar discretely from a certain distance to find out if his staff was cheating. However, the most significant tool

that I developed was to record the weather conditions because on rainy days visitors of the shopping mall regularly waited until the rain stopped and used this waiting time to have their shoes repaired. We observed a quite precise percentage of more sole replacements on rainy days compared to days when there was no rain. If on rainy days the staff members did not report the usual increase of sole replacements but the number of used nails and the amount of glue increased, there was the suspicion that staff was cheating. We did not claim that my software used artificial intelligence but Peter and I were proud of our clever detective system.

If we calculate in our head the result of 3 x 7, we must use our natural intelligence. We could do this by retrieving the result from our memory if we have learnt by heart the multiplication table, which we also call 'times table'. Otherwise, we can add three times the number seven to arrive at the result, which is 21. A person with smart intelligence, let's call him Matt, will not mechanically add five times seven to calculate the result for 5 x 7 but will first and easily calculate 10 x 7, which is 700 and will then half this amount. And finally, to calculate 9 x 7, Matt will again calculate 10 x 7 and then deduct seven to arrive at 63. The computer is not as smart as Matt. The computer will do the calculations mechanically by adding seven as often as required. Software does not need smartness to create shortcuts because the computer compensates its lack of intelligence with the speed of its operations. We could nevertheless claim that this computer has artificial intelligence because it produces extremely fast the same results that an intelligent person like Matt produces by figuring out a clever shortcut.

This reminds me of a joke that I heard at the university of Tübingen when I was assistant of professor Gernhuber. We said that you can become professor in three different ways: firstly, you can become a professor if you are extraordinarily intelligent, which is given only to very few students. Secondly, you can advance your career by befriending and marrying a professor's daughter. We called someone who was successful on this pathway a professor by penis. The third option, available for most of us, is perseverance and stamina (Sitzfleisch). You just work hard until the time comes when the university finally acknowledges your endurance and does not find a better candidate. Winston Churchill, the British prime minister during the 2nd World War, was a poor student at school and barely passed his exams. But by studying English very hard by himself he became a gifted and witted speaker and was elected to the top of his country at a time when well crafted speeches became essential to encourage the British people not to give up. This Churchill once emphasized that continuous effort, not strength or intelligence, is the key to unlock your potential. In this context he recommended that if you you're going through hell, keep going. This is drastic advocacy for endurance and resilience as the main ingredient for success. Computers do just that.

If a computer calculates in no time the result for 1943 x 7, which is 13,601, the computer outperforms the brain not because it is much smarter than human beings but because it is much faster in completing mechanically 1,943 times the addition of 7. The computer will not even be smart enough to turn around the task by calculating seven times 1943, which involves only seven transactions. The computer programmer could tell the computer to save energy by inverting the calculation from 1943 x 7 to 7 x 1943 but this additional smart move would be overkill because the computer is extremely fast in both ways. In short, we should distinguish between the results that a computer can produce and the methods by which the completes a task. Another example of a computer's lack of intelligence is the way, in which the computer retrieves information from its memory. The computer needs an address where the information is stored or it has to go serially through all records until it finds the right piece of information. The human brain is smarter by using the power of associations and retrieving information by its content and not by searching for a physical address in the brain or by running serially through the entire content of its memory.

When I was many years ago writing myself software for sea port management, I let my software calculate all port dues that a vessel owed for using the facilities of the sea port. The calculation involved many things like retrieving the hours that the vessel had spent alongside and reading the port tariff that was in effect at the time of the vessel's arrival. When I tested for the first time if the calculations were correct, I could not see the results on the screen. I became nervous until I found out that I had forgotten to tell the computer to display the result. The computer was not intelligent enough to know that I wanted to see the result on the monitor. Computers are like obedient children, if you remember that such children existed long time ago. They do only what they are told to do.

Computers act only on precise instructions. This principle has not changed since the beginning of computing when software instructed the computer to do action 'A' when the result of the previous step was 'X' and action 'B' when the result was not 'X'. This is not artificial intelligence but the result of the programmer's work. It was an ingenious novelty of the ENIAC computer in 1943, when it took conditional instructions (IF . . THEN). Programmers instructed this gigantic machine to branch into different operations depending on the result of a previous computation. Nobody talked about artificial intelligence at that time.

Carl Friedrich Gauss, who was born 1777 in Brunswick (Braunschweig), is a very famous German mathematician who showed his talents already when he went to school. One day his teacher had to go away to run some errands. To keep his students busy during his absence, he asked them to add up all numbers from one to hundred. The teacher had just put on his jacket and was ready to leave the classroom when the young Gauss called out the answer, which is 5,050. Instead of mechanically adding up one hundred numbers one after the other, Gauss realized with his natural intelligence that the numbers zero plus hundred, 1 plus 99, 2 plus 98 etc. all add up to 100 each until the pair of numbers is 49 plus 51. Hence, he calculated easily fifty times one hundred, which is 5,000 and he added the number 50 in the middle. A computer is not intelligent like Gauss. The computer is persevering like Churchill and will mechanically add up all numbers from 1 to 100 in no time. A computer programmer will see no utility to develop the shortcut that Gauss used and would waste his time to write complicated software for a shortcut that will be useful only very rarely.

Let's assume that I had never seen in my life an electronic calculator and that all of a sudden someone presents me such a toy and shows me how it works. I would say that this machine possesses artificial intelligence because it can perform operations that usually only the human brain is able to perform. Today, we don't say that a calculator has artificial intelligence but we say that software and computers possess artificial intelligence only when they perform more complicated calculations and processes. But the principle is the same because a computer with so-called artificial intelligence will only do what software programmers tell it to do, including to draw pre-defined conclusions from interim results and to act according to such conclusions even if the programmer does not know in detail what these conclusions might be. But a prudent programmer will carefully study all scenarios that the computer might encounter. He will build guardrails to keep the system in check. He will not build a car without brakes.

Chess playing software follows clear rules for a total number of 10^{120} possible moves, including illegal moves. But chess is paradise for a powerful computer because clear rules govern the environment even if the rules involve masses of numbers and processes. The clarity of rules made the development of chess playing software attractive for programmers. No artificial intelligence but only high computing power is needed to process all possible moves taking the games of famous chess players as models. These chess playing computers are 'trained' as specialists call this tedious process of collecting data from more than 150,000 games. Incidentally, most chess games end in average after only 30 to 60 moves, which makes

the work of a computer programmer easier. I guess that chess playing software prepares every move by analyzing the current position of stones and not by analyzing the opponent's mind except possibly that it uses information from previous games that the opponent played.

Software developments in other areas, in which no clear rules like in chess exist, require obviously more sophisticated programming efforts to create perfect results.

I can see an excessive risk of so-called artificial intelligence if programmers allow the software to do automatically things like pushing the red button to send a nuclear intercontinental missile to the capital city of the enemy, which will trigger a deadly nuclear response. In this case, the catastrophic result will not be the fault of autonomous artificial intelligence but the fault of the programmer of the software and the fault of the people who trust the software to make autonomously far-reaching decisions. It will be necessary that developers build into the software a list of the worst-case scenarios that an AI-driven device is not allowed to produce without human approval.

An interesting application of artificial intelligence will very likely develop in the courts of law for the automatic prediction of judicial decisions. If an intelligent computer warns a litigant that his lawsuit will not succeed the litigant might not proceed and there might be only a fraction of court cases.

Researchers from the Institute for Artificial Intelligence at Tsinghua University in Beijing have proposed a system that they base on 'Legal Reading Comprehension' as they call it in the English translation. The experimental system processes natural language by recognizing patterns of legal language and the logic of its grammar. Having had some exposure to Mandarin and its lack of logic and preciseness, I must congratulate the researchers at Tsinghua University for their courage to try natural language processing (NLP) with their extremely difficult and illogical language.

The system, which the Tsinghua researchers call 'AutoJudge' or 'RoboJudge', follows the working protocols of human judges. The system predicts possible judgments in court cases. It collects information from the statement of facts of the plaintiff's plea and the relevant articles of law, that the plaintiff quoted in his plea. The system then captures the complex semantic interactions among facts, pleas, and laws. It constructs a dataset of real-world civil cases with relevant precedents that then allows a prediction. The system is still experimental but has in my opinion a great potential in jurisdictions, in which petitions, claims and responses that lawyers submit to the courts, must follow mandatory logical structures and templates.

If, in addition, laws and precedents are properly indexed with cross-references, I predict a bright future for an automatic judgment prediction system. It will allow the parties in a dispute to assess chances of success before filing a petition or a claim. It also makes the work of judges easier when they receive from the system the draft of a decision with annotations for their consideration. Each feuding party in such a system will feed the computer with their respective arguments and the robot will spit out the draft of a judgment. This is still short of a system, that replaces judges. A law firm in Ontario analyzed the usefulness and reliability of GPT-3 for lawyers and concluded in its report that many functions will have to be improved. But their report predicted that the improved version GPT-4 will not supplant lawyers but only lawyers who do not use ChatGPT.

The judiciary of England and Wales was one of the first to publish guidelines for judges and their staff about the use of chatbots. This document shows that England and Wales have accepted but not fully embraced AI as a tool in the judiciary. It recommends to use AI-driven tools but gives many recommendations how to use them wisely and responsibly. A contentious issue is that the guidelines

don't call for the disclosure when a judge has used chatbots in his decision. The guidelines clearly demands that a judge must remain fully responsible for his work.

Judges in many courts of higher levels use bench assistants to search for precedents and to draft a legal opinion. These judges rely on the quality of their assistants' work. In the High Court of Lesotho and in the Supreme Court of Nepal I have observed that the bench assistants practically handled the court cases and the judges often signed the judgments after brief review of the draft that the assistant had prepared. For these judges it might be less risky to use ChatGPT than to rely on the work of an underpaid and overworked bench assistant who might have been biased.

After I had watched several proceedings in small claims courts, I had the impression that judges acted like robots when they handed down many decisions in a row after hearings that each lasted not more than 10-minutes. They handed down their decisions as fast as a computer might do, except that the computer's judgment might be more accurate. I often felt that the parties in small claims court cases – instead of asking the judge - had better thrown a coin to resolve their disputes. After all, if a coin has the capacity to solve a dispute, we can conclude that it possesses intelligence. This is what a lawyer in Vancouver replied after I had asked him about the chances of success of a lawsuit. He said: '*Based on my experience, the result of court processes in British Columbia is highly uncertain*'. Artificial intelligence could replace many judges and could create more predictability and more legal certainty.

A lighter version of AI in the judiciary appears when lawyers of parties in court proceedings submit their court documents that they produce with ChatGPT or similar software. Some legal purists fear that AI produces submissions to the court that they call "hallucinations". These AI-produced documents might, as they argue, inadvertently mislead the court by misrepresenting evidence or precedents. Nobody suggests that lawyers must not use tools like ChatGPT to prepare submissions to the court. The judge will anyway have a hard time to distinguish a document produced by artificial intelligence from a document that an average lawyer has drafted. Instead, the Court of King's Bench in Manitoba, for example, issued in June 2023 a Practice Direction, that prescribes that a lawyer who used AI in the preparation of court filings, must reveal that he has used artificial intelligence. While I find the requirement in the Practice Direction justified as a measure of abundant precaution, I find the fear of the legal purists exaggerated because many lawyers out of abundant zeal to win a case, often submit misleading arguments that they produce without artificial intelligence but with the bias of their own scholarly intelligence.

Exploration and Conquest of the Cosmos

Space exploration did not exist When I was born in 1943. It was only one year later, in 1944, when the German engineer Wernher von Braun, developed the V2 rocket that reached space.

Space exploration and deep space exploration now not only exist but have an incredibly bright future if no global turmoil spoils their progress. Space travel did in the 1940's and 1950's not even exist in our minds. It was only in 1969, twenty-six years after my birth, that I watched Neil Armstrong on TV walking on the moon as the first human being. At the time when I was a boy, such a feast was not imaginable. It was also not foreseeable that the spacecraft Voyager 1, which the Americans launched in 1977, would almost 50 years later fly into the interstellar space beyond the solar system in a distance of 24 billion kms and would still be under the control of NASA engineers. This timeline shows that a serious space exploration project is the responsibility not only of one but of several generations of engineers who work in an inter-generational relay race.

Before Neil Armstrong walked on the moon the moon's uneven surface inspired the blissful idea of a man in the moon. Fancy observers sometimes interpreted the shapes of the moon's surface as the face of a person or of an animal similar to the interpretation of the shapes of clouds. Scientists call 'pareidolia' our brain's tendency to see and recognize images on objects or clouds. This makes the brain a recognition machine for illusions of faces and other objects.

We obviously could not imagine at the time when I was a boy that a human being in flesh and blood could walk on the moon two or three decades later. The first scientist who speculated about the possibility of using rocket technology for manned spaceflights was the Russian scientist Konstantin Eduardovich Tsiolkovsky in 1903. Twenty years later, Hermann Oberth published a book with the title 'The Rocket into Planetary Space' (Die Rakete zu den Planetenräumen). He explained in his book with mathematical calculations that rockets could escape the earth's gravitation if they were sufficiently fast. The German ministry of war, as the ministry of defense was called in all countries, rejected Oberth's idea as pure fantasy.

Prior to this, people had no better ideas than to use rockets for fireworks, for improving artillery and for research of the atmosphere in higher altitudes. Nobody had the simple idea that they could improve a toy rocket for fireworks well enough to transport people into space. Simple ideas or observations have sometimes enormous results. An example is the invention of the steam engine. One man observed that the lid of a kettle with boiling water was dancing because steam was coming out of the pot. He pressed the lid down and noticed that some force was needed to keep it down. He then had the simple idea to use the power of steam in an engine. This story is probably not fully true but could be true. It exemplifies that observations of small happenings can trigger important technical innovations.

There are tech freaks who successfully experimented with steam-powered rockets. They were optimistic that they can further improve the steam technology to propel rockets into the cosmos. Mike Hughes who called himself the 'Mad Mike' is a tragic example. The core of his rocket was a pressure tank with 112 gallons of water that an immersion heater brought to a temperature of 400 degrees and a pressure of 247 PSI. When he opened a valve at the bottom of the water tank, the superheated high pressure of the steam escaped and propelled the rocket into the air. Mike had planned to reach as a passenger of his rocket the outer atmosphere. His rocket gained during a test flight a maximum speed of more than 560 km/h and reached 570 meters altitude. He crashed into the desert of Mohave when his parachute did not open. This was the end of both Mike and his steam rocket.

Famous or rather infamous became the rockets called 'V1' and 'V2'. The letter 'V' meant 'vengeance'. Hitler's Luftwaffe used the rockets to create considerable damage in London. These rockets hit mostly non-military targets because they were not yet precision bombs. Hitler used them in the vain attempt to conquer the British Isles. He wanted to discourage the population and to put an end to their support for Churchill's war efforts. German scientists and technicians were so advanced in rocket technology that the US under the code name 'Operation Paperclip' poached Wernher von Braun and some hundred other scientists and engineers who had been involved in the German rocket program. These specialists had the privilege to continue their work almost uninterrupted for a different master – this time in the US. I remember that my parents were overly proud of Wernher von Braun. He gave them the consolation that Germans, yes, had lost the war but were smarter than the victors.

The first time when a rocket brought an object into space to stay there for some time, came on 04 October 1957. The Soviet Union, the friend during the war and enemy of the US afterwards, surprised the world with the launching into orbit of the very first satellite, called Sputnik (спутник). This word means 'co-

traveler' or 'companion' in Russian language. Sputnik circled our earth for two months before it burnt into ashes during its return to the earth. We call this return 'de-orbiting' if a spacecraft remains intact and functional. Sputnik was a ball of 58 cm in diameter and weighed almost 84 Kgs. Its great promotional success did not come from its size or from its functionality; it came from the 'beep beep beep' that Sputnik transmitted to all parts of the earth no matter if you wanted to hear it. These beeps sounded in the ears of a western person as if the Soviet Union was ridiculing the western claim of technological superiority. I remember very well the days and weeks after 04 October 1957 when I was 13 years old. All adults around me looked paralyzed by the fear that the Soviet Union would come out of the Cold War as a cruel and punishing winner. As a response to the Soviet Sputnik feast in 1957, the US established in 1958 the National Aeronautics and Space Administration that we now know as NASA.

Who laughs last, laughs best (Wer zuletzt lacht, lacht am besten). This saying became true 12 years later when the Cold War was still going strong. On 20 July 1969, it was not a soviet tovarich (товарищ - comrade) but the American astronaut Neil Armstrong who passed away in 2012 age 82. He became the first human being to set his foot on the moon and saw for the first time our earth rising over the moon's horizon during the Apollo mission. When William Anders, an astronaut aboard Apollo 8, saw for the very first time an earthrise from the lunar orbit, he realized correctly '*that the earth was small, delicate and not the center of the universe*'. This objectively correct statement has not yet entered everybody's mind.


Earthrise on the Moon

Live television transmitted the historical event of the moon landing, I watched it with open mouth. While staring at the TV screen I feared that something might go wrong in this risky expedition. Roughly half a billion people in the world watched this important milestone in the conquest of the cosmos.

I can imagine that people in the Soviet Union also watched. They did it probably in the hope that something might go terribly wrong.

Many space vehicles followed Sputnik and the first moon walk. The main players in the conquest of the cosmos launched thousands of satellites for observations of the earth and as radio transmitters. I perceived them as flying objects like airplanes. This view changed in 1998 when the first space shuttle mission started the assembly of the International Space Station (ISS). Two years later, the American Bill Shepherd and two Russians (Yuri Gidzenko and Sergei Krikalev) became the first crew who resided onboard the station for several months. Since then, the ISS is permanently manned and circles the earth 15.5 times per day at an average altitude of 400 Kms. This gives the crew 16 sunrises every day. I consider that ISS is the first human colonization of outer space.

I anticipate that in the next decades more manned space stations will follow and that humans will colonialize the moon. It will not be a colonialization like the conquest of the Americas and of Australia but some people will take turns living on the moon as they now live on the International Space Station (ISS). And people will stay on the moon as long as it makes economic sense. Nobody knows at the current stage, what the economic benefits of space explorations could be. For the time being the focus of every nation is to outperforming the other competitors with technological achievements and to be the first one to have a manned outpost on the moon. All participants of the race don't yet know what comes next and whether it is worthwhile to keep a manned outpost on the moon.

I make my optimistic prediction of further space exploration with two caveats. While progress is impressive, the question is how far humans can venture into the cosmos. Human beings will never reach stars that are millions of light years away and we can probably not make experiments that take hundreds or thousands of years. I have the impression that space exploration is currently at a similar situation, in

which our far forefathers were when they wanted to explore the oceans. They might have talked about big progress when they wetted their feet on a beach for the first time and did not know how much more was lying ahead. We have even today not yet explored most of the depth of the oceans.

Space exploration will only continue if military, biological and environmental catastrophes don't interfere. Expeditions also become more and more complex and will very likely not remain financially and economically viable if they had ever been economically beneficial. The US Government Accountability Office has already warned that the ambitious Artemis mission to the moon could become unaffordable. As one of the first measures to save money, NASA has scrapped further development of the VIPER rover that was supposed to search for water and ice and for other resources at the lunar south pole. They made the decision to scrap VIPER after they had invested half a billion USD into the project. More projects might be scrapped as funding dries up and changing occupants of the White House move NASA's goal posts.

Organizations that are involved in space exploration become overly complex after a certain number of years. The US established NASA in 1958 in response to Sputnik, the first satellite with which the Soviet Union surprised the US and the rest of the world. NASA, which the US originally called 'National Advisory Committee for Aeronautics (NACA), would probably not exist without the Sputnik. NASA, which is a state-owned enterprise, now employs 18,000 civil servants and has an annual budget of well above $25.2 billion USD, which is almost twice the budget of 1998. NASA manages 12 major projects. One of them is the Space Launch System (SLS), for which NASA has requested from government a budget of $11,2 billion USD for the years until 2029 after it had spent already $11.8 billion USD in prior years. The Artemis program is another of the 12 NASA projects. More than 50 years after the first human visit of the moon, Artemis wants again to send men on the moon in a space capsule that they baptized 'Orion'. NASA started the Artemis project in 2011 and it will probably cost a total of 93 billion USD if we don't count the habitual cost overruns.

The management of great numbers of gigantic projects that take more than a decade to complete, is as complex as the NASA organization itself. I have doubts if a state-owned enterprise with civil servants can efficiently make necessary changes to the management structure that has grown during more than 65 years into an inflexible mammoth. Younger organizations involved in space exploration like SpaceX in the US and those in India and China have shown that they are considerably more efficient. They started their space agencies afresh, used the latest technology that the west had developed and focused on fast improvements to achieve one specific goal: go to the moon. China, for example, established its National Space Administration (CNSA) only in 1993, modernized the Russian Soyuz spacecraft into their own spacecraft called Shenzhou and sent only ten years later, on 15 October 2003, its first astronaut, Yang Liwei, into space. It is often more efficient to start a project afresh instead of trying to adapt old organizations to new requirements, particularly if the government runs the organization with civil servants.

Politicians without space experience control NASA's operations by giving directions and by granting or denying funds. NASA must by law follow an agenda that presidential administrations and the Congress define. Changes of the political will influence decisions about priorities of projects and disturb the planning of ongoing projects. Politicians will probably not be guided by technical considerations but by politics. The only consideration to develop the Apollo moon program in 1958 was to beat the Soviet Union with technological progress. There were no other objectives. Politicians who have to decide space exploration projects, are now probably more interested in jobs that subcontracts create in their constituencies than by progress in space exploration. Another example for political interference is courtesy of Donald Trump. NASA had planned the next manned mission to the moon for the year 2028. But the government under Trump revised this timeline and decided in the style of soviet planned economy

that this date was to advance by four years even though NASA officials declared that this timeline was overly ambitious.

We currently see that not only the US and Russia but also China, India, Israel and Japan have become spacefaring nations and compete in the exploration of the cosmos. The former Soviet Union had landed in 1959 its uncrewed spacecraft, Luna 2, on the moon and the US had sent a total of 12 men to walk on the moon between 1969 and 1972 and has soft-landed its Odysseus or "Odie" in 2024. India became in 2023 the fourth country to land a spacecraft on our moon followed by Japan as the fifth country when its 'Moon Sniper' soft-landed in 2024 on the moon. China's Chang'e 6 spacecraft landed in 2024 on the far side of the moon,

Israel's Beresheet moon lander, however, crashed into the moon in 2019. Russia's Luna-spacecraft also smashed into the moon's surface in 2023. But I am sure that excursions to the moon will become routine and as safe as travelling by car.

Additional countries might enter the competition. It has almost become a moon exploration frenzy. People and countries strive for prestige but also expect favorable technological spin-off effects and hope to discover natural resources on the moon and elsewhere in the cosmos. Competition is strong between China on one side and the traditional western countries, including Russia, on the other side. Both sides want to be ahead of the respective other competitor no matter the costs and possible benefits. Prestige seems to be once more the mother of progress. In addition, a competitive environment, which often fuels progress, has developed within the US, where Jeff Bezos' company Blue Origin tries to outperform Elon Musk's company SpaceX for the conquest of outer space. These companies now offer space tourism for wealthy customers. Elon Musk, in particular, envisions establishing SpaceX permanently on the moon and even on planet Mars. He wants to make humans a multi-planetary species in defiance of God's design of mankind.

Obviously, the Bible has not predicted space travel and also not the presence of human beings on the moon and on planets. Some orthodox interpreters of the Bible say that God has given mankind the use of the entire earth but not the use of space of planets. They therefore conclude that space travelers are illegally trespassing on God's territory. They base this opinion on Psalms 115:16, which says that "*The highest heavens belong to the LORD, but the earth he has given to mankind*". In addition, some theologians find that it is heresy if the purpose of space exploration is to investigate the origin of life. They demand that we faithfully accept and believe the unbelievable story in Genesis that God has in six days created our world in the form, in which it exists today.

China plans a permanent space station, a manned expedition to the Moon and a series of interplanetary missions to explore the Solar System. In 2020, China used a space vehicle to bring a handful of lunar rocks back to Earth, which exploit only the US and the former Soviet Union had previously achieved. In 2024, China's Chang'e-6 lunar lander successfully touched down on the far side of the moon to collect samples from the lunar surface and returned two kilograms of rock and soil safely to our earth for chemical analysis.. It is an open secret that a permanent Chinese presence on the moon will follow the Chinese manned space station. The ultimate usefulness of a human settlement on the moon is not yet clear but we will for sure know once the settlers have explored all possibilities. They might find some gold or some rare earths on the moon but they will not find any slaves to bring home.

Baba Vanga, the Bulgarian clairvoyant who lived in the 20th century, predicted what Elon Musk promotes. She predicted that a Mars colony will exist and will become self-sufficient in 2183. She predicted that this Mars colony will demand sovereignty and independence from earth similar to what the British colonies in

America did in the 18th century when they eventually became independent from the British Crown. I wish I lived long enough to see if the Mars colony will become independent in a peaceful process or if our descendants will experience a real star war. Baba Vanga did not consider the possibility that living beings, similar to humans, might have lived on Mars until they had made it uninhabitable as we currently do with our earth. The idea that planet Mars used to be habitable is not too far fetched because scientists have analyzed a Martian meteorite of 320 grams that they baptized 'Black Beauty'. Scientists found this meteorite, which slammed into the Sahara Desert, in 2011. It revealed that there must have been warm water on Mars some 4.45 billion years ago. This suggests that Mars may have been able to support life-long time ago. Astronauts might even find fossilized bones of ancient Martians. If they find DNA in these bones, our descendants might be able to de-extinct or to resurrect Martians to their original shapes.

When Christoph Columbus started sailing west in 1492, he expected to land in East Asia because he knew already that the earth was not flat. But he grossly underestimated the size of our earth. He left with the intention to make fortune by opening an alternate trade route for the Silk Road to China that the Ottoman empire had closed for Christian traders. As we now know, Columbus' discoveries were a success but for other reasons than planned. Similarly, the colonization of the moon and of planets might produce benefits that are different from what we now expect. You never know when you try to predict the outcome of a venture.

While I can foresee that mankind will colonize the moon at the end of this century, I have difficulties predicting that the benefits of such a venture will be sufficient to make it last beyond its first tentative settlements. The moon, though, could be used as a cemetery. The American company Celestis Inc. already proposes moon burials in addition to space burials.

The attempt to colonize the moon might become one of the crazy stories in the footnotes of history books. People in 500 years will then look back and laugh at the people in the 21st century who made the totally useless attempt to colonize the moon. However, if the expeditions find natural resources and precious minerals, which I don't want to exclude, I can imagine that cargo space ships and space tankers will commute between the earth and the moon. "AstroForge" is a relatively small California company that started in 2022 the attempt to hunt for precious metals in space. They have launched in 2024 a robotic spacecraft that they baptized "Odin" after the father of Thor in Norse mythology. Odin has the task to explore if the asteroid called "2022 OB5" contains platinum that they can afterwards mine in a subsequent space mission.

If they find valuable resources, the colonizing nations or private enterprises will become wealthy as Portugal became with its colonies. These space explorers will also fight about the boundaries of their respective territories on the moon or on asteroids. China might high-handedly claim large chunks of the moon's surface as they generously claim ownership of huge areas of the South China sea. They might say that Mao Zedong, when he created the new Chinese nation in 1949, has pointed with the forefinger of is right hand at the moon to indicate that the moon had become part of the Peoples Republic.

Despite continuing fast progress, I cannot see that we will populate the planet Mars as Elon Musk envisions. The goal of his company SpaceX' is to fly the first humans to Mars and eventually establish a settlement there. But this planet is an average of 65.4 million km away from our earth, which is a considerable distance even for seasoned space travelers. The fastest spacecraft available now is NASA's New Horizons, which can travel at 58,000 kilometers per hour. It will still take 162 days to reach Mars if this planet is at average distance from our earth. NASA estimates more realistically that a round trip to Mars could take about two years. The long journey must be boring for the astronauts because there is no interesting landscape to watch.

The length of a single journey to Mars is discouraging and poses severe problems. We firstly don't yet know if the human body is made for long periods of zero gravity. Astronauts have already reported health problems like vision impairment that they call space adaptation syndrome. There will secondly be severe problems if the spaceship urgently needs spare parts and supplies. When something went wrong in ancient times, sailing vessels that explored foreign continents sank to the bottom of the ocean where we can search for them now. But a spacecraft will forever fly through the cosmos with its dead crew inside.

Elon Musk, the guru and freak of space travel, is optimistic that he can shorten the trip to Mars to 80 days. I tend to believe him not because he is a genius but because technical developments have been generally very fast during the last 200 years and technology might continue to advance quickly to make rockets fly faster. The performance of rocket engines is improving with the development of a rotating detonation engine (RDE) that does not burn fuel but makes the fuel explode in a chamber without moving parts. Researchers call this new kind of combustion a restless 'ring of fire'.

Jules Verne described in 1872 a sensational trip around the world in eighty days in his novel with the same name. This fictitious trip was believable thanks to the railways that America and India had built across their respective continents. Nobody would have believed in the 19th century that Howard Hughes would in 1938 fly around the world in 91 hours and that you can do the same 15 times per day in a space station.

Travel to and from the red planet might not be the biggest problem but living conditions certainly are an issue. The air consists of toxic dust and 95% CO_2, which means that you have to bring or to generate your own oxygen. In addition, Mars is really a cold place. Temperatures drop to 62^0 Celsius below zero overnight and food will have to be grown in costly greenhouses. We also have to fear that the human brain, the senses and bones will become damaged by permanent exposure to space radiation and only 38% of the earth's gravity. How babies will develop and in which shape they will be born in this environment are other questions.

Unless our descendants find gold or even more precious minerals on Mars, I cannot see that they will colonize the red planet. However, when I was younger, I could not imagine that I can survive in extremely low temperatures. But once the winter had arrived in Manitoba and the temperatures came down to 39^0 Celsius below zero, I had no difficulties surviving. Even my car engine did start because I had connected it to an electric block heater. Human beings are to a certain extent able to adapt to all kinds of rough situations. But why would people emigrate to an extremely inhospitable place like the planet Mars? Even after a cataclysmic event on earth the survivors will find live on our planet more comfortable than life on the surface of the red planet. Those, who move to the planet Mars with the intention to escape a cataclysmic event on earth, will pay an extremely high price by living in a totally inhospitable world. It is imaginable that Martians had lived on the red planet until millions of years ago after they had destroyed their environment as we do now on our earth. Trying to make the planet Mars habitable again sounds to me much more ambitious than transforming the Sahara or Gobi deserts into Gardens of Eden.

I definitely anticipate more unmanned missions to planets and other stars. Many different spacecrafts have already explored some planets and have even touched down on planet Mars as early as 1976 in the Viking mission. NASA has been landing several rovers on Mars starting with the Sojourner experiment in 1997, followed by 'InSight' in 2018. This is short for 'Interior Exploration using Seismic Investigations, Geodesy and Heat Transport'. It was a robot, which took six months of travel before it landed on planet Mars to study for two years the structure of the planet's inside. InSight has investigated with its sensors the planet's interior and has allegedly discovered a gigantic hidden ocean some 11.5 to 20 kms beneath the red planet's outer crust. It remains to be seen what this daring discovery means for the future life of mankind on Mars.

Another feast of space exploration came in 2021, when NASA landed a small helicopter, called 'Ingenuity' on Mars. This helicopter completed during three years a total of 72 flights until its rotor blades got damaged during a landing in 2024.

The new space telescope 'James Webb', which a consortium launched on 25 December 2021, has started orbiting the Sun some 1.5 million kilometers away from the earth. Its task is to search – amongst other things - for light from the first stars and galaxies that formed in the cosmos after the Big Bang. This will get us some information about the origin of life that will be clearer than the explanations that we find in the Bible. With the help of James Webb, it will be possible to watch the history of the cosmos like a live show because the pictures, which James Webb can see, have travelled for billions of years before they arrive in its camera. The pictures show us today as current events what has happened billions of years ago. This coincidentally suggests that time is a relative phenomenon because what you see now is not necessarily what happens now. It is like looking out of your living room window and seeing some 40,000 medieval witches that Christian people burnt alive on stakes. This will actually be what observers on a star will see right now if the star is 400 or 500 light years away from our planet. One light year is 9.46 trillion kilometers. 400 or 500 million light years are as many times 9.46 trillion kilometers. On a human scale, such a distance is difficult to perceive but on a galactic scale, it is in our immediate neighborhood.

Time will for sure be different for astronauts when they will live on the moon. The reference for time could be based on the motion of the Sun as seen from the Moon but the astronauts might also go by earth rises and earth sets to decide when they should go to bed. They will certainly not go by Eastern Standard Time (UTC-5) or by any other earthly time zone.

Space exploration projects require huge amounts of funding and take many years of planning and implementation. The budget for the James Webb Space Telescope (JWST), for example was $4.96 billion USD in 2014 but cost more than $10 billion when JWST finally left for its long voyage in 2021.

Such projects also require long-lasting cooperation between several international partners. These mammoth projects finally require a peaceful political environment with healthy economies. If these enabling conditions disappear because of more pressing priorities or because of wars, the projects will die. The technological achievements and our know-how might get lost. I therefore make my prediction of colonization of the moon and of further exploration of the universe with the daring assumption that a favorable political and economic environment continues to prevail. If this environment disappears, the entire space exploration will fade away as the Khmer empire and other civilizations have vanished.

All technological devices and their documentations that we use for the exploration of the cosmos will rot and rust away. No monuments like the pyramids in Egypt or Angkor Wat in Cambodia or the Parthenon in Athens will bear witness of our achievements. Nothing of our civilization will survive. Descriptions of technology that researchers use for space exploration are all in digital format and will also rust and rot away because they are not chiseled on stone tablets. Future generations will not realize how sophisticated we were. The hard disk or tape or other storage media, on which we store information, does probably not survive the vicissitudes of several hundred years. It will have rotten away by stray magnetic fields, oxidation and decay of material. Microfilms might last longer but they too will not survive forever. Even if they survive, they might no longer be compatible with the hardware that people will use in 200 years. Computers might use entirely different technologies. But even if new equipment accepts the old storage media, the operating system, software and standards like ASCII and Unicode might no longer exist and the new standards make it impossible to retrieve a document from the storage media on which information is archived. And then, even if our descendants can see the letters and numbers of our documents, they will look to them like cuneiforms or hieroglyphs that they will have the same difficulties

to decipher as we have with the writings of our ancestors in Mesopotamia. There might be an unsurmountable problem reading these texts. But I can give hope to our descendants.


Silver Foil inside Amulet

Archeologists found, for example, in a library in Herculaneum many scrolls of papyruses that got charred by hot ashes from the eruption of Mount Vesuvius in 79 AD. The hot ashes did not burn the papyrus because there was no oxygen.


Charred Herculaneum Scroll

Other archeologists found in a grave near Frankfurt a very thin silver foil inside an amulet. The scrolls would have crumbled and their content would have been lost if the researchers had unrolled them. Instead, they used laser technology, CT scans and artificial intelligence to decode the documents without unrolling the scrolls and the foil. They baptized the technology that they used "virtual unwrapping". This technology made it possible to decipher and to read 18 lines of the Latin text on the silver foil that an ancient artist had written in the 3rd century. It was a confession of Christian faith and contained a quote of Philippians 2:10–11, which says in Latin: '*that at the name of Jesus every knee should bow, in heaven and on earth and under the earth and every tongue acknowledge that Jesus Christ is Lord, to the glory of God the Father*'. Researchers extracted text from one of the papyruses that, as they believe, the Epicurean philosopher and poet Philodemus, had written. It says: '*As, too, in the case of food, we do not right away believe things that are scarce to be absolutely more pleasant than those which are abundant*'. This wisdom refers to the real, intrinsic value and not to the economic or market value of rare objects. Immensely rich people often pay extreme high amounts of money for objects only because they are rare.

If a major catastrophe does not stop further development of the human species, our descendants in thousand years will use artificial super intelligence to virtually re-build and decipher the content of a hard drive of a charred computer that they might find in the rubble of the ancient city of New York. However, it would harm the reputation of our current civilization if the computer that our descendants detect, is by coincidence the computer of the police department that contains criminal statistics about murders, mass shootings and overdose deaths. Similarly, it would be detrimental for our reputation if researchers find and decipher only one computer if it is Donald Trump's computer containing all lies and conspiracy theories that he regularly disseminates.

Cultivated Meat and other artificial Food

People slaughtered world-wide in 2019 some 80 billion animals to satisfy their need for animal protein and other nutritional values that meat offers. Some scientists predict that by 2030 the demand for meat will increase by up to 72%. This daring prediction obviously assumes that population growth continues unabated. It also disregards the possibility that many people become vegetarians.

Traditional meat production, which converts vegetable protein into animal protein consumes extensively natural resources like land, water and energy. It needs much more resources than just the production of grains and other crops. Meat production also contributes significantly to the emission of greenhouse gases like carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Cows, for example, produce methane that exits their intestines through poops and manure.

Animal rights advocates criticize the inhumane industrialized methods of raising and slaughtering animals.

I am amazed that people don't discuss a reduction of population growth as one method to mitigate the negative aspects of extensive meat production and of other negative impacts for nature. Reducing with

birth control the world population to pre-industrial levels would solve many problems, including global warming.

Instead of reducing population growth, people discuss new technologies to increase production of food, which will facilitate further population growth. Many ancient civilizations expanded at the expense of the environment, which degraded and became unable to sustain their unreasonably growing populations.

New technologies produce meat by replicating in laboratories the metabolic processes of farmed animals. This artificial process produces meat without growing and killing animals. Stem cells from animals are the 'seeds', from which technicians grow cultivated meat, as we call the product. People refer to this product also as 'in-vitro meat', 'cultured meat', 'lab-grown meat', 'cell-based meat' or 'clean meat'.

Scientists anticipate that they can produce in-vitro meet for the entire population from only 1% of cattle that farmers currently raise. Artificial meet therefore will reduce stress on nature by 99%.

We are not talking about fake meat, which is plant-based and contains mostly vegetable protein from soya beans or peas. Such plant-based meat is not real. It is fake even if its taste and texture come close to real meat. It creates for meat lovers the nice illusion of meat. It will – if we widely use it - reduce the negative side-effects of traditional meat production but will increase the need to grow soya beans and peas. And this will increase the emission of the greenhouse gases as I have already mentioned.

The process of cultivating meat starts by isolating bovine stem cells from samples of muscle tissues of an animal. The producers of in-vitro meat let these cells grow and mature in a nutrient-rich incubator they call bio-reactor. They then use the resulting muscle mass in a 3-D printer, called bio-printer, which forms the mass into a steak that has a texture similar to real meat and might include fat that they inject if costumers prefer fatty meat.

A company called MeaTech in Israel presented in 2021 as a milestone event its first steak of 104 grams. They did, however, not report what a gourmet had to say about its taste. In my opinion as a unassuming consumer of steaks, most pleasure that the consumption of a steak provides comes from the texture of meat and from the spices.

There is a long way to go until mass production of in-vitro meat can start in a big scale at reasonable costs. MeaTech is not an isolated pioneer. A range of many other companies in the world currently start to use technologies for the production of cultured meat. Some of them work on the production of in-vitro seafood as well. Yet others try to produce synthetic cow's milk, which they call cowless milk. All these developments carry the flag of animal-free food even though animals are still at the origin but to a very small extent. If scientific progress gets out of control we might see in thousand years a human-less humanity – a world with cultured human beings. If sperm concentration or sperm count in male semen continues to decrease and reaches levels of general infertility, mankind will have to culture human beings.

Maastricht University created the first cultured beef burger patty in 2013. It took two years to produce the delicacy at a cost of $300,000. Some over-optimistic fortune tellers thought at that time that the price would come down to $10 by 2021. This has not happened but I trust modern technology, which has already managed to make the prices for products like computers and mobile phones come down within short periods of time from extremely high to amazingly low levels. Even the costs for launching a satellite have dramatically come down.

Progress in producing cultured meat is very fast. A start-up called 'Eat Just' from the US has made its historic debut buy serving cultured chicken meat in the fashionable restaurant called '1880' in Singapore. This country's food agency had approved the sale of cultured meat. The restaurant offers small lab-grown

chicken pieces with fancy side-dishes for $23 USD to few selected guests. But smart economists who always present precise numbers, predict that the cell-based meat market will reach $140 billion USD by 2030.

In 2023 the Agriculture Department granted two California-based companies licenses to sell chicken meat that they culture from animal cells. But Florida has in 2024 enacted a law that bans the production and the sale of lab-grown meat in this state. Ron DeSantis, the conservative governor justified the ban using a silly conspiracy theory. He said that '*Florida is fighting back against the global elite's plan to force the world to eat meat grown in a petri dish or bugs to achieve their authoritarian goals*'. Political pundits expect that Alabama, Arizona and Tennessee might follow Florida with this policy. I nevertheless predict that neither irrational arguments nor the lobby of cattle farmers can successfully fight the development of large-scale production of cultivated meat, including seafood. Cultivated meat products will in a couple of decades become standard affordable food in restaurants and on the shelves of supermarkets. But I fear that mankind – as always – will use increases of food production not to save the planet but to increase the size of the population. Human beings, at least in some developing countries, are like the rabbits in Australia. Thomas Austin imported from England in 1859 some 13 wild rabbits. He released them on his farm at Barwon Park in Victoria for the pleasure of hunting them with friends. These beasts found ample food and increased to 600 million by the 1940s creating devastating results for the environment. There is a natural law, to which all living beings including humans are subject. Living beings multiply if they find the necessary food. They disappear when an overpopulation has destroyed the environment and its necessary resources.

Government Debts financial Crisis and Collapse of Economy

The world suffered in 2008 financial crisis. I was not affected because I was working in the cozy comfort of a well-paid, long-term job in a technical assistance project in Vietnam. I watched the effects of the crisis almost like an outsider except that I feared for the value of cash that I had saved in bank accounts for my retirement. My parents had lost all their savings in 1923 and I feared that the same could happen to me. The 2008 financial crisis was one of the most severe economic downturns since the Great Depression of the 1930s. Economists with a hindsight view expertly explain which factors caused the crisis. Too many banks had lent money to borrowers with very poor credit ratings. The banks then bundled and sold the bad apples into mortgage-backed securities (MBS) as lucrative investments to their wealthy and greedy customers. Lax banking regulations allowed the financial institutions to engage in such risky behavior. And the bubble burst when house prices came down to a level that was much lower than the mortgages.

This was predictable – at least in hindsight - but only a few economists like Nouriel Roubini warned a few years ahead of time about an upcoming financial crisis and about the resulting global recession. Nobody listened because Roubini had made numerous predictions of which many were wrong. There were also hundreds – if not thousands - of economists who made different predictions. Whom should you believe? And even Alan Greenspan, the trusted economist and head of the Federal Reserve in the US for almost 20 years, did not see the crisis coming.

I am not an economist but I have common sense. With this mental gift, I predict that excessive government debts will cause a financial, economic and human crisis in the near future. I see such a crisis as clearly as Alan Greenspan should have foreseen the 2008 financial crisis.

Most governments in the past decades have been spending much more money than they collected. They have amassed astronomical debts. As at the middle of the year 2023, the US federal government has accumulated debts in the amount of almost 33 trillion USD or some 97,000 USD per capita or $254,000

per tax payer. This amount increased to 34 trillion USD at the end of 2023. The increase of debt by 1 trillion USD in half a year shows that '*America just cannot stop borrowing*' as the president of the Committee for a Responsible Federal Budget put this discouraging fact with resignation. Further increases of government debt require that investors remain willing to buy and to keep government bonds. But this willingness will not last forever. As a result, governments must offer higher interest rates for their bonds to make them more attractive. Borrowing becomes more and more expensive. Some countries spend already more money on servicing their debts than on health care. The US budget of $842 billion for the military is already extremely high but interest payments will soon be higher than costs for defense or for Medicare.

Japan holds the largest share of US federal debt followed by China. About $13.1 trillion USD matured between 2020 and 2024. Since the US government cannot pay back this amount, they have to refinance the debt at then current interest rates. To the federal debt, we have to add $1.3 trillion USD debts that US states have amassed and $2.3 trillion USD that local governments have accumulated.

There seems to be a steady further increase of astronomical debts. Instead of cutting expenses the American parliament raises legal ceilings for national debts almost automatically. Some parliamentarians oppose the increase of the debt ceiling not because they want to cut spending. They blackmail government and make their agreement for more debt dependent on concessions in unrelated areas – for example the approval of a pipeline for an oil company in their constituency. This is unpunishable blackmail.

The American parliament is unable to decide on a longer-term strategy for controlling expenses. They always wait until a government shutdown looms for lack of funds and then increase the debt ceiling with a stop gap law to avoid the government's paralysis. A limit, which in January 2023 was $31.4 trillion USD, is not a limit if the government regularly and automatically increases it. People think that everything will continue to go well since no catastrophe has materialized so far. Let's continue even more boldly, they think. Government debt is like an elephant in the room. People think it away and ignore it. In democracies it is difficult anyway to cut expenses because the vox populi – the voter - demands money and elected governments give it. Common sense says that this cannot continue. If you spend continuously much more money than you earn, dire consequences lie ahead. I therefore predict that a financial catastrophe will soon raise its ugly head.

Many wise economists who rarely predict anything correctly, use complicated technical arguments and daring assumptions in the attempt to convince us that common sense is not applicable when governments continue to borrow money excessively. Everything will be fine, they say. One of their major arguments is that money that the government borrows and spends will end up in government investments and in the pockets of business people who will make the economy grow by investing the money and ultimately pay more taxes than the amount of money that the government has spent. This assumption or hope that overspending will miraculously generate money has not materialized in the past. The concept of spending or investing money to make money is certainly true for inventive business enterprises that create new beneficial products. But if governments budgets apply this concept, it sounds rather like the illusion of a miraculous money creation (wundersame Geldvermehrung) as Hans-Werner Sinn, the German economist called it. They seem to think that it is like pouring money into an acre of farmland and harvesting endless bushels of dollars,

Increased government revenue would only offset increased spending if the additional revenue were used to repay government debts. But government spends the money for daily necessities like social security, Medicare and for the military. They borrow more money to service trillions of government debts. The US federal government paid $892 billion USD interest in 2023 after only $376 billion USD in 2019. These are

ever increasing portions of available tax money. If you add necessary expenditure for social security and Medicare there is very little left for discretionary spending – not even in situations of crisis.

The economist Brian Deese was head of the sustainable investing division of BlackRock, the world's largest asset manager. He also was economic advisor of Presidents Clinton, Obama and Biden. Government leaders employ, as always, economists who favor borrowing if they want to spend money. They never employ consultants who don't agree with such plans.

He took the liberty to criticize the balanced-budget law that Germany had established in 2009 in its constitution as an austerity policy. They call it 'debt brake' (Schuldenbremse). Deese, in contrast, called this law a 'straitjacket'. He told the German government to accumulate more government debts and to implement '*strong counter-cyclical economic policies to drive a more rapid, inclusive growth*'. You will always hear the word 'inclusive' in tandem with 'sustainable' when growth-obsessed economists or politicians try to justify more borrowing. Deese asked the German government to use the US culture of borrowing as model for the development of a '*robust and responsible fiscal strategy*' that is based on long-term incentives and *'provides the certainty needed to induce investment and growth*.' Economists always focus on endless growth. They don't talk about spending more money than you have and 'borrowing' money. The call it 'fiscal policy' instead.

If a government has to borrow money to service its debts, the situation is definitely not healthy and becomes even much worse if the government has to borrow money at higher interest rates.

This situation remains dire even if smart economists paint an optimistic picture with scientific-sounding arguments. Some economists, for example, argue that everything is fine as long as the growth rate of the economy exceeds the interest rate that the government pays of its debt. Or they calculate the ratio between government debt and GDP. They calm down the critics by saying that this ratio is higher in other countries, and that the domestic situation therefore is still healthy. It is like hearing that your neighbor died from the same lung cancer that you have but all is OK since you are not (yet) dead.

The debt spiral continues to turn unstoppably. The Congressional Budget Office (CBO) anticipates that America's debt-to-GDP ratio would under the most favorable conditions rise from 99% in 2024 to 122% in 2034. This might still not immediately trigger a financial collapse but there is no better end in sight since the debt spiral continues to turn. Mike Campbell is one member in a group of the lost generation after the 1st first world war. Ernest Hemingway describes him in his novel 'The Sun also Rises' as a drunkard. Someone asks him in the novel how he got bankrupt. In '*two ways*', he explains, '*gradually and then suddenly*'.

The arguments of economists sound so smart and esoteric that you feel like a dummy if you use common sense and simply argue that spending consistently much more money than you earn is ultimately not sustainable and will lead to bankruptcy. If a person pays off a credit card debt with another credit card, we rightly judge that he is financially irresponsible but if a government does practically the same, they call it a sound fiscal policy.

Compared to the US, China's national debt looks modest. According to some estimates, it is the equivalent of $5.6 trillion USD or only 49% of GDP. But independent analysts estimated in January 2023 that China's outstanding government debts surpassed 123 trillion yuan ($18 trillion) in 2022. These numbers do not include the debts of local governments which jumped to 35 trillion RMB ($5.2 trillion USD), according to data from the Ministry of Finance. Interest payments on local government bonds exceeded 1 trillion RMB ($148 billion USD), which burden decreases the capacity of local governments to provide social services and to consider new investments.

State-owned enterprises in China are also indebted to levels that are difficult to assess. Some banks in China sit on loans that might never be repaid. China has also a huge wealth management sector of trust companies that we refer to as 'shadow banking'. Their financial health is in danger since they have strong exposure to the tumbling real estate sector. Economists, who usually claim to know everything, are unable to assess the level of risks in China.

Information about China's overall indebtedness is murky. We do not have sufficient information which causes me to fear that there are hidden risks. The fact that the communist government has accumulated debt in periods of economic prosperity is very alarming. How can they provide necessary services if the economy slows down? Individuals set aside funds during good years as contingency for bad years but governments do not seem to show this responsible attitude.

The construction boom in China has been raging unabated for more than 20 years in all subsectors and has been feeding local government with the help of land sales. Many Chinese have become wealthy. They invest in apartments not to live in them or to rent them out to obtain a return. They buy them in the erroneous belief that 'concrete gold', as they call their investments, will strongly continue to appreciate. And builders eagerly start new residential housing projects with the wrong assumption that they can generate demand for housing by creating massive supplies of residential high-rises with gigantic new bank loans.


Dreadful Housing Development in Tianjin

Many of these new developments stay empty, as I have observed. They are in locations where nobody wants to live. I personally would never move to an inhuman place far outside cities where there is no infrastructure. Builders continue building with the unrealistic expectation that investors will buy anything as long as it is made from concrete. This cannot continue forever even if agricultural land is still available for the development of new buildings. In addition, new developments of residential high rises are often so dense that residents in one building can almost greet neighbors in the next-door building with handshake from window to window. Chinese people generally don't mind physical closeness but as you can see from the photo above, residential builders exaggerate.

Housing Data from the National Bureau of Statistics (NBS) show that some 648 million square meters of new housing stood empty as in August 2023.

I fear that a bubble will burst sooner or later as the current troubles of the building industry announce. This and other financial risks might materialize all of a sudden and by coincidence at the same time when other problems arise. When it rains, it pours ("Ein Unglück kommt selten allein") is the adage that the profoundly pessimistic law of Murphy expresses by stating that anything that can possibly go wrong will go wrong unexpectedly at the same time. This is what I fear for China. The communist party benefitted in the past from a strong and growing economy and from a trouble-free environment. People were spoilt by the ever-increasing flow of money into their pockets. An ultrasound doctor who, I know earned 2,900 RMB in a government hospital in Changchun in 2005 and earned 30,000 RMB seventeen years later in a private hospital in Ningbo. This is remarkable and allows many Chinese to sit back with satisfaction since the inflation rate in China was also very low during these years.

China has seen unprecedented peace and economic growth after Deng Xiaoping started China's 'Reform and Opening' (gǎi gé kāi fang - 改革开放) around 1980. He practically abandoned communist economy

and introduced capitalism. He called the new economy a reform of communism. But this reform allowed many Chinese to engage in business ventures in an extreme capitalistic spirit. Găi gé kāi fang was the forerunner of the corresponding glasnost, the opening to new political and economic concepts in the Soviet Union After the introduction of găi gé kāi fang, China developed into an economic powerhouse with consistently high GDP growth, improvements of infrastructure at breakneck speed and the establishment of a mighty military, which will probably not always stay idle. Income of a large segment of the population has dramatically increased over the last 40 years. While 90% of the Chinese population in 1978 lived in poverty, this percentage s now not even 10%. In this positive environment the Communist Party has not to fear too much criticism from its people. This positive attitude can change very fast in the event that the economy shrinks or the financial sector collapses. If the economy goes down, the political system will probably weaken or might even collapse.

When America sneezes, the world catches cold. Journalists and economists issued this warning some decades ago to indicate that America is overwhelmingly strong and that for this reason any serious economic and political problems in the US will have ripple effects in all other countries. This is to some extent probably still true today but China has joined the US in its importance for the world's economic well-being. It looks to me as if the world is now possibly facing not only the cold and sneezing of one single country but the simultaneous cold and sneezing of two mighty economies that might drag each other into the same crisis because they are heavily interdependent.

The economy and the value of money are under the threat of many risks like natural disasters, hot wars and trade wars and other political measures. But the greatest and obvious risk is in my view the continuing accumulation of gigantic debt.

Wars

When we say 'war' we traditionally mean armed conflicts between two or more sides. The Geneva conventions of 1949 give more details of how to define what a war is and they establish rights and obligations of participants of an armed conflict. More than 180 nations are parties to the conventions. When two warring factions belong to the same country, we call the conflict a civil war.

Wars between countries started in the past with a formal declaration of war, which messengers or ambassadors delivered through diplomatic channels before the fighting started. The American Congress, which has by law the exclusive power to declare war, has done this 11 times in five different conflicts. They did it, for example, by declaring war against Germany in 1917 and against Japan in 1941 after Japan had destroyed in a surprise raid many American warships in Pearl Harbor, Hawaii. The US did not have to declare war against Germany during the 2nd World War because Hitler preempted this step by declaring war against the US in 1941. This sounds as silly as it would sound when an already wounded mouse declares war on a healthy elephant.

Italy under its dictator Benito Mussolini was Hitler's ally and declared also war against the US. Thailand, which was under Japanese control, did the same in 1942. Otherwise, the US were spared such declarations. In 1989 the American president George Bush interpreted an unfriendly speech that General Noriega had made, as a declaration of war, and used this as justification for an invasion of Panama. In this sense, many people call an unfavorable statement – even if is true – a declaration of war. Telling the truth can be a declaration of war.

After the 2nd World War, the US government not only by-passed congress regularly but also avoided diplomatic formalities. They went directly into the Korean war, the war in Vietnam, and the wars in Afghanistan and Iraq. All other recent wars also started without formal declarations. The initiators of

military action often did not even call it a war but deceitfully called it a 'special military action' or even an armed 'peace mission'. If we abuse our language even further, we might call the 2nd World War a peace operation, which was indeed successful because peace followed six years afterwards.

Warfare before the 1st World War was different from what it is today. Well-equipped armies met in open fields until one of the two fighting armies either surrendered or were annihilated. It was a cage fight so to speak. Only the military were involved. Modern wars affect the civil population and destroy residential buildings and infrastructure. Carl von Clausewitz, the military philosopher and director of the Prussian War College wrote at the beginning of the 19th century a book "On War" (Vom Kriege), in which he introduced the concept of total war. Erich Ludendorff published then in 1935 his book 'The Total War' (Der totale Krieg), in which he envisioned the war as the full mobilization of the entire civil and military manpower and of all resources of the country. Ludendorff's idea became reality during the 2nd World War and culminated in vast bombings of residential areas for the greatest possible psychological effect on the population. This concept came to a culmination in 1945 when the Americans flattened the two cities of Hiroshima and Nagasaki and killed with atomic bombs instantaneously more than 140,000 civilians. This motivated indeed the Japanese emperor to surrender two days later instead of continuing a murderous war that might have cost many more lives. You kill to safe lives.

Infamous became Hitler's propaganda minister Joseph Goebbels, who made in February 1943 in front of a gigantic and frantic audience a speech in the sports palace (Sportpalast) in Berlin. At one point in his speech, he asked his listeners 'Do you want a total war?'. (Wollt Ihr Den Totalen Krieg?). He received an excited 'Yeees' from the enthusiastic crowd. At that time, the allies had already bombed many cities in Germany into ruins. The damage of the war was already total.

Wars with military tools and methods happen as we see in Sudan, in the Ukraine and in the Middle East. However, many countries are nowadays at war with new methods like cyberattacks, disinformation campaigns and election interference.

We call hybrid war a fight between countries that combine traditional military operations with unconventional methods such as cyber warfare, sabotage, disinformation campaigns, and economic sanctions and pressure. Israel orchestrated, for example, a massive attack against members of Hezbollah by hiding explosives in pagers. The explosions, which happened all on one day, killed at least 12 people and wounded almost 3,000. The secret service of Israel, Mossad, had managed in 2024 to intercept the delivery of pagers and put the explosives inside the pagers before they were handed out to members of Hezbollah.

Russia has started waging a hybrid war against European countries that support Ukraine in its defense against the Russian 'special military operation' as Putin calls his war against Ukraine. In addition to the attempt to destabilize Europe with thousands of propaganda bots, Russia has disrupted GPS signals and has cut some data cables in the Baltic Sea. Several other recent incidents create the serious suspicion that Russia is also behind several parcels that exploded in airports and a German cargo airplane that caught fire and crash-landed in Lithuania at the end of 2024.

Russia built an Orthodox church close to a military airport and to other critical national infrastructure in Västerås, central Sweden. The Swedish Security Service established that the church was linked to Russian intelligence operations, that use it as a platform for espionage and subversive activities.

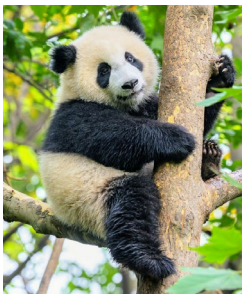
The defense against cyber attacks and against acts of sabotage is difficult to design and to organize. Counter-intelligence efforts require a high level of cooperation between all countries that Russia targets

but some countries are reluctant to open up for these efforts. They distrust the recipients of their intelligence and fear that they might use it against them.

Some aggressors also instrumentalize migrants to weaken their enemy or adversary. They firstly support human smugglers to increase the already huge number of refugees that arrive in a country and secondly instigate in the host country the fight between people who accept refugees and those who want to send them back to their home countries.

As a matter of fact, competing countries are always at war and use more or less subtle and secret means to gain the upper hand, including phony diplomacy. This is what Mao Zedong clearly expressed when he said that '*politics is war without bloodshed. War is politics with bloodshed*'. Talleyrand was a French statesman and a gifted diplomat who offered his services to opposite masters during and after the French revolution. He defined politics as '*the art of standing on someone else's toes until he apologizes*'. Donald Trump's diplomacy, if we can call it so, is different. It is pure blackmail. He uses the economic and military strength of the US and the powers of his office for a 'do-or-die diplomacy'. If another country does not do what he wants, he imposes tariffs on imports or threatens that he will make the hell brake lose. It is the return to natural law of the strongest, the law of the jungle.

China uses an alternate and positive type of soft power, which we call the Panda Diplomacy. The giant panda with its black and white fur lives in the bamboo forests in the mountains of central China. These cute animals captivate all people around the world. Mao Zedong started giving pandas as '*furry diplomats from Beijing*' free of charge to its socialist allies to strengthen ideological ties and foster diplomatic goodwill. Subsequent governments in China continued this diplomatic practice by giving pandas to many other countries in the world to strengthen diplomatic relations. However, money oriented as China has become, they now loan these bears for ten years and charge the recipient countries 1 million USD per year.


Giant Panda

The recipient countries recover these costs easily because pandas have become tourist attractions. Pandas not only look cute in their abundant black and white fur but, when they chew on bamboo sticks, they also move and behave like little children. It is impossible not to love it.

Conventional wars and military actions have always happened and will continue to flare up here and there from time to time. Wars will happen as long as mankind exists. A nuclear war of epic dimensions might deliver the end of it. This might then be the big battle of Armageddon that the Bible describes as the final war between good and evil that ends our world as we know it now. The difference between the battle of Armageddon and a 3rd or 4th World War will be that not good and evil but only two evils will fight each other. Both will perish without successors and without afterworld. However, if undamaged human DNA survives the battle of Armageddon, a new cycle of human evolution might start with the re-appearance of something like the ancestors of Homo sapiens. A second human evolution will then start towards the development of human beings similar to what we are now. It might be like a reincarnation of the entire mankind.

The US has never been shy in using their military muscles in open warfare. In precisely targeted military strikes and special operations the US regularly kill people and destroy buildings outside their own territory. The US started during the last two decades wars in Kuwait, Iraq and Afghanistan and intervened militarily in many other countries like Syria, Libya, Somalia, Cameroon and in Middle America. Yemen is one of the recent targets. The American president ordered in 2025 a "*decisive*" military action against Houthi rebels and deployed "*overwhelming lethal force*" against the group.

It looks as if military interventions were for the US government one form of political activity. Carl von Clausewitz, whom I have just mentioned, said that war is a tool for achieving political goals. The American military have adopted this message but have not internalized it. Their wars and military activities around the world look to me as if they were not guided by consistent or useful political goals. An exception might be the continuous presence of the US military in Iraq and in the Middle East. The only political purpose theses military activities is to protect Israel from Iran and other enemies of the Jewish state. Protecting, aiding and abetting Israel is the only clear political goal of the US military in the Middle East.

The use of weapons is also very popular within the US where the 2nd amendment of the constitution gave all citizens since 1791 the right to keep arms and to bear them openly in public. The firearms at that time were typically single-shot weapons, requiring manual reloading after each shot. But technology has advanced to produce more deadly weapons, including assault rifles with automatic reloading. But the US did not adjust the 2nd amendment to this new situation.

Some states in the US now even allow teachers in schools to carry guns despite the fact that some schools have their own police department to control increasing violence in educational institutions. American citizens use extensively the right to carry rifles and guns. They also use them often to kill. This is what they are made for. Aren't they? Americans can freely buy not only pistols but military-style assault rifles with chambers for high-powered 308 ammunition. Young people have these weapons, which are ideal for efficient mass shootings. They are allowed to possess such weapons even if they have mental health issues or if they are traumatized former soldiers that the government had trained in the use of such weapons before they sent them to wars in foreign countries.

Almost 43,000 people died in 2023 by firearms of which 15,050 (35%) were homicides and 24,080 (56%) were suicides. In comparison, the 20 years long war in Afghanistan has killed only 2,355 American soldiers. While mass shootings receive great public attention, they represented only some 860 casualties in 2023.

Stephen Paddock staged the deadliest mass shooting on 01 October 2017 in Las Vegas. He fired with assault-style rifles some 1,000 rounds into a crowd of 22,000 concertgoers from his hotel room, killed 58 people and wounded more than 850 people. Omar Mateen killed 49 people and wounded more than 50 others in 2016 at a nightclub in Orlando, Florida.

Excessive use of guns in the US is like war inside the country. This prompts me to change Clausewitz's statement by saying that gun violence is one form of social interaction in the US. I personally don't care if the enemy of my country or if my next-door neighbor kills me with a gun. Altercations in daily life can easily turn violent. An angry person might get physical and uses his fists. If he has a knife in his pocket, he might use it and if he carries a gun, he will in his anger shoot his opponent. Opportunity makes thieves and make also shooters, but the majority of American politicians don't acknowledge this natural law.

Aggressive leaders of governments like Vladimir Putin with his invasion of the Ukraine in 2022, and GW Bush with his invasions of Iraq and Afghanistan ignite military actions with the inherent risk that they grow uncontrollably into wars of global significance.

The leading world powers are heavily armed and ready to use their military might beyond the deterrence for which – they say – they built their weapons. China upgrades continuously its military but spent in 2020 only an estimated equivalent of $252 billion USD while the US spent with $778 billion USD three times more than China. The US even increased the military budget to $886 USD for 2024. Because the three largest federal budget deficits in US history were $3.132 trillion USD in fiscal year 2020, $2.772 trillion USD in fiscal year 2021 and 1.833 trillion USD in fiscal year 2024, we can make the fair statement that the US

funds its military and much of non-discretionary expenditures with borrowed money. I find this an insane military overreach.

China builds up its military to give more power of persuasion to their claim of vast areas in the South China Sea as part of their own country. China's inflated territorial claims create animosity of all other rim nations. The US encourages these nations, including particularly the Philippines, to oppose the Chinese claims and the US promise to support them militarily. Taiwan's insistence on continued independence could one day escalate into war because China considers Taiwan as a breakaway province that must be re-united with the mainland at financial and human costs that are difficult to predict. Obviously, the promise by the US government to assist Taiwan directly in an armed conflict with China, removes a possible motivation of the Taiwanese government to compromise. The US say that their support is '*iron clad*' and they try to justify the support of Taiwan with their global fight for democracy. The real reason for the unconditional support for Taiwan is to use the Taiwan issue as a pretext to counter China's ascendance as a dominating world power. At the same time, the self-proclaimed American missionaries of democracy make their weapons manufacturers benefit from massive sales of military equipment to Taiwan. The US demonstrated their '*iron clad*' commitment for the defense of Taiwan by providing in 2023 military equipment with a value of 80 million USD free of charge. Probably the American military wanted to scrap this equipment anyway because it might have been outdated. This type of gift giving is part of ostentatious and irresponsible saber-rattling. It firstly adds fuel to the conflict. All these gifts are secondly irresponsible because they are financed with borrowed money that tax payers have to pay back with interest.

China and Taiwan could look at the mechanism that led to the German re-unification. It might be worthwhile to investigate to what extent the process that led to the German re-unification could serve as a model for the Taiwan problem and also for a possible peaceful re-unification of the two countries on the Korean peninsula. Thirty years after the German re-unification, some politicians claimed that this had been nothing short of a miracle and had been '*a sudden gift out of the blue*'. This is how Emily Haber, Germany's ambassador to the United States, has put it. But I think that firstly the fall of the unnatural Berlin Wall expressed the logic of history. I had predicted that this will happen one day because such a concrete wall through the middle of a great city cannot exist forever. The fall of the wall was not a miracle.

I am secondly convinced that it was a good idea of the west-German government not to confront the other side with saber rattling but to pursue the re-unification with consistently small diplomatic and economic steps and to bring western friends and the population of east Germany on their side. This allowed the German chancellor Helmut Kohl and his American counterpart George Bush to act fast when an opportunity for re-unification came up. My best advice for Xi Jinping is to stop military threats against Taiwan and to apply friendly or subcutaneous measures to bring the Taiwanese population on his side. I find it, for example, illogical that China claims that Taiwan is one of their provinces but apparently requires Taiwanese people to apply for a visa or for a "Taiwan Compatriot Permit" (tái bāo zhèng- 台胞证) if they want to visit the mainland.

I have observed that younger Chinese, who all love their nation, developed pride not only in China's economic might but also in the military power that China is systematically building and presenting with great pride to its citizens.

US Advertisement

Television in China, which only the government runs, often shows to its citizen videos of glamorous scenes where enthusiastic young soldiers of navy, air force and army show their newest equipment with pride. The background music of these videos alone gets the spectator ready to go. Propaganda for war and for service in the armed forces is everywhere.

Army Poster in China

Propaganda in western countries emphasized the attractiveness of military service and the emotional rewards that it offers. Who does not want to join the Submarine Service if it provides the benefits shown in the insane American poster above?

The Chinese poster above, in contrast, underlines Prussian values of discipline, devotion, duty and obedience. The soldiers do the goose steps in front of the portrait of chairman Xi, who tells them that '*We strive to build a military of people who work and fight well and listen to the Party's instructions*. Mao Zedong could not have expressed himself more clearly.

The young Chinese today seem to think that China, after the humiliating episode of the Japanese occupation, has now become invincible and immune from foreign interference. France and the British should acknowledge that they have heavily humiliated China in the 19th century. They fought two wars against the Qing dynasty. We call them Opium Wars because the British and the French wanted to continue the very lucrative import into China of opium from India. This increased Chinese addiction to opium and resulted in severe social and economic damage. The British started the first Opium War in 1839 because the Imperial Commissioner Lin Zexu had all opium destroyed which British merchants had stored in warehouses in Canton as they called Guangzhou. A similar second war that the French joined, followed a few years later and ended in China's humiliating defeat. In addition to many other concessions, China had to pay a total of 37 million silver dollars and 16 million taels of silver to the winners of the war and China had cede Hong Kong and other territories.

From what I hear, see and feel in China, people stand firmly behind their government. I assume that people will continue to support their government even if it decides to go to war. Young Chinese folks might become as optimistic and excited as German soldiers were when their Kaiser sent them to the front at the beginning of the disastrous 1st World War. A poll taken in 2014 showed that 75% of the public in China believes that their military is strong enough to win a war against the U.S. This is the opinion of the vox populi and not the opinion of military experts but it indicates that Chinese people will not oppose a decision of their leaders to engage in a war. The Americans lost the war in Vietnam partly because its population did not support military engagement thousands of miles away from home. The Chinese government has in case of a war, which it might start, not to fear that people demonstrate against it in the streets, particularly because China will engage in war only for the direct interests of the fatherland and not for obscure indirect interests in far-away continents.

The Middle East, to mention another problematic region of the world, has since the beginning of the 20th century always been the theatre of military conflicts, which one day might not remain local or regional as they always had been since before and after the establishment of Israel in 1948. Israel was often involved in wars like the Arab–Israeli War 1947-1949, the occupation of the Sinai Peninsula in 1956, the Six-Day War in 1967, the Yom Kippur War in 1973, one unsuccessful military engagement in Lebanon in 2006 and

Israel's year-long destructive attacks of the Gaza strip in 2023-2025. In addition, the Israeli Defense Forces (IDF) have been conducting countless smaller punitive actions against Gaza during the last decades whenever Hamas, the military arm of Gaza, launched attacks against Israel. The Middle East has been a powder keg ever since Jewish immigrants arrived in high numbers and then established the state of Israel on Palestinian soil.

Iran and Israel are the most dangerous adversaries in the region. Iran rises the stakes by seeking to build nuclear arms. Other additional players, who might suddenly shift alliances, blur the possibility of predictions. Even Russia has become a military force in the region. One little spark in the region might ignite a powerful military explosion that can spread beyond. As a matter of fact, I have been hearing about the conflict between Arabs and Jews in the Middle East regularly since I was a little child. Newspapers did rarely report about a conflict but talked always euphemistically about peace proposals and peace missions for the Middle East, which consistently failed. It interests me to know how this seemingly eternal story will end. It might end with the extinction of Palestinians.

There will eventually be an end of the conflict. Everything has an end. The only question is when this end comes and what 'a New Middle East' will look like. It is unlikely that the foes in the conflict suddenly turn into friends as it miraculously happened between France and Germany as a result of the 2nd World War. These two countries buried the hatchet and became friends after centuries of many armed conflicts. A similar reconciliation between Arabs and Israelis is currently inconceivable. The unconditional military support by the US strengthens Jewish innate determination to win and demotivates the Israeli government anyway from compromising. Israel can start any hostility – even committing war crimes - because the US will always be behind them with unconditional backing that their presidents regularly call 'ironclad', which word means 'blind'. Iran encourages Palestinians and supports them in their fight against Israel. Israel – in turn – wants to change in their own favor '*the balance of power in the region for years to come*' as Israeli Prime Minister Benjamin Netanyahu declared after his defense forces had killed in 2024 the entire Hezbollah leadership with one air strike in southern Beirut. It is all or nothing for Israel and the US.

War has returned to Europe surprisingly after more than 75 years of peace if we disregard the Bosnian war from 1992 to 1995. This was an ethnically rooted conflict within the boundaries of former Yugoslavia. If this country had continued to exist, we would have called it a civil war.

In February 2022 the Russian army attacked the Ukraine under Putin's orders. This was in violation of the 1994 Budapest Treaty Memorandum, in which the Ukraine surrendered their soviet-era nuclear weapons and received in turn assurances for their safety, security and sovereignty from the US, Great Britain and Russia. Putin violated this memorandum by invading Ukraine, which is reminiscent of Hitler's invasion of Poland after he had promised in the Munich Accord of 1938 to stop Germany's geographical expansion.

Everybody - including probably Putin – expected that it would become a Blitzkrieg by which Russia would very fast conquer the country and create a fait accompli. This would not have given outside forces the time to intervene. But Ukraine showed a surprising resolve while the Russian army revealed weaknesses that prevented them from conquering the Ukraine in swift action. Putin has probably realized that his army is weaker than his generals told him. If Putin cannot achieve with conventional weapons his goal to incorporate the Ukraine into Russia, there is the risk that Putin might in his desperation use nuclear arms to achieve his goals. This will for sure trigger the 3rd World War. It currently looks as if Putin has the Russian population and all members of his government with strong methods under control. He does not allow any opposition against whatever he decides to do. This situation becomes particularly dangerous in the event that Putin falls ill and becomes mentally handicapped as Hitler did in the last years of his rule.

While Putin controls the population like a tyrant, he might not be able to prevent strongmen in his apparatus to stage a coup against him, which I predict will happen if the war in Ukraine drags on for too long and with too many casualties.

At the time of writing, the war in Ukraine is in its fourth year. I dare to make a prediction as follows: it will be impossible for a small country like Ukraine to beat the Russian army even if the west continues providing modern western weapons. While Ukraine can mobilize far fewer soldiers, Russia can mobilize two million military personnel that they accept to be killed in the front line that we call a meat grinder. Russian respect of life and of its soldiers in particular was never well developed. At the end of some more months of heavy civilian and military casualties on both sides, Ukraine will seek a peace agreement because Russia continues to send an unending stream of soldiers to the front and the western countries will get exhausted in providing help. The peace accord will sanction the annexation of the Crimean Peninsula by Russia in 2014 and Ukraine will yield to Russia its eastern regions that Russia had annexed in 2022 to become the Russian oblasts Donetsk, Luhansk, Kherson, and Zaporizhzhya. The west will foot the bill by paying for the reconstruction of Ukraine using only partly funds that they had seized in Russian bank accounts in the US and in Europe. Napoleon and Hitler had previously made the costly experience that it is next to impossible to overwhelm the huge Russian bear.

The Future of Democracy

Universal suffrage is the key feature of modern democracies. All citizens have the right to participate in elections no matter their commitment to democracy and their capacity to understand the issues that determine the best future of the country. The majority of voters are not really able to judge if policies of competing political parties are beneficial or will produce catastrophes. Not even the people in power can predict the consequences of their policies and their actions in medium or in longer-term. Politicians seem to know only where power and money are today.

The universal right to vote in modern democracies exists unfortunately in tandem with an over-emphasis of individual liberties and selfishness. This includes the freedom to loudly criticize and oppose democratic institutions and to fight against democratically made decisions. The republican party in Texas, for example, has in June 2022 officially adopted Trump's claim that president Joe Biden was not legitimately elected. Such resolutions, which nobody censors, undermine seriously the respect for the office of the president and for the integrity of electoral proceedings.

The sense of responsibility for the well-being of society consistently decreases. I think we should distinguish between on one hand individuality, which is the result of the freedom to develop one's own individual potential and characteristics. We should promote the development of Individuality. On the other hand, we have selfish individualism that disregards mutual interdependence of citizens in society. We should fight this type of individualism and should not condone it.

Indifference for the common welfare in a democracy is at least as dangerous as the tyranny of an autocrat. This is how Montesquieu apparently put it in the 18th century. With his main book 'The Spirit of Law' (L'Esprit des lois) this influential political philosopher was one of the first proponents of the separation of political powers into the three independent bodies of legislative, executive and judiciary.

The derailment of democracies, that we can observe in many democracies, is probably not the fault of the original concept. The idea of democracy was appropriate 200 years ago in different circumstances. '*European democracy was originally imbued with a sense of Christian responsibility and self-discipline, but these spiritual principles have been gradually losing their force*'. This is how Aleksandr Solzhenitsyn, the Russian novelist and historian, put it when he studied American democracy while he lived in exile in Cavendish,

Vermont, during the 1980'. He, who was fully aware of soviet tyranny, consequently rejected democracy and favored a benevolent authoritarian regime with Christian values. I think that not a sense of Christian responsibility motivated the movement towards democracy but excesses of monarchs. Solzhenitsyn was right when he stated that people 200 years ago had probably a stronger sense of social responsibilities.

Limitless possibilities of communications that modern technologies created, challenge liberal democracies today. In the name of holy freedom of expression, democracies condone abuses of the internet by their own citizens and by abuses from outside. Fake news and conspiracy theories easily spread like wildfires or firestorms and misguide gullible individuals.

When news – fake or not – travel fast, we colloquially say that they 'go viral'. There is indeed a parallel between the spread of fake news and the spread of viruses. Scientists have applied mathematical models that simulate the spread of pathogens and have used these models to calculate the speed of diffusion of fake news in social networks. They call this model SIR. A virus meets on its way people who are susceptible ('S') or are already infected ('I') or people who have recovered or are resistant ('R'). One important factor in this model is what they call the basic reproduction number (R0). This is the average number of new infections that an infected person creates. They call persons with a high reproduction number "superspreaders".

Scientists use the epidemiological model 'SIR' to firstly forecast the speed of a virus spread and secondly to create methods how to slow it down. When misinformation travels in social networks like a virus, it meets people who are susceptible ('S') or gullible and believe whatever they hear. There are others who are already infected ('I'). Fake news also meets people who are immune or resistant ('R'). Scientists hope that they can use experiences in epidemiology and the model of SIR to fight or to slow down the spread of fake news in social networks and in media.

Some famous participants in social networks are superspreaders. Elon Musk is a current example with his overwhelming appearances in public and with his control of the social platform 'X', which used to be called Twitter. Elvis Presley was one of the first superspreaders before the arrival of the internet. When he received in the height of his popularity in 1956 a polio vaccine in the arm, he brightly smiled in a video that was widely published. During the following six months, vaccination rates among American youth sprang up to 80%. The vaccination rate would for sure have gone down if Elvis Presley had presented himself as a vaccination critic.

Democracy was not designed to withstand firestorms of misinformation. We have not yet built the necessary safeguards against the new dangers. Freedom of speech includes nowadays the right to criticize without borders the government and the democratic institutions.

There is a significant difference between voicing a critical opinion factually and – on the other side - crusading for a dubious opinion by inundating social networks with opinions that attack democracy. Freedom of speech probably covers such exaggerated multiplication and dissemination of critical opinions. But there should be a limit. We should weigh a citizen's freedom to crusade for his opinion against the need of protection of individuals from constantly be showered by the same opinion. I find it, for example, very invasive and manipulative – even insulting - when during a newscast in television the same aggressive advertising clip is shown repeatedly before each and every newsclip. The freedom of speech should, in my opinion, not allow a person to repeat without invitation thousand-fold his opinion. Democracies should, in particular, not allow constant repetition of fake or manipulated news and of inflammatory opinions. Authoritarian leaders of non-democratic countries repeat thousandfold their political slogans

because they know that people believe anything that they constantly hear. Democracies should not allow individuals to do the same.

I heard the probably fictitious story of a totalitarian regime that asked a prisoner what his favorite piece of music was. When the poor man answered that it was the overture of Mozart's Marriage of Figaro, the prison guards tortured him by locking him up in a cell and exposing him with the loud and endless flow of this overture without interruption day and night for several weeks.

Repetitions seem to give actions and words a new meaning, particularly in politics. If a court of law punishes a politician for one single crime, the public will see him as a criminal and will push him to resign. If courts indict a politician like Donald Trump several times for many offenses, he will be successful with the electorate by claiming that his multiple indictments are witch-hunts and also an interference in democratic elections. It is an irony of the human mind that people take repeated statements for the truth but consider repeated indictments as evidence that their favorite politician is the target of political prosecutions.

Repetitive statements are efficient not only in public life. If a wife, for example, dislikes the furniture at home while her husband shies away from buying new furniture, the astute wife will not to demand the purchase of new furniture point blank. Instead, she will be far more efficient to repeat as often as necessary negative factors like lack of space, difficulty to keep clean and that the furniture is old-fashioned style. It will also be useful that the wife repeats every so often that the neighbors have classier furniture. At the end, the husband will change his mind and will suggest to buy more new furniture.

Democracy in its current form is not sustainable. We will have to replace it in a few decades – at the latest - with another form of government. Since self-healing capacities of liberal democracies are limited, necessary peaceful reforms look impossible. Democratic nations need a political or economic collapse or a revolution that create room for necessary changes. European history shows that major changes in the political landscape did not come by consensus and agreements. Major necessary changes don't come about at the ballot box. Only violent revolutions and wars made necessary changes possible in Europe's history. The idea that fundamental changes to the better are only possible after the total destruction of the current situation is reflected in the biblical prediction of the "*Great Tribulation*" (Matthew 24:21) that precedes the establishment of God's heavenly kingdom. If I were a fan of the Bible, which I am not, I could use this biblical quote in support for my prediction that western liberal democracies will violently fall apart and will not be able within the next few decades to produce peacefully necessary changes.

The generally accepted opinion is that politics are the art produce whatever is possible. But a much better idea would be to see politics as the art to make possible what is necessary. And just this does not seem to be possible. I have dedicated another essay to democracy. The title of the essay is the question if modern Democracies are doomed. But this is actually not a question. It is a prediction.

Prediction pf Political Developments

In the next two sections, I want to predict political developments in the US and in Europe. I give more thoughts to Europe, which – I confess - is closer to my heart than the US.

Predicting the Future of the US

I can foresee a continuing decline and even an approaching collapse of the USA within the next 50 years. I make this prediction even if the democratic principles were well functioning, which they are not. There are other reasons why the decline is irreversible. The US lost the war in Vietnam. The US then did not achieve anything by starting useless and costly wars in Korea, Afghanistan and in Iraq. President HW Bush had started a war against Saddam Hussein in 1991 without finishing it.

President George W. Bush, his son, forced in 2003 the start of another war against Iraq with the outrageous lie that Saddam Hussein stored weapons of mass destruction, including chemical, biological, and potentially nuclear weapons, of which the US store many types themselves. Bush argued that these weapons posed a threat to regional stability and to the US by which he probably meant Israel's security.

He also wrongly claimed that Iraq had ties to terrorist organizations, including Al-Qaeda. The two wars in Iraq were not at all justified. There were no weapons of mass destruction. There were also no clearly defined political goals.

The two wars were a personal vendetta of father and son against Saddam Hussein. It is incredible that the American population let GW Bush get away with all his lies, by which their president tried to justify the war. Joe Biden was in 2003 senator for Delaware and defended the war publicly as '*a march to peace and security*'. This is today reminiscent to Vladimir Putin who called the brutal invasion of the Ukraine in 2022 a 'special military operation'.

The favorite strategy of populists and dictators is the reversal of facts into the opposite. Donald Trump has in 2025 also used this strategy by accusing the Ukraine that '*should never have started*' the war with Russia. When Putin assembled his army around Ukraine, which clearly looked like the preparation of an attack, he accused the western countries as 'warmongers' because they expressed fear that Putin would invade Ukraine. When Putin actually did this, he called it a peace keeping mission.

The '*march to peace and security*' in Iraq became one of the worst of US military debacles. It left behind more than 150,000 deaths and an indescribable political, social and economic mess in the country and in the region. It is also incredible that the US continued using military power in Iraq during two decades after they had invaded this country.

The US also engaged its military forces almost everywhere in the rest of the world without clear goals and without gaining any tangible benefits. Their senseless military activities left behind 17.5 million mostly frustrated war veterans and half a million victims of Post Traumatic Stress Disorder (PTSD). The US Department of Veteran Affairs (VA) employs more than 400,000 staff and had in 2024 a budget of $303 billion USD. Future medical and disability costs for veterans of the wars in Iraq and Afghanistan will total between $2.2 trillion and $2.5 trillion USD. The Roman empire had also to deal with a considerable number of war veterans before it collapsed. Rome had probably – like the US - an organization like a Department of Veterans Affairs and a Veterans Authority to look after the needs of traumatized war veterans. The government of ancient Rome compensated war veterans with land as compensation. Emperor Augustus killed two flies with one stone. He compensated his 300,000 veterans by granting them land in colonies that Rome had conquered. At the same time, he colonized the conquered lands.

America's excessive and unconditional financial and political support of Israel, which is several thousand kilometers away from the US mainland, is not in the best interest of the US. In the opposite, the US has become a voluntary slave of Israeli interests. Without gaining anything, the US's 'ironclad' (which mean blind) support for Israel gets them unnecessarily dragged into all conflicts, in which Israel is embroiled.

America suffers from negative circumstances like military over-reach, heavy taxes, a Kafkaesque bureaucracy and legal system and astronomical piles of government debt. In 2023 alone, the US recorded the death of 43,000 people by firearms and more than 107,000 deaths caused in 2021 by drug overdoses, mostly from fentanyl. Police killed more than 1,000 mostly black people in 2021 during traffic stops or during other trivial interventions.

Nothing seems to be achieved by replacing one helpless president with another to cure these problems. The causes for the decline of the US lie very deep and are difficult to address in a democracy, where selfish lobbyists block necessary reforms. To top it off – a small layer of immensely rich and influential individuals and companies exist parallel to a large majority of underprivileged citizens. The small upper layer of society pursues relentlessly their special interests. The introduction of democracy was a good measure to fight authoritarian monarchs and arbitrary rulers a couple of centuries ago but a look at the US today seems to indicate that the concept of democracy has grown too old and needs some corrections to avoid chaos caused by unrestricted individualism, by powerful lobbyists and by immunity to necessary reforms.

During prerevolutionary monarchies in Europe the situation was similar. The absolute monarch exercised his powers under the strong influence of cliques and factions of powerful noblemen and influential persons from finance and church. The monarch was only the highly visible tip of the iceberg. This is why the French revolutionaries not only attacked the king but also the nobility and the clergy. Bankers, industry leaders, businessmen and churches today also form the powerful and often in-fighting network of political forces that operate parallel to consultations of the people through democratic elections. The American voter can replace one president with another but they certainly cannot change the influence that powerful lobbyists and interest groups exercise on all presidents and on the members of parliament.

In my legally trained mind, I see the justice system in the US in shambles as well, which is another nail in coffin of the US. Many lawyers act irresponsibly by launching frivolous lawsuits and sucking money recklessly out of their clients' pockets. Rudy Giuiliani, Donald Trump's infamous and now disgraced personal lawyer, reportedly charged 20,000 USD per day of work. Christopher M. Kise, another lawyer who used to be Attorney General in Florida, asked for and received a retainer of 3 million USD before he started his work in Trump' team of lawyers. This is criminally high. Mike Pence called the lawyers who worked for Donald Trump 'crackpot' lawyers, which they probably are. It is significant in this context to note that 'the Donald' does usually not use his own money to pay for his legal battles. He uses donations that he collects from his gullible followers. He actually used more money to pay his lawyers than he used for his re-election campaign. I think that this might not be criminal embezzlement but is for sure morally the same.

The legal system in the country north of the US is similar to that of the US. Court proceedings in Canada take endless time before they conclude. A man was driving nearly three times the speed limit in Vancouver and caused a fatal accident in 2015. He received a sentence of 18 months in jail but only five years after the collision.

Lawyers' fees in Canada are like in the US, often excessive. The law firm 'Nahwegahbow Corbiere Genoodmagejig' that assisted with the settlement of the Robinson Huron Treaty in 2023, presented the 21 first nations with a bill of $510 million CAD. The amount of the settlement is $10 billion CAD that the first nations receive from the governments of Canada and of Ontario. This is, I admit, a huge amount. But this does not justify making the lawyers multimillionaires each. If they charge $400 CAD for every hour of their work, the legal fees represent 1,275,000 hours or 437 years if the lawyers worked eight hours on 7 days every week.

The few bad experiences that I had with Canadian lawyers made me feel like living in a lawless society like in the Wild West. In one situation I asked a lawyer in Vancouver for his legal opinion in the following situation: The company, that manages the leasehold building in which I own an apartment, rejected payments by e-banking and insisted on being paid only by cheques which I was unable to write and to send by snail mail from China. Instead of answering my question, the lawyer asked me to pay upfront a retainer of 2,500 CAD. With this request for money, he sent the draft of a convoluted 4-pages retainer agreement, in which he basically protected only his own interests and clarified that his hourly rate was 500 CAD. He did also not give any commitment or indication as to the number of hours needed to answer my simple question. When I practiced law in Germany 40 years ago, all my honest colleagues and I had the attitude that we are supposed to know the law and never charged our time that we needed to look the issue up if we did not know off-hand. We charged – if at all – only the time that it took us to answer a simple question on the phone or in writing. Lawyers in Canada charge their clients for the hours that they say they need to know what the law says.

In another case back in Manitoba I asked a lawyer to help recover money from a neighbor who had stolen 12 heifers from our pasture. He asked for a retainer, which was higher than the value of the heifers. I left his office immediately with greetings but with no thanks. My conclusion is that it is bad in these legal systems if you have a problem but if you hire a lawyer for help, you add another more serious problem. Legal Professions Act (LPA) gives a lawyer's client the right to submit to the court a request for a review-of a lawyer's bill. But this right is rather theoretical because the lawyer whose bill the client questions, uses all his legal skills and tricks, which makes is necessary for the client to retain a lawyer in the review proceedings. At the end the review process becomes usually more costly than the bill under review.

The overly complicated court proceedings and their protracted lengths present additional sources of pain. It often takes a couple of years before courts provide the final resolution of a dispute.

This deplorable state of the justice system creates frustration and is a breeding ground for social problems, irritations and can feed unrest.

The political system in the US does also not look healthy. Big money and an irreconcilable division of a disgruntled society dominate politics on all levels from federal Washington down to counties. The two political parties behave like sworn enemies instead of cooperating for the best of their country. The catastrophic presidencies of Donald Trump, who constantly lies and misleads the public, contributes to a further decline of democracy and of the US. Trump's behavior, which he continued after his disastrous term in office, is only a symptom of America's sickness. More than 50% of the voters elected him into office in 2016 and he received 49.8% of popular vote in the 2024 elections despite all the lies that he told and suicidal political decisions that he had made during his first term in office. When Trump tells incredible lies, he benefits from the fact that a large portion of the American population – almost 50% as mentioned above - is susceptible to believe uncritically daring conspiracy theories and lies that irresponsible people like their president disseminate and constantly repeat until uncritical people take it for the truth. The problem, which is the result of a malfunctioning education system, therefore comes from deep within. Only a few more drops in addition to Trump will make the bucket overflow.

The US was born only a little bit more than 240 years ago. This is a short period of time in historical terms. But it is a long period of time for a specific nation or for an empire which in average last only between 200 and 300 years. The German Empire lasted only 47 years from 1871 to 1918 and Hitler's 'Third Reich' lasted only 12 years from 1933 to 1945. France also changed its format of existence frequently during the course of history. Napoleon's pompous empire lasted only ten years from 1804 to1814. France changed since 1792, when they established their first republic, four more times their republican systems until the latest

change in 1958 when they established the current 5th Republic. The general idea of being a republic did not prevent France to open the door for emperors and kings to take the helm in-between. The first emperor after the first republic was Napoleon Bonaparte who crowned himself in 1804 and was emperor until his defeat in Waterloo in 1815. A couple of Bourbon kings followed until 1848 when France established the Second Republic. This new republic lasted only four years when Louis-Napoleon established the Second Empire making himself emperor of France, which he remained until 1870 when France became again a Republic, which it is until now.

German history is not less eventful. A German emperor headed a group of kingdoms and chiefdoms as first amongst equals (primus inter pares). They called this conglomerate of independent nations the "Holy Roman Empire of German Nations" because they considered that they were the successors of the Roman Empire. This construct ended in 1806 when Napoleon swept the German emperor away and left all the German kingdoms and chiefdoms on their own. These fiefdoms competed and fought with each other until 1871 when Wilhelm I became emperor of a united Germany. This emperor's grand child became emperor Wilhelm II in 1888 until he fled in 1918 to neutral Holland right after the 1st World War. He fled as a refugee because he feared to be killed by revengeful winners of the war or even by his own disgruntled subjects. Germany became the so-called Republic of Weimar, which nobody really liked due to the social, political and economic complications after the 1st World War. The Weimar Republic was unable to unite people of which some wanted to re-establish the monarchy and others who were inspired by communism, wanted to create a pure socialist republic. France insisted on the payment of unreasonably high amounts of reparations, which created additional resentments against the government. But this government felt that they had legally to comply with the Treaty of Versailles that had laid down these payments. In this confusing environment of the Republic of Weimar it was easy for Hitler to take the reigns as a courageous solver of problems and creator of jobs with huge infrastructure projects like the construction of Autobahns. Hitler, who tried to make Germany great again, stayed in power for only twelve years. After his devastating reign it took 45 years of uncertainties before Germany became the nation that slowly developed into the country that it is now.

I mention the history of France and of Germany to show the contrast with the history of the US, which has not yet experienced similar upheavals, which usually clean the scene and allow a new start with a fresh way and with new ideas.

If the US follows the usual pattern of rise and fall of civilizations, its fall is coming soon or is already overdue. No nation, empire or political entity lasts forever. The situation of the US is different from the situations of much older nations in Europe like France and Germany as I have just mentioned. They have experienced dramatic changes in revolutions and wars. Each time after such drastic events, the European countries had an opportunity for renewal and for new beginnings that ballot boxes cannot bring about. The US had no such experiences during its more than 240 years of existence. The US continued to exist without dramatic disruptions, and missed the opportunities for necessary renewal and reforms that usually follow serious upheavals.

Predicting the Future of the European Union

I fear for the future of the European Union, which is not a country and also not a state or a nation. It has not yet united its members into the United States of Europe. The people living in these states have no common identity. The EU will exist only as long as its members see its utility. The dangers that I see, come from actors and factors inside the union and from outside. Let's start with the dangers from inside.

Risks coming from Inside

After the Brexit, twenty-seven countries form now the European Union. 'Union' is a strong word for an association of countries that are each culturally and economically far apart. It is similarly ununited and united as was the so-called "Holy Roman Empire" that covered western and central Europe with changing names and borders. It originally comprised parts of what is now France, Germany, and Italy but split in 811 AD from its western part, the Frankish Kingdom, after the death of Charlemagne. The eastern part of Charlemagne's empire became the "Holy Roman Empire of German Nations" with a geographical area around the area in which Germany is now located. The constituent heterogeneous nations of the holy empire all kept their different identities, ideas and views about the purpose of the empire, its justification and powers. The member-countries formed a loose federation of kings, princes, knights and noblemen. They did not form a powerful political unit. The empire was rather a wishful political theory which reappeared after the end of the 2nd World War.

European Union 2023

Holy Roman Empire 800 AD

Holy Roman Empire of German Nations

Political and military forces in European countries in the past always pushed and pulled in different directions creating changing power centers without permanent institutions. The EU today with its administration in Brussels is for sure a much stronger entity than the holy empire. It has a clear legal and administrative framework but has inherited the political and cultural diversity in Europe that stands in the way towards the United States of Europe. Members of the EU want to keep their independence.

Main differences of long historical standing are on the north-south and on the west-east cultural axes. Countries in the north like Finland and Sweden are traditionally protestant. The cultural differences within these countries are small. We then have in the south of Europe the traditional catholic countries like Greece, Italy and Spain, which all show more cultural differences within their respective boundaries. Particularly big is the cultural difference between the north and the south of Italy. The industrialized north with Milano in its center is much closer to Germanic culture and characteristics than the south.

On the west-east cultural axis we have in the west the six original countries of the union, namely the three Benelux countries, France, Germany and Italy. EU members in the east are former communist countries like Poland, Bulgaria, Romania and the three Baltic countries. Cultural differences could not be greater. The EU is a multi-cultural entity. The concept of a melting pot is foreign in Europe. Multiple cultures exist in clearly identifiable geographical regions of the EU. This is different in Canada, where multi-culture cuts across societies in every province except in Québec, which the federal government recognizes as a province with distinctly French culture.

I am cautiously optimistic in believing that people in the east-European countries might eventually shed off the remnants of soviet indoctrination to which they were exposed for a couple of generations. It takes another set of generations for fundamental changes of cultures. We have observed the length of this process when communist east Germany became part of west Germany to form a re-united Germany. The population in the east needed some forty to fifty years to shed socialist ideas and to adopt to some extent west Germany's political and cultural features.

Ho Chi Minh expressed this phenomenon by saying that it takes ten years to obtain a return from planting a tree but it takes hundred years to cultivate the people. Mikhail Gorbachev, the last leader of the Soviet Union, wanted to democratize communist governance with his policy of Perestroika. After the collapse of the soviet empire, he admitted in 1995 that he had made tactical errors as Soviet leader by not considering that this process cannot be completed over night but takes decades rather than years to succeed. He won the Peace Nobel Prize in 1990 just one year before the demise of the USSR.

People in the EU use many different languages and dialects of which the EU administration uses 24 as official languages. These languages belong to different language families like Slavic languages (Polish), Romane languages (Italian, French etc.) and Germanic languages. But we also find smaller language families like Uralic (Hungarian, Estonian) and Celtic languages in Scotland, Wales and Ireland. It is a real confusion of tongues.

English French and German are 'procedural' languages in the EU. After the Brexit, English is not an official language in any remaining EU country; Europe should therefore no longer use English as official language. However, English is practically the lingua franca in Europe. The current situation that a foreign language serves as lingua franca, is not new in Europe. Latin served in this function for many centuries in almost all European countries until French had become slowly the language of leaders and diplomats. France was under king Louis XIV, the "Sun King" (roi soleil) the most powerful country in Europe and had set the standard for culture and art. Up to today, the language of Voltaire still benefits from this tradition and remains one of the six official languages of the United Nations.

China has hundreds of different languages, which belong to one broad language family. China has a common official language, which is standard Mandarin (pǔtōnghuà - 普通话) in its simplified version that they introduced in 1956. Despite the great number of different languages, Chinese people feel culturally united by the knowledge that their common culture is 5,000 years old and that their different languages belong basically to the same language family. We also find a broad racial unity between the many different 'nationalities' as they call culturally and linguistically different societies in China. China's cultural unity is less endangered than in Europe because China does not suffer from any onslaught of refugees or of immigrants. Unity in language and culture is missing in the European Union and puts limits to integration and to the development of a shared identity.

All Europeans identify themselves firstly as nationals of their respective countries of which they are primarily proud. A Frenchman, for example, will not fail to tell you that he is French as a Texan might proudly tell you that he is from Texas. But the Texan will confess that he is firstly American. The Frenchman, in contrast, will put his French nationality in the forefront. He might then say that he is European but 'Europe' is for him a geographical and not a political term. Citizens of Finland and Switzerland are not members of the EU but they feel like Europeans. I think that many Russians also clearly feel that European blood flows through their veins even though their government nourishes conflicts with the EU.

I have not yet heard someone saying that he is proud to be a citizen of the European Union. This is partly because there is no EU citizenship but mostly because people don't identify themselves as members of the EU. I personally feel more like a European than like a citizen of the European Union. I have the strong feeling that the European Commission does not make sufficient efforts towards the development of an EU identity.

The EU is also not a currency unit. Only 20 of the 27 members of the European Union have adopted the Euro as their official and sole currency. They form what we call the 'eurozone'. Member states like

Denmark, Sweden and Romania keep their own national currencies. While the Euro as currency is only a little bit older than 25 years, the US dollar is more than 250 years old.

A normal feature of a united country is the free and unrestricted movement of people without border controls. But the EU is not fully such a country. There is not even a European passport. The treaties that created the EU did not expressly include the freedom of movement. But 27 European countries have signed the separate so-called Schengen agreement, which abolished their internal borders. While four non-EU members became Schengen countries, four EU members did initially not join. As a result, Bulgaria, Romania, Ireland and Cyprus still controlled their borders that they share with other EU countries. But Bulgaria and Romania joined Schengen as of 01 January 2025. If we transpose the situation with Ireland and Cyprus to the US, you might have to stop at a border control when you enter California from the north and you will have to show your Oregon passport.

I think that the European Union expanded too fast. The original six member countries should have grown more closely together and should have formed a more homogenous union before admitting other countries to the club. Because of this failure, the central powers of the EU, the European Council, the European Parliament and the European Commission, are not vested with sufficient authority. They are also by far not as popular as similar institutions in the US. When I lived in Strasbourg, Place Broglie, I often walked some 30 minutes along the Bruche River to the area, in which the European Parliament, the European Council and the European Court of Human Rights are located close to each other. The impressive buildings of these institutions never looked busy – rather sleepy – because the real European administration is in Brussels. Nevertheless, when I walk in this area, I always feel closer to the political center of Europe than citizens in Romania or Bulgaria must feel. People in these countries must perceive the institutions of the EU as a strange Moloch that handles the European political affairs almost 2,000 Kms away in a different culture and using all kinds of foreign languages.

The central powers of the EU are not strong enough to bridle many disuniting and centrifugal forces. Individual member states like Poland and Hungary often make extravagant requests. They also make decisions that they base on values that contradict those that other EU countries share. Poland in particular, has not yet abandoned its authoritarian understanding of the judiciary that it has inherited from the Soviet Union. As a result, Poland regularly acts – for example - against its obligations to adhere to the democratic principle that the judiciary must be free from government interference.

It is remarkable that the member countries that are most vocal in criticizing the basic values of the EU, are the countries that greatly benefit financially from it ('tax eaters') while 'tax payers' in Germany, France and Italy and in other committed member countries pay taxes to make this possible. Poland was by far the biggest financial beneficiary from the EU having in 2019 received 11.6 billion € more than they have paid into the pot. Hungary was the second most important beneficiary with a net benefit of 5 billion €. Other EU members, such as Greece, Portugal and Ireland, are also net cash recipients. Everybody agrees that it is beneficial for a country to be an EU member because, for example, of access to a single market of 450 million consumers and a uniform regulatory framework. But economists have problems calculating the economic benefits of EU membership beyond the cash transfers between the EU and its member states.

One of the central bodies of EU's administration is the European Commission in Brussels, which we can compare with a government. There is then the European Parliament, which is headquartered in Strasbourg but is managed from its offices in Luxemburg while most sessions of parliament also take place in Brussels. We then have the European Council, which is a collegiate body composed of the heads of states or leaders of governments of the EU member states. The council defines the overall political

direction and priorities of the European Union. We also have the Court of Justice of the European Union (CURIA) in Luxemburg, which oversees the application of European Law. There is finally the European Court of Human Rights (ECHR) in Strasbourg.

Law that the European Parliament promulgates does not need ratification by parliaments in member countries. It is automatically the law of member states and is supposed to be enforced by individual countries. But most institutions, including the European courts, are toothless. Europol, which is headquartered in The Hague with staff of more than 1,400, is a European police organization that supports its member states in preventing and combating serious international and organized crimes, including cybercrime and terrorism. But Europol's mission is not to enforce decisions of the European Courts or of the European Commission. The Commission is limited to withhold payments to disobeying countries that show contempt of court. The EU cannot expel a member state even if it repeatedly violates the EU's founding principles. It can only suspend their representation and voting rights.

Many important decisions still require unanimity or qualified majorities. This opens the path for blackmail when a country makes its 'Yes' vote dependent on fulfilment of special requests or on concessions in areas not related to the issue that is up for vote. The requirement of unanimity might one day break EU's neck. When the majority in the European Parliament rejects selfish and unreasonable requests of individual countries, the overruled country might break away out of protest. Political dynamite will brew if economic conditions become bad. Egoistic member states might then get nervous and might jump off the sinking ship under the motto 'Save yourself if you can'. The British pushed for the Brexit partly because the North Sea protects physically the British Isles from invaders and they think that they are better off on their own. The British inherited their strong pride from the glorious past of the British Empire. This self-confidence remains until today stronger than the rational acknowledgment that the British empire is history and that other global superpowers define the new world order. The British don't want to realize that it is more rational and reasonable to be part of a united European community that guarantees competitiveness instead of going alone. The British monarchy with its pompous ceremonies like the crowning of King Charles III in 2023 is an anachronism that does not point into the future. The State Opening of Parliament at the Houses of Parliament in London is another example of an extremely pompous annual ceremony. The monarch travels from his home in Buckingham Palace to parliament in a gilded coach, while a separate coach carries the Imperial State Crown. The king does this haughty trip for the only purpose to deliver his speech from a golden throne while wearing the Robe of State and the diamond-encrusted Imperial State Crown. It is actually not the King's speech but a text that the prime minister has written and that the king reads from a book or from a teleprompter.

I cannot understand that the British people are proud of such pompous ceremonies and proud of a king who represents an ultra-wealthy family that lives in luxury, for which the tax payer carries most costs. Charles III is king by birthright and not because of any actual aptitude or achievement.

In addition to the desire to remain by themselves as subjects of an anachronistic king, a typical British attitude worked in favor of the Brexit. It is the belief that someone is a friend only as long as he provides benefits. The British did not see sufficient benefits and did not want to wait until a problem arises to jump off the ship. They prefer sinking their own ship if worse comes to worse. Some people say that the British joined the EU anyway only because it is more efficient to fight the EU from inside than from outside.

In some countries that are members of the EU, we find right-wing political parties that openly advocate the exit from the EU. In France, for example, such parties are quite strong. Two separate movements of Jean-Luc Mélenchon and Marine LePen fight against France's membership in the EU. LePen obtained with 47% the first place of the popular vote in the general elections of 2022. Pro-European parties obtained

only 33.15% in the elections of 2024. This shows that LePen needs only a few more votes for her movement to become dominant in one of the next elections. Given the benefits of EU membership, not all right-wing parties in EU member countries might go through with an exit from the EU once they are in power. They might just want to cut EU's wings so they can pursue national interests at the expense of other EU members. "More Italy, Less Europe" was the motto of Matteo Salvini in Italy. Marine LePen similarly stated that her followers '*refuse to see the national torch extinguished*'. They think like women who want to have children but refuse to lose their virginity.

To avoid that the membership in the EU is constantly up for discussion, each member state should have written in their constitution that the country is part of the EU. This would make the fight for an exit from the EU unconstitutional. This is the situation in the US, where the Pledge of Allegiance clearly says that the union is '*one nation under God, indivisible, with liberty and justice for all*'. Individual states cannot unilaterally secede from the Union. This made acts of the Texas legislature that declared independence '*absolutely null*' as a federal court ruled in 1869. If Texas wants to regain independence, they will have to do this by revolution or by civil war. Texas had gained independence from Mexico through the so-called Texas Revolution, which was the war from October 1835 to April 1836 between Mexico and Texas colonists. This resulted in the founding of the independent Republic of Texas, which ended in 1845 when Texas joined the Union forever.

It is an outstanding feature of history – and actually of life – that nothing lasts forever. It is also a feature of human beings that they question from time to time the most basic and vital pillars of their political systems even if it is written into the constitution. The logic of history, on the other hand, might not have included the development of a United Europe where many very different and strong nations have always placed high priorities on the preservation of their respective cultures and religions. The desire for self-determination is very strong in Europe.

Threats from Outside

Outside forces and powers also threaten the survival of the EU.

China might have an interest in a united Europe if the EU is willing to become China's ally. This is an interesting avenue because the US with its "America First" policy have lost interest in Europe and are about to abandons security guarantees for the old continent. While there are quite a few areas, where China's and Europe's interests don't converge, the EU refrained from having a closer relation ship with China mostly because the US have adopted a very confrontational stance towards China and pressured Europe to do the same and to keep distance from China. The US observes any move of Europe towards a partnership with China with great concern, animosity and countermeasures, of which most are hidden secretly behind nice diplomatic utterances that deceitfully emphasize shared interests and mutual friendship. But Donald Trump has started to show openly his antipathy for the European Union even though the US are officially not yet hostile towards the EU. Without having evidence, I imagine that the US covertly use all opportunities and tricks to disunite the EU and to obstruct efforts to make the union stronger. After all, the natural goals of politics and diplomacy are not altruistic. Every country wants to promote with all means its own special interests and tries to prevent other countries from jeopardizing these interests no matter if they are friends or foes.

Trump prefers bilateral agreements over multilateral relationship under the motto 'divide et impera': divide and rule. He cultivates personal relationships with certain right-wing leaders and populists, such as Italy's Matteo Salvini and Hungary's Viktor Orbán, who are openly Eurosceptics.

Russia and the USA have both no interest in seeing the EU grow in strength as a competitor in the world economy and in other global affairs.

Russia has like the US the goals of promoting their own interests and to weaken the EU. 'Everything that divides Europe is advantageous for Putin'. This is how Romano Prodi put it many years after his tenure as president of the European Commission

However, in contrast with the US, Russia does not at all hide its intentions behind empty diplomatic words. In the opposite; since Russia's annexation of the Crimean Peninsula in 2014 and its invasion of the Ukraine in 2022, the EU and most European countries are on an open collision course with Russia. Journalists have unearthed clear evidence that the Russian propaganda machine subcutaneously supports in the internet opinions of groupings that are hostile to liberal democracies in Europe. It seems that troll factories in Russia work full time to systematically misinform gullible European people in the internet. They want to de-stabilize the political climate in the countries of the European Union. More than 20 years ago, Boris Yeltsin had issued the policy to devote "*more attention to developing the entire range of means of information warfare*". We have evidence that Vladimir Putin, who is a former KGB agent, follows his master's advice. I have already mentioned above the cyber-military unit or online army, known under the name 'Sandworm' or 'Unit 74455'. As western secret services have established, Sandworm operates a troll factory or troll farm to undermine social peace in Europe. Sandworm also tries to sabotage businesses and European government agencies and to steal and abuse sensitive data.

European countries – particularly European NATO members – know that the US will always put America first and keep the possible growth of Europe's strength at bay. But in the face of aggressive military threats from the Soviet empire and now from Putin, it was in the best interest of western European countries to seek shelter under the mighty military umbrella of the US which dominate NATO. For higher interests you sometimes have to sleep with the enemy.

After the dissolution of the Soviet Union and after the end of an aggressive communist ideology the transatlantic alliance looked less natural and less necessary. Trump showed during his two non-consecutive terms in the White House clear signs of ambivalence about NATO along with his reluctance to defend Europe against military aggressions. Emmanuel Macron even claimed in 2019 that '*we are experiencing the brain death of NATO*'. His suspicion is justified. The EU cannot rely any longer on the US for its defense. Macron therefore pushes hard for the development of a European Defense Force to make the EU independent from the slowly fading American willingness to defend Europe against military aggressions. Macron's concerns are in line with Trump's invitation to Putin that he can do to European countries "*whatever the hell they want*" if alliance members fail to meet defense spending targets. Awareness of the need to establish a military force for the defense of Europe might bring European nations closer together.

It is a serious weakness of the EU not to have exclusive jurisdiction over foreign affairs. An autonomous body, called 'European External Action Service' (EEAS) tries to bring coherence and coordination to the European Union's international activities but it does this only in a consultative role and can exercise no other authority than the powers to discuss and to convince. The EEAS manages 139 offices outside the EU, which are called delegations and not embassies because the EU is not a country even though some host countries refer informally to the head of a delegation as 'ambassador'. A delegation functions as eye, ear and mouth of the EU. They promote EU policies and coordinate Overseas Development Assistance (ODA) projects worth about €20 billion to €30 billion per year. This is only a fraction of ODA that EU member countries provided with a total of almost 65 billion Euros in 2020 and 69 billion Euros in 2021. This shows that even in the issue of ODA, the EU does not speak with one voice.

It is also strange that the EU does not yet have its own military under the exclusive control of a central command. Instead, each member state manages its own foreign affairs and maintains its own military. If we transpose this situation to the US, we would find in each of the 50 states sovereign armed forces and secretary of states who roam around the world to implement their respective own foreign policies. If, for example, North Dakota declared war on Canada, all other states would be free to join the fight or to let North Dakota fight on their own. North Dakota might annex the Canadian province of Manitoba – or in a worst-case scenario – Manitoba might freely annex North Dakota without military intervention by other states of the US.

An alliance between all European countries located on both sides of the former iron curtain looks more natural to me than an alliance between countries that a huge ocean separates. Dividing Europe into east and west is as artificial as was the wall in Berlin. We should consider bringing Russia on board of the EU ship. Without Russia, Europe will never be what it should be. Russia is not only geographically part of Europe but has in history always been an important part of Europe. In the past, Russia had multiple partnerships or interactions with other European countries like Prussia, France and Austria. Russia was, for example, part of the Western European alliance during the so-called Great Turkish War against the Ottoman Empire from 1683 to 1699. Russia was then partner of the so-called Triple Entente with France and the UK during the 1st World War. The Soviet Union was also a partner in the western alliance against Nazi Germany.

Russian people are European people even though they were for a couple of generations exposed to the special experiences of soviet ideology and communism. Vladimir Putin, Russia's temporary dictator is only one of few remaining children of the horrible Soviet Regime.

I am possibly biased because during my trips through Russia I was deeply impressed by Russian culture, which is closer to my heart than what I see in the US. I also feel generally more comfortable and I am more interested when I meet a Russian than when I meet an average American. I visited the sea city of Dalian some years ago. It is located in the north east in China's Liaoning province that borders Russia. Many Russian vacationers patronize the city that shows many buildings in Russian architecture. I felt like being at home in Europe.

Educated Americans will be impregnated by the cultures of their ethnic backgrounds. America has not a genuinely own American culture. Traditionally, the US borrowed its culture from across the Atlantic but recent immigration from Latin America and from Asian countries has eroded this cultural heritage, which is now diluted. In contrast, an educated Russian will be – and can be – proud of his country's home-grown European culture. A Russian does not have to look across a vast ocean for cultural identity.

Russian culture used to be mainly Slavic and Byzantine until it gradually turned towards Europe starting in the 17th century under tsar Peter I, whom we call Peter the Great. This emperor's dream was to turn Russia into a European power. French became later the dominating language in the high society of Russia as it was in all of Europe at that time. Immigration of some 15,000 wealthy members of the French nobility who fled the terror of the French Revolution contributed to the spread of the French language and culture in Russia. Imperial Russia also welcomed in the late 18th century Mennonite immigrants from the Netherlands. Mennonites greatly reinforced the Russian economy and contributed to the westernization of the cultural landscape. Peter the Great founded the city of Saint Petersburg in 1703 as Russia's new capital.


Saint Petersburg, Russia

He had the ambitious intention to make it the 'Venice of the North', which it became indeed with the majestic Neva River and innumerable canals. Waterways crisscross the entire city.


Venice, Italy

Impressive buildings in the architectural style of eastern Europe. Colorful paint of their facades line the waterways. I stayed in Saint Petersburg for the first time in 1971 when the soviets had named it Leningrad after they had called it Petrograd. I came back for work twice in 1999 and in 2000 when its name was Saint Petersburg again. I was every time in love with this beautiful and rightfully proud historical city. The Hermitage Museum, founded in 1764 by Catherine the Great, is inside and outside a jewel of European culture.

The only unpleasant feature of Saint Petersburg is the scarcity of daylight during the winter. At its location in the north, the sun in January rises only at around 10 am and sets already at around 3:30 pm leaving only five and a half hours of daylight. Clouds covered – as often - the sky when I stayed at the hotel Moskwa in January 1999. I did not really feel that daylight had appeared during the entire day. It felt as if darkness had won the fight over light. Chronobiologists, like Sofia Axelrod at the Rockefeller University, tell us that lack of sunshine has an important impact on physiology and behavior. But people who were born and raised in the north, are used to it and don't suffer. I spent a few years later, three days during January in Murmansk, which lies 200 kms north of the Arctic Circle. At this time of the year the son is down all day and twilight – not daylight - reigns for only five hours from 10 am to 3 pm. This really felt as strange and mysterious as a solar eclipse, particularly because I arrived there from Vanuatu in the South Pacific, where people don't know the word 'winter'.

Russians had completed the cultural turn towards Europe by the beginning of the 19th century but have kept alive many cultural features from previous centuries such as colorful onion domes and ornate religious symbols of the orthodox church.

Russia excelled in European literature and music. Tolstoi with "Anna Karenina" and "War and Peace", Dostojewski with "Crime and Punishment" and Tschechow became famous as European writers. Eminent Russian composers and musicians are Peter Ilyich Tchaikovsky, Sergey Rachmaninoff, Igor Stravinsky, Sergey Prokofiev, and Dmitry Shostakovich.

Famous are also the Mariinsky Ballet in Saint Petersburg and the ballet company at the Bolshoi Theatre in Moscow. I had in 1971, when life in soviet-style was still going strong, the opportunity to watch an unforgettable performance of Tchaikovsky's "Swan Lake" at the Bolshoi Theatre. An equally unforgettable midnight banquet followed the performance in the Bolshoi theater. Our hosts offered Russian delicacies like herring and smoked meat, pelmeni (dumplings) and plinis, which are buckwheat pancakes served with caviar. We washed down the delicious food with vodka and Sovietskoye Shampanskoye. Stalin who was a native of wine-growing Georgia had introduced this sparkling wine as an affordable soviet mass-luxury to democratize champagne. During my stay in Russia, I did not feel like being in a foreign country but I felt at home in the European environment.

The sad intermezzo of some 70 years of communism and the cold war has split Europe artificially in two opposing halves. This recent history misguides some current Russian and western politicians to see each other as enemies. Putin, who will not live forever, is a remaining member of the old soviet guard and is as such impregnated by the soviet view of western Europe as an enemy. But I think and feel that Russia's

younger generation has a European heart and mind and will tear down the still existing iron curtain if a favorable opportunity comes up similar to the circumstances that led to the fall of the Berlin wall.

Russia with its roughly 146 million inhabitants would be a major member of the EU. If it were member of the EU, Russia would have probably an above-average influence within the EU. But this is still better than Russia being a rival or enemy outside the EU. As Lyndon Johnson, an American president, would have put it 'It is probably better to have Russia inside the tent pissing out, than outside pissing in'. With Russia as a member, the EU would become a real-world power. It would then also be more appropriate to move EU's headquarters from the extreme west, where it is now, to central Europe, possibly Warsaw, where it probably should be. Such a move would also put an end to the impression that many EU members have when they perceive the EU as the realm of France and Germany.

When I left Germany in 1980 to settle in Canada, my partner in the law firm told me that I was doing the right thing because he seriously feared in line with other Germans that the Soviet Union would soon invade Western Europe. His prediction was not the reason for me to move to the other side of the Atlantic. His prediction was also wrong as we know now. The subsequent events showed again two things: firstly, it is very difficult to forecast major events. Secondly, nobody can seriously blame Mikhail Gorbachev's perestroika for the collapse of the Soviet Union, which came about not by the activity of a single man. It was the result of history's logic. For me, this logic says that Russia is part of Europe and should become member of the EU no matter how delusional such an opinion might sound right now in the ears of the majority of my contemporaries.

'*No one doubts the great value of Europe's relations with the United States. But I believe that Europe will only consolidate its reputation as a powerful and independent center of world politics in the long term if it combines its own capabilities with Russia's human, territorial and natural resources, as well as with Russia's economic, cultural and defense potential*'. This is what Vladimir Putin said in a speech that he gave on 25 September 2001 in perfect German in the Bundestag.

Putin's vision that he had expressed 24 years ago, when he was probably a different man, was very likely genuine at that time. But the vision that Putin expressed in 2001 was against the political and economic interests of the US and did for these reasons not materialize. I vividly share Putin's vision of 2001 and I predict that Europe will be one day united with Russia and I wish that this is a real prediction and not just wishful thinking.

Opponents of my favorable assessment of Russia will point at the war that Vladmir Putin has started against the Ukraine in February 2022. But this is not a war of the Russian people. It is not evidence that Russia continues soviet-era expansion to the West. It is Putin's war and Putin will not govern and live forever. Once he is no longer in autocratic power, the path will re-open for the playbook of history, which calls for a unification of Europe – including Russia. Hitler, who invaded most countries in Europe, can also not be taken as evidence that Germany is a permanent enemy of Russia.

However, any silver linings that appear when I think about the future are tainted by all the other risks that I have mentioned in many previous sections of this essay.

To summarize my view of the future, I see major nasty risks for America and for Europe and actually for the rest of the world. Serious catastrophes might be in store for the lives of people that were recently born or will soon be born. I see so many risks that I would not choose to live in the future if I had the option to be born now and to live during the next eight decades.