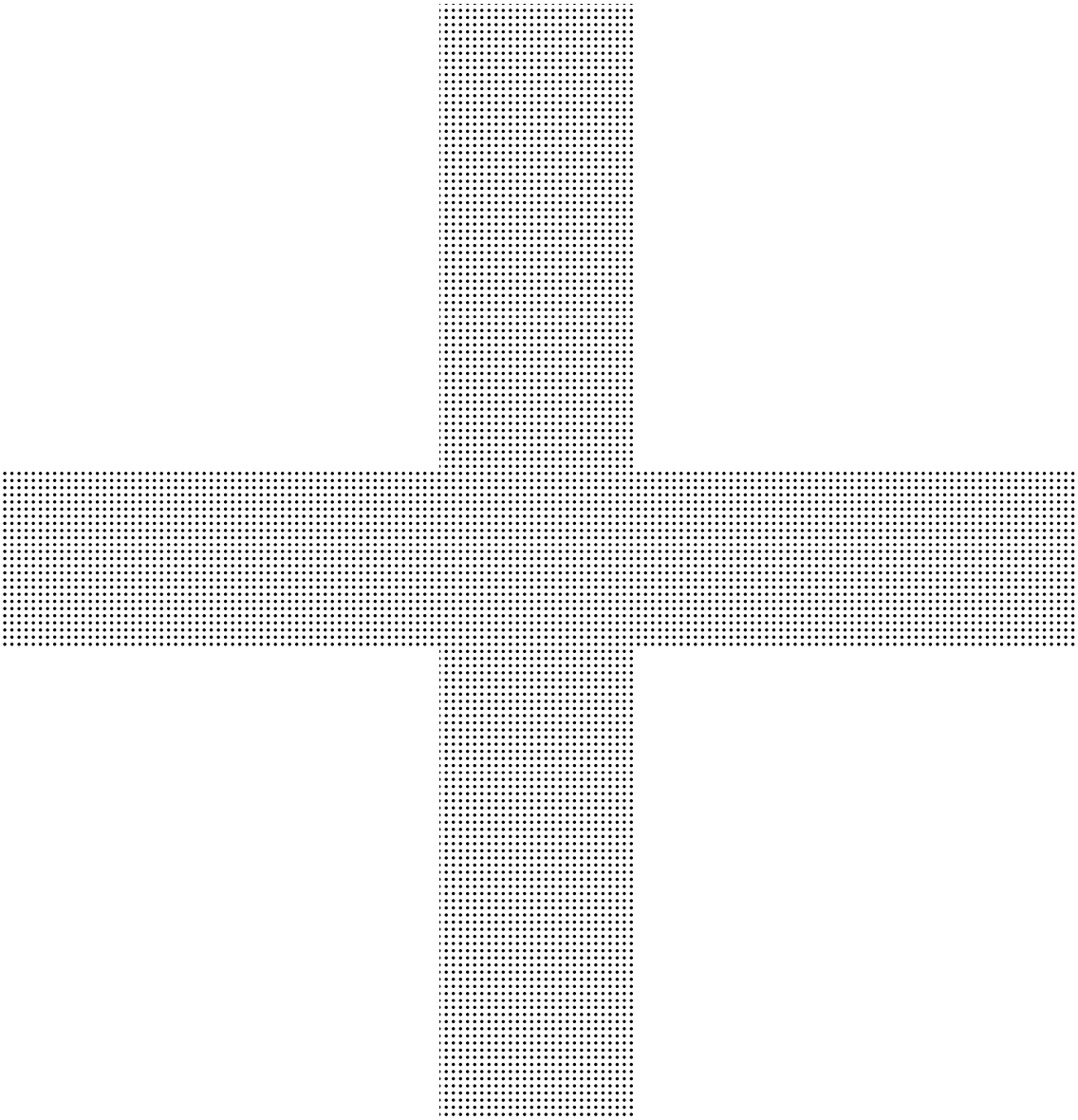
change

what's heading our way?



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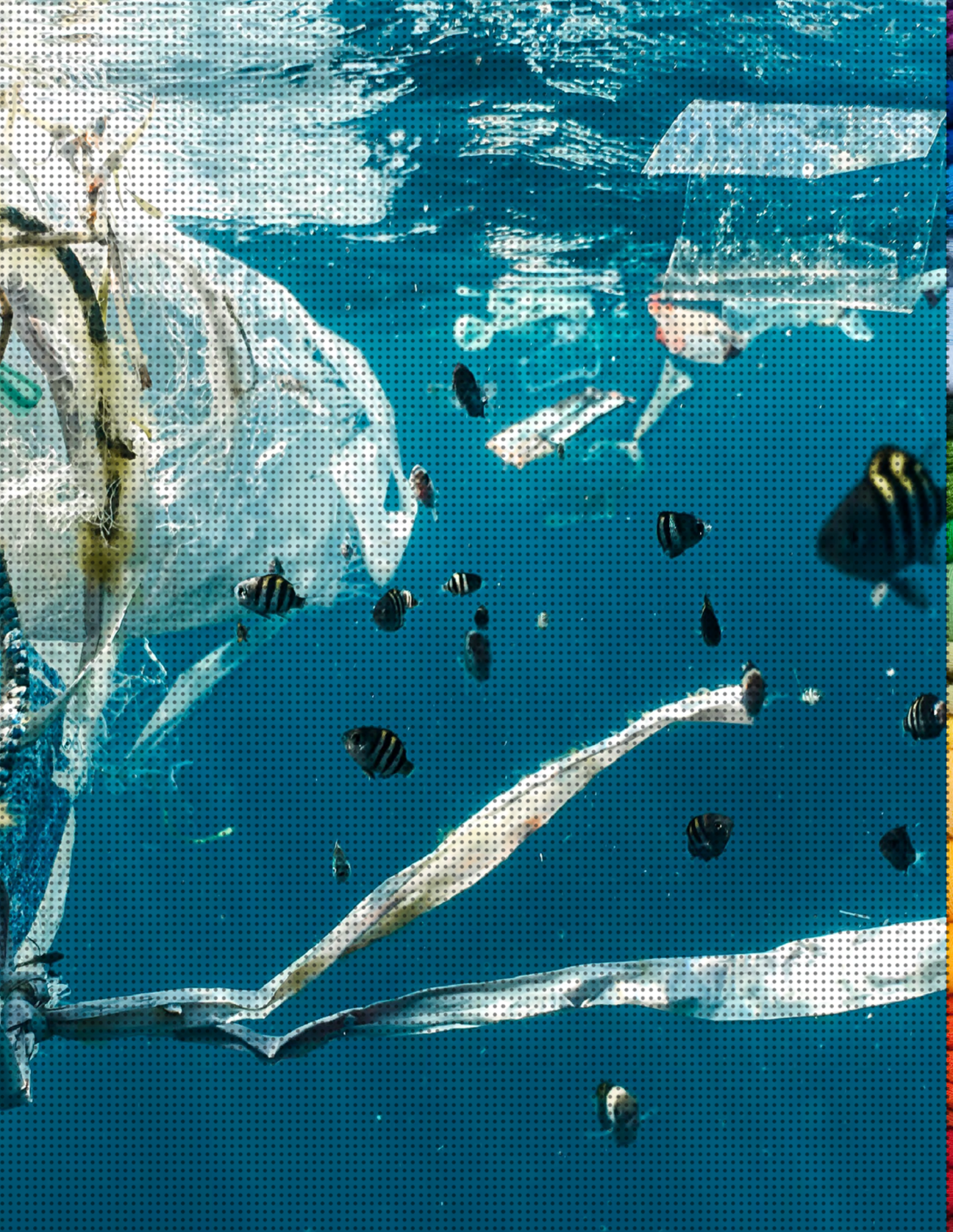

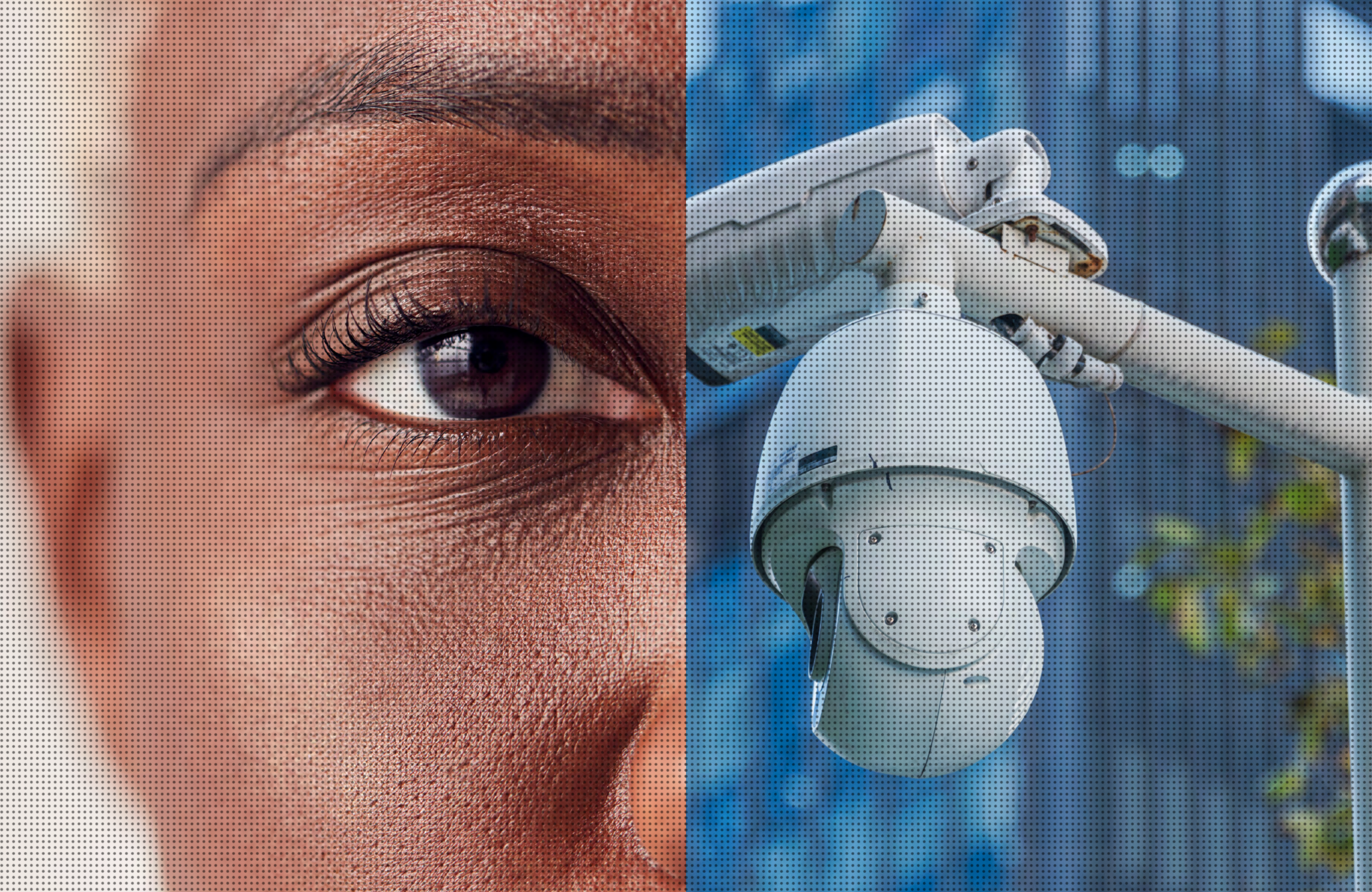


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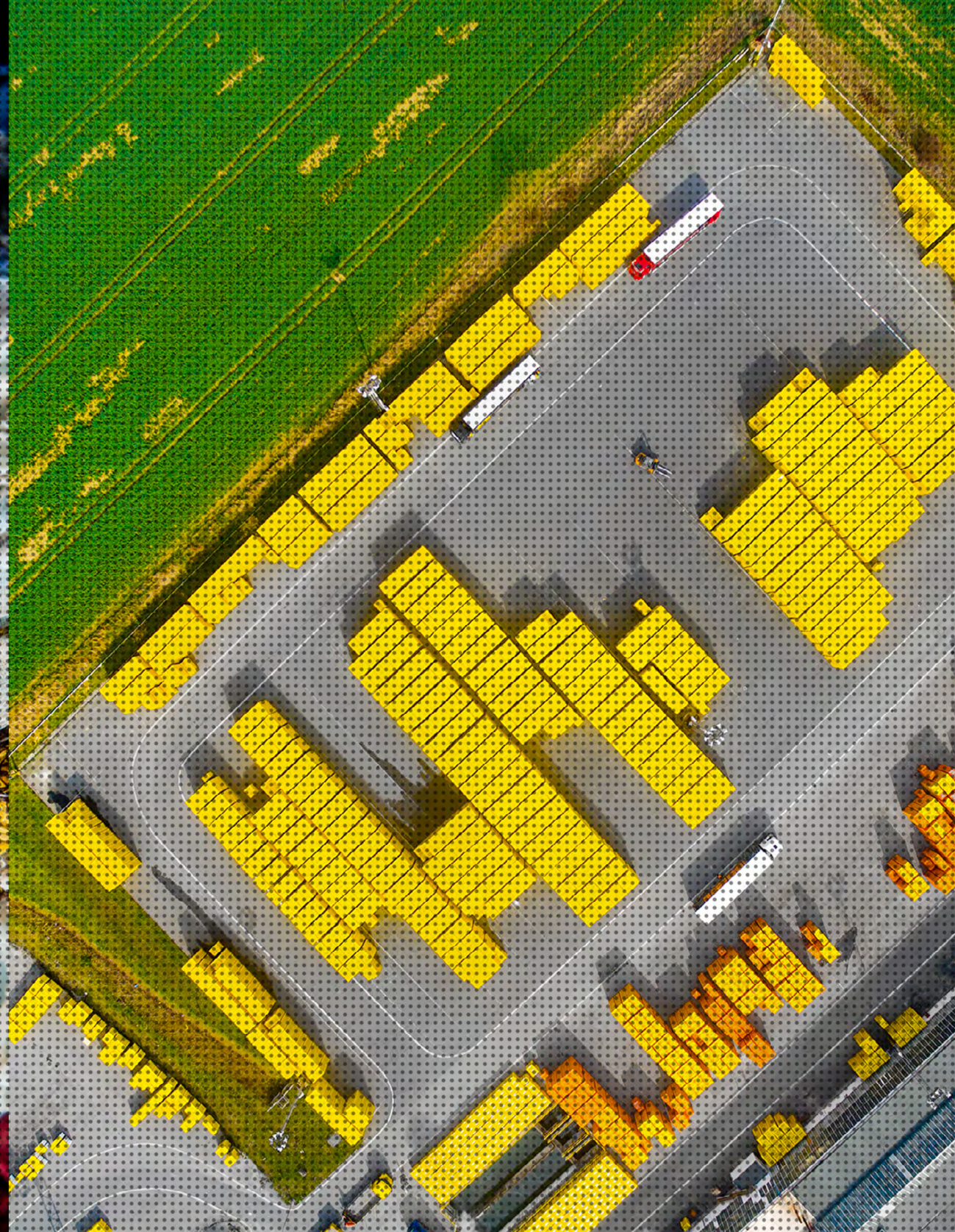

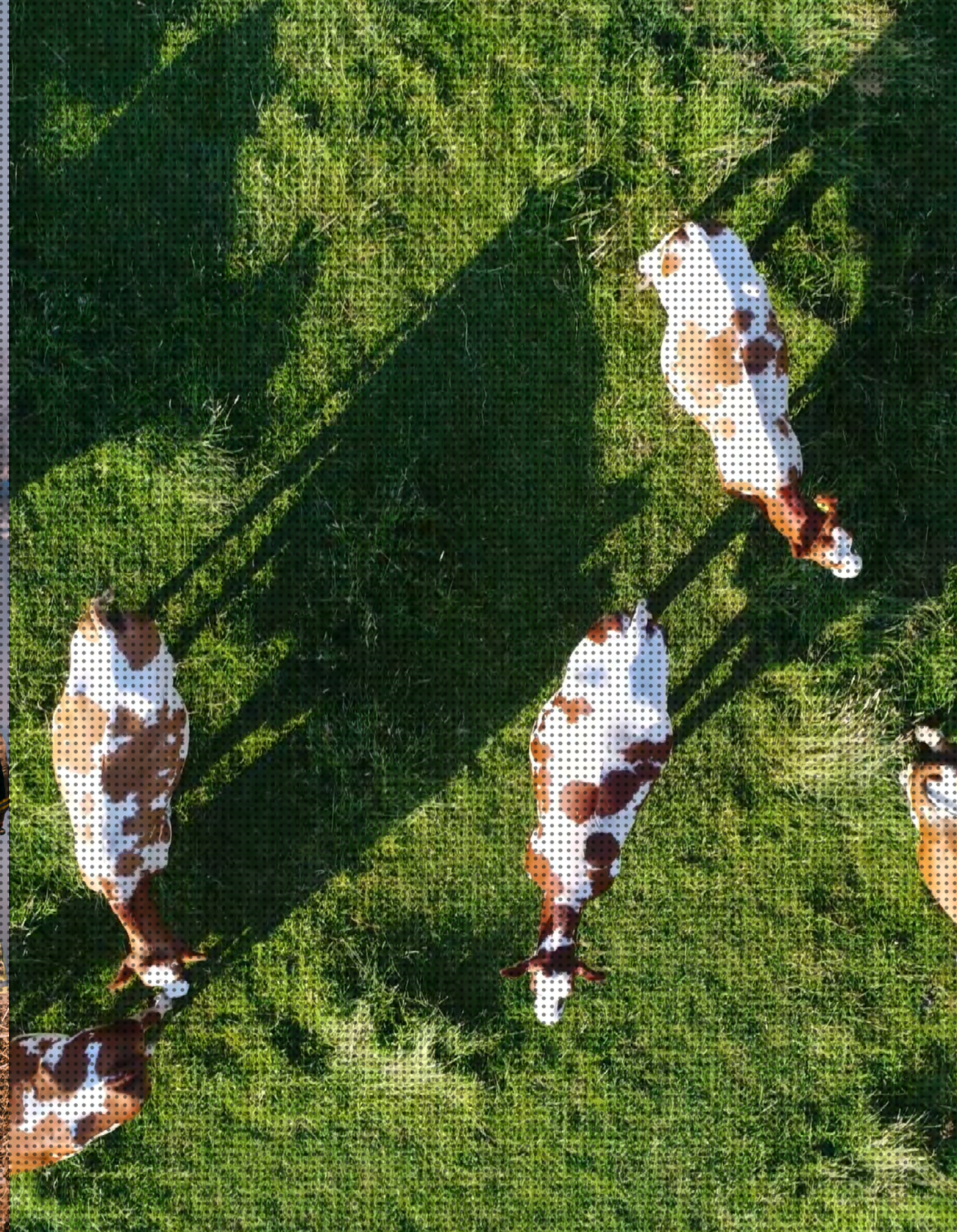

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change — what's heading our way?

When the Covid-19 pandemic spread globally, we were unprepared to face it. Suddenly, everything changed. Individuals, communities, enterprises, universities, and governments had to adapt to a new system. *Reality* became about hybrid education, home office, online meeting, social distance, vaccines. And, in the center of all: health. Global perspective changed in a few weeks' time. Would it have been different if we'd known that these changes would happen? What if we had been prepared?

It's impossible to be fully prepared for the *unpredictable*. But if we can map out possibilities, we can explore scenarios and anticipate. Plus, in most cases, change the direction of the change. That is precisely where this book is aiming for: a knowledge-based guess at what might be ahead, so you can change course and use it for the better.

To explain possible trends, threats and opportunities, we dreamed of gathering various perspectives, overseeing coming changes, and developing future thinking. So we formed a multidisciplinary, diverse team of colleagues from Malaysia, Morocco, the Philippines, Ecuador, Taiwan, the U.S., and the Netherlands. Ten analysts, a group of designers, and three strategists searched, collected, aggregated, analyzed, combined, discussed, selected, and designed an overview of changes. They shared their findings with twenty colleagues for reflections and opinions. You can read some of their four-thousand remarks in grey alongside the main text.

We tried to structure the impossible. And share the outcome to inspire you to realize "it can be different." Although we conducted this study with a diverse team and spent thousands of hours on it, we are aware that we have biases. Our view of change assumes our current reality. Reality is eminently equipped with bias, which is a perception of reality. We can always do better. And we want to. That's why we invite you to complement your perception of *change* and share it with us.

how to read this book?

'*change*' is not a traditional book; you can read it front to back, back to front, start in the middle, or at any chapter you want. It can serve as an informative tool or simply a spark of inspiration. The anatomy of the book is as follows: the main research is on the outer edges, footnotes are on the inner edges, and the reflections of our colleagues are in the middle. The reflections are indicated by the following symbol: +. Several reflections include a QR code. These refer to different sources or reading suggestions. At the end of each chapter, we pose a question that embodies the total research. Hopefully, we've inspired a starting point for an answer to that question. We want all of the research to be open to interpretation, both for the writers and readers. That is why, as we did for ourselves, on every page there is space for you to reflect, make notes, drawings, or anything else you think should be part of your book. For your convenience, our website https://change.ftrprf.com has rather interesting searchtools and the latest updates of this project. Bellow is the QR code.

Making change is a collective effort, and it is endless. We have not tried to be conclusive, rather, we made a starting point for conversation. It is a wide set of topics and possibilities that inspire. So, let's start the conversation. Shall we?

executive summary

Tomorrow's world is different from today's: things are constantly evolving and changing. The developments of the past decades and centuries have enabled significant developments in human progress. Similarly, current developments on various frontiers also enable considerable improvement in the years to come. Gaining a good understanding of how the world is changing is vital to understanding interrelationships and enabling thorough decision-making. Even though countless changes are happening, some of which are unimaginable with the current information available, it is worthwhile to understand the changes of the future. This book analyses the future from 6 different perspectives: economic, socio-cultural, political, ecological, technological, and demographic. While these chapters do not cover all possible changes happening in the future, they provide a good starting point for those who want to familiarize themselves with the world of the future. While the authors of this book have tried to be as thorough in their research as possible, this book should not be seen as 'hard facts'. If there is one thing we can be sure of, things are constantly changing; the conditions surrounding the changes the authors have anticipated can also change. For those interested in the contents of this book, the following pages provide an overview of the key points per chapter divided per subtopic.

economics

The economics chapter touches upon many different actors and the global system. All topics interact with each other. Consumer behavior will change production, demanding more sustainable and futureproof options. Therefore, international trade and government policies will change and contemplate new opportunities and risks for the economic system, such as the rise of cryptocurrencies, the aging labor force, and automation. Emerging and declining skills, the future of work, and new demographic conditions are already changing the labor market. Therefore, private actors, technology, and governmental policies will change the future economic system.

the future of production

- **key trends — digitalization, cybersecurity, & the environment:** Advances in technology will contribute to greater efficiency and production productivity. The three key trends impacting production will be the digitization of the supply chain, the negative cybersecurity threat posed, and a greater emphasis on environmental risks.
- **relevancy, responsibility, and resiliency of upply chains:** Automation in manufacturing, greater investment into advanced technologies such as Artificial Intelligence and Machine Learning, and the consumer towards the center of decisions will transform the supply chains.
- **creating sustainable business models:** Business models will undergo various changes: business models will adapt with a focus on global sustainable impact, the investment will be allocated to sustainability, and there is growing consciousness to observe sustainable business practices.

shifting towards a futureproof consumption pattern

- **the importance of sustainable food systems:** Sustainable food systems come down to three influential trends: the digital transformation of controlling agricultural production, growing consciousness on behalf of consumers to improve their diets, and regulatory policies to incentivize sustainable consumption.
- **changes in consumer behavior:** Consumers will become more aware of their actions and their purchases' effects on the environment. Consumer behavior will move towards digital adoption, the digitization of the consumer shopping experience, and changes in purchasing choices to become more sustainable.
- **online retail**: The future of online retail will be redefined by its ease of use. Online shopping will optimize the customer experience, emphasizing sustainable practices, the environment, and easy use. Online retail has to deal with severe criticism due to various forms of pollution.

money, money, m... cryptocurrency? financial developments

- **capital markets:** The future of capital markets will focus much on ESG factors, digitalization of financial products, and the incorporation of new (ESG and technological) risks.
- **rhe tise of cryptocurrencies:** The growing popularity of cryptocurrencies has brought fundamental disruptions in our financial world.

the global economy — trade & interdependence

- **international trade & global value chains:** The increased focus on the negative impact of interdependency and technological advancements, will mean that countries engage differently in international trade.
- **trade policies:** Governments are increasingly actively using their trade policies to protect their economies and even attack a different country's economy.

the labor market

- **the future of work:** The digitization of work and globalization will see a diverse international collaboration through online meetings and Work From Home (WFH) initiatives.
- **emerging and declining skills & jobs:** Advancements in technology will digitize certain tasks. This has a net positive impact on jobs relating to technology. However, this will consequently cause a decline in jobs pertaining to simple, repetitive tasks simply.
- **work and demographics:** An aging population and globalization will

cause the labor market to look very different from ever before. This brings more diversity in terms of age, ethnicity, and gender.

changing policies — governments' roles in economics

- **central banking:** Central banks worldwide are expected to proactively address challenges brought by digitalization and the carbon transition.
- **taxation — the economic and social side:** Tax authorities are reconsidering the relationship between tax design, economic growth, and sustainability in the digital era.

socio-cultural

The Socio-Cultural chapter explored some trends that will shape the socio-cultural context in the future. The individual and societal well-being will face new positive and negative changes. New advancements in social media will create a future where online and virtual are linked, and this sector will increase drastically. However, there are the risks of a future lack of face-to-face interactions and the development of fake information. In addition, religions will change in terms of number and proportions. Some will slightly decline, others will remain and grow, mainly because of the aging and growing population. New social standards will rise, and some social issues will remain. What is certain is that society will change.

societal & individual well-being — living happily ever after

- **a healthy community — societal well-being:** Future advancements will change current online communities, marriage, and family structures; the rise of the individual will affect society as a whole.
- **a healthy self — individual well-being:** Technology and countries will address loneliness and mental health conditions—happiness and well-being on the individual level.

media & entertainment

- **the future of the digital era:** The gaming, music, radio, podcast, book, and online entertainment industries will adapt to new platforms and more streaming-based media.
- **social media — every company online:** Social media will intertwine even more with the physical world; it is shifting to a virtual world.
- **the decline of trust in media:** The trend is that trust in media is declining. Policies, such as data protection and e-privacy laws, can mitigate the harm of fake news.
- **the creator economy — 100 billion dollars, 50 million creators, and growing:** Content creators, curators, and community builders will work on new or renewed platforms, for example, cooperative ownership. More people will be able to live off of their content and continue being creative.

purpose & spirituality

- **change in religion:** The size and ratio of different religions are changing. Some are rapidly growing due to population growth; others will stay the same or even shrink in size due to an older population.
- **the power of conspiracy theories & cults:** There will be new movements; they will rise and gain popularity due to the internet and social media. Some will be known as cults and others as new religions.
- **what does 'purpose in work' entail?:** The sense of purpose is an essential aspect of humanity. Having it benefits individuals and companies. The purpose will become even more critical in our lives and at work.

social standards — navigating future expectations

- **beauty standards — towards diversity and body positivity?:** Beauty Standards in society have impacted the way men and women project themselves; however, these standards have changed dramatically throughout the years and are never constant. There is no real definition of what "beautiful" is; beauty can be defined in many ways, starting with oneself.
- **female emancipation — women's role in society:** In many cultures, women have been expected to act a certain way and do certain things that men are not pressured to do so. These societal expectations affect how women see themselves and impose self-limiting beliefs.
- **anti black racism and black lives matter — a voice for racial injustice:** Biases in the Black community have affected numerous people for decades; from biased justice systems to biases in the workplace, these are issues that people worldwide are trying to bring to the light.

politics

No one can precisely predict the future of politics, but the politics chapter outlines some of the possible trends. The political climate depends on what parts of our politics are embedded in our human nature and taught behavior. At the same time, geopolitics will see conflict and security in different forms and definitions. New actors like China are taking the lead to change the way states cooperate, given that many of the existing international organizations are having trouble with their effectiveness and representation. Meanwhile, technology will change civil society and government interactions, resulting in new policies and new forms of activism. At the same time, the leaders of tomorrow will have new abilities and attitudes, and different types of leaders will come into politics and business.

political climate — dealing with polarization, populism, & xenophobia

- **polarization — when societies divide:** There are two possible

scenarios, one is grim and the other optimistic. The first portrays polarization as a self-reinforcing cycle that will spin out of control. In the second, polarization is a pendulum that has reached its peak, and the debate will turn more rational.

- **populism — the supposed rule of the people:** Globalization trends will heavily influence populism; It will keep expanding unless the underlying issues are tackled.
- **xenophobia — when strangers are to be feared:** The future of xenophobia is opaque because it largely depends on human countermeasures in the coming decades. Living in a less xenophobic world lies in expanding the hunter-gatherer band to include all human beings.

geopolitics — on war & peace

- **traditional security — borders & militarization:** Countries continue to increase their military spending and military innovation, and there is an increasing role for privatized military companies.
- **does warfare ever change? old wars vs. new wars:** New developments in war dynamics (like long-lasting but low-intensity conflicts) and technological advancements will lead to fundamental and ethical questions about how countries wage wars.
- **cyberwarfare — when actors resort to different methods:** The total cost of cybercrime on economies is estimated to reach trillions of dollars in the near future. The priority for combatting cybercrime and cyberwarfare is the creation of international guidelines and regulations for malicious cyber practices. Until then, current legal grayness will allow aggressors easily get away with their malpractices.
- **the politicization of strategic resources:** Scarcity of sand and sustainable water projects can increase tensions between countries.
- **human security:** What security is truly about? Governments and international organizations have introduced the idea of human security as a holistic security approach. This concept will stimulate more and more governments to apply it in their countries.
- **global powers & the power shift:** Unipolarity, bipolarity or multipolarity may happen in the future. Global and regional power may shift. However, it isn't easy to know who the main actors in global politics will be.

international cooperation — enemies and allies

- **politics at the highest level — the united nations:** The Security Council will need to change to remain relevant, and the UN is a key actor in climate change mitigation.
- **when institutions die — the case of the world trade organization:** The WTO currently does not function and will need to change to deal with future trade challenges.
- **emerging powers — the brics:** Countries that feel like traditional international organizations do not represent their interests create their institutions to further their international interests.
- **new initiatives & the importance of infrastructure — the belt and road initiative (BRI):** China is investing massively to develop infrastructure worldwide.
- **covid-19 and international cooperation:** The pandemic has created possibilities for soft power influence — sharing vaccines and economic aid to further political agendas.

political developments around the world — individual regions

- **asia-pacific — china, democratic backsliding, & online activism:** China's growing influence, democratic backsliding, and the emergence of digital activism are shaping the political landscape of the Asia-Pacific region.
- **americas — the fragility of trust:** The political divide in the United States is more pronounced now than in the past, while Latin America is witnessing declining trust in democracy
- **west asia and north africa — demographic, economic, & geopolitical shifts:** The rapidly growing young generation, economic uncertainty, and changing geopolitics could bring political changes across the Arab world.
- **europe, russia, and eurasia — allies & alliances:** European leaders are increasingly aware of the issue of political integrity and the development of the Sino-Russian relationship.
- **sub-saharan africa — new generations & democratization:** Despite the unresolved conflicts in the region, the young population and rapid urbanization are likely to transform Sub-Saharan Africa's political landscape.

technology and the government of the future

- The increasing role of technology in the political sphere is molding the way governments respond to fundamental changes in our society.

political activism — changing society for the better

- **climate change activism — the demand for immediate action:** One of the most controversial movements; now, the youth is in-charge. The fight against Climate Change is growing; however, the impact of climate change is irreversible.
- **lgbt+ — the fight for gender & sexuality rights:** In today's world, most cultures have been more inclusive of the LGBT+ community; however, discrimination against the LGBT+ community is still an ongoing issue; equal rights and laws that raise accountability for assailants have still not been implemented despite the alarming events.
- **inclusivity — a voice for everyone:** While activist movements challenge political action, everyone that wants change must consider how people are affected and how a movement creates a chain reaction internally and externally.
- **is the government to be trusted? political trust & legitimacy:** Trust is essential, and the same goes for the citizens and the government. Without trust, policies and regulations are harder to implement.

- **the future of activism:** Digital Activism is now on the rise; this form of activism has changed policies, fought biased justice systems, and challenged unethical practices. This is an addition to the future of activism.

leading the change — leaders of tomorrow
- **what the private sector can contribute — the future of business leaders:** While certain components of leadership will remain the same, the future leader will require a new set of abilities and attitudes to thrive. World crises and transformations necessitate the appointment of new leaders with diverse ideas.
- **future of political leaders — the need for inspiration & inclusivity:** Political leadership is to be more inclusive, while at the same time, there is a rise in populist leaders.

ecology

The ecology chapter explores the challenges society will face in the coming years: rising demand for food and water coupled with decreased supply, the need for renewable energy systems, the wastefulness and unsustainable nature of the current economic system, and the decline of the natural world and environment. Some cases are caused by climate change; others contribute to the effects of climate change. Major developments will change the environment's prospects and help humans live more sustainably. For example, future technology can improve the availability of food, clean water, and sustainable energy. Furthermore, corporate sustainability, bio-based materials, and new public awareness will help the world move towards a circular economy, protecting biodiversity and environmental activism.

food & water — our most fundamental needs
- **food — how to feed the largest global population yet:** Without any drastic changes, the world will not reach the zero hunger goal by 2030. 3D food printing, alternative proteins, and vertical farming will change the food sector and consumption culture.
- **water — scarcity vs. flood protection:** Global water consumption is predicted to rise by 50-80% over the next decades. New technologies will address the challenges of water scarcity and floods; if not, billions will be affected by 2050.

the energy transition & natural resources
- **solar power:** The future of solar power will be characterized by communities sharing solar panels, floating solar panels, and solar-powered electric vehicles.
- **historic with great potential — wind power:** New technological developments will evolve for wind power generation. Industrial Learning of Things is one aspect that will change the way of working with and generating power via wind.
- **the majority of our planet's surface — water & the potential of hydropower:** Hydropower has reached high levels of technological maturity. Still, there are technological developments planned for the future to make this renewable energy source more sustainable and compromise for its damage to the environment.
- **inner heater — geothermal power:** Geothermal power's future will be characterized by the new technology of Enhanced Geothermal Systems.

towards a circular economy — living within the earth's biocapacity
- **bio-based materials:** Bio-based materials will create opportunities to reduce industrial waste and pollution by replacing plastics and other raw materials with natural, sustainable alternatives and even repurposed waste materials.
- **waste recycling, upcycling, and remanufacturing:** Public support for sustainable, refurbished, and recycled products is growing at the same time that companies across different industries are finding ways to minimize, reduce, and reuse the waste they produce.
- **market pressures & corporate social responsibility:** the world is at a point where CSR is the standard instead of optional to integrate into a firm's strategy.

conservation & the natural environment
- **biodiversity — how do we prevent mass-extinction?:** Biodiversity loss, which has accelerated to the point of sixth mass extinction, threatens Earth's ecosystems and living creatures and human and even economic health.
- **environmental awareness and activism:** The increasing urgency of the climate crisis is reflected in the growing strength and intensity of environmental activism from communities around the world and across walks of life.
- **technology for ecology & conservation:** Technological tools will increasingly be used to detect, mitigate, and prevent environmental problems, fight climate change, and more.

technology

The Technology chapter finds that many parts of people's lives will become partly if not fully digitized. Artificial intelligence will be implemented into daily tasks, personalizing and revolutionizing medical care. It might be possible to eradicate many current diseases. The internet of the future tends to be more user-centered. The increased usage of robots allows for increased efficiency and can alleviate some prospective labor shortages. Blockchain can significantly help society by improving trust, transparency, and efficiency while facilitating innovation. However, technology is a tool that helps and harms people

according to how it is used; it's essential to design and implement technology carefully and thoughtfully.

digitization — technology in every aspect of our lives

- **even more connected — the internet of things:** Interaction with Wi-Fi enabled machines will be the norm, possessing certain benefits, including greater efficiency, control, and feedback. The increase in IoT-enabled machines will be seen in diverse locations such as households and manufacturing plants.
- **will robots take over?:** The advancements in technology will replace laborers who fulfilled repetitive tasks. The implementation of robots within the industry can be seen in diverse industries, including manufacturing and even the fulfillment of smart cities.
- **the potential of blockchain:** The emergence of this new technology has the potential to change the way we conduct finance, legally binding contracts while providing efficiencies within supply chain management.
- **living in the digital world — the metaverse:** This new concept holds the potential to redefine the way we interact and socialize. Known as the next iteration of the internet, the future of the metaverse can significantly change how we interact within the digital space.

big data, internet, and connectivity

- **freedom and transparency:** The huge scale and scope of Big Data production have led to an increased desire for user control over personal data and more transparency about how this information is collected and used.
- **web 3.0 — "the financialization of everything":** The desire for transparency, autonomy, and user control in the digital space has led many people to invest in the idea of Web 3.0, a new version of the internet in which it is owned collectively by all users.
- **human-centered data and tech:** Applying human-centered design principles to technology and data development can help harness the potential of technology in ways that improve human lives as much as possible.

what can technology contribute to healthcare?

- **the digitization of health:** Spurred by technology, telehealth and personalized healthcare are becoming more widespread.
- **gene editing — perfect health:** Gene editing has the potential to eradicate genetic diseases. However, there are many ethical concerns related to gene editing as well.
- **saving lives? 3D printing organs:** In the coming 10-15 years, it might be possible to 3D print fully functioning tissues and organs that can be transplanted into humans.
- **robots — bridging the healthcare-worker-gap:** The role of robots will become increasingly bigger in the decades to come.
- **singularity — will technological growth become uncontrollable?:** There is a theoretical point in time at which technological growth becomes uncontrollable and irreversible, resulting in unforeseeable changes to human civilization

digital ethics — is there a morally right and wrong in technology?

- **protecting the digital — cybersecurity:** Digital reliance increases the risk of cyberattacks; anyone and any organization can be a target.
- **data privacy in the digital era:** Everyone can choose what information to share and let companies collect, but not everyone is aware of how companies use it. Most of the time, people do not have the ability to say no, or else they will be denied service or access.
- **bias in technology:** The future of technology is promising, but with the Bias instilled in technology such as AI, the question of the fairness of the future of technology remains unanswered.

demographics

The discussion turns around four trends in the demographics chapter: aging, population growth, urbanization, and migration. Current data generally shows that the world population will grow until the end of this century, but not in every region. A growing population causes environmental impact, and population degrowth affects the pension and economic structure. In the future, the anti-aging market will grow, and older people's access to a good quality of life will improve. In addition, more people will live in cities, bringing challenges and opportunities discussed in the urbanization section. Cities, smart and sustainable, will enable a good quality of life. However, not every city can afford to be smart and sustainable; currently, more actions and policies need to be implemented to ensure proper and inclusive urbanization in the coming years. On migration, high skilled people will have a higher labor demand everywhere, making it easier to migrate. In addition, climate change, environmental and cataclysm events, quality of life will be significant push and pull factors for migration in the future.

the future of gray hairs — aging populations

- **global and regional developments:** In 2050, 1 in every 6 people on Earth is expected to be over the age of 65.
- **perceptions towards aging:** Older people can experience poor treatment from others in the form of ageism. Many older people try not to let the physical effects of aging show, resulting in a booming anti-aging market.
- **aging healthily and happily:** People's lifestyle, healthcare, and living arrangements all play an instrumental role in ensuring that older people maintain a good quality of life in their old days.

growth and degrowth — dealing with changing demographics

- Whether the global population grows or shrinks, there are challenges ahead. A growing population brings environmental troubles

with it, whilst degrowth impacts the pay our pension system work. Current projections state that the population is set to shrink in the majority of countries from the end of the 21st century onwards.

- **depopulation — shrinking countries:** Depopulation is projected to be a reality for both the developed and developing world in the coming decades. It will bring new challenges, some of which will result in negative and positive outcomes.
- **unrestricted growth & population control:** 10.9 Billion people at the end of this century, population growth and sustainability are paramount for sustainability. Population growth needs to occur, but it can become an independent variant to assess sustainability. The impact of population growth on climate change depends heavily on where a child is born.
- **life expectancy — will we still die?:** There is the possibility to reach 150 years of life expectancy in the future. The world is likely to be a more peaceful place as the average citizen grows older. The increase in life expectancy and low fertility rates will make children a rarity. Societies will also be less innovative and risk-taking.
- **pensions — can we afford to become this old?:** The world's pensions schemes are in for a paradigm shift. With many demographic factors changing rapidly in this century, it is an enormous task to keep up with current developments.

the future of cities — developments in urbanization

- **global and regional developments:** Although there are some differences around the world, at large, the world is set to urbanize in the future increasingly.
- **quality of life in cities:** On the one hand, city life enables significant benefits such as high life satisfaction, innovation spillovers, proximity to goods and services, and less emission of greenhouse gasses. On the other hand, city life can result in greater exposure to pollution and diseases, scarcity of green spaces, and lack of community sense.
- **a roof over our heads?:** Owning or renting accommodation in cities is becoming more of a distant reality; 90% of cities around the world do not provide affordable or adequate quality housing.
- **cities of the future — smart and sustainable cities:** Smart and Sustainable Cities: To combat some of the challenges associated with city life, smart and sustainable city initiatives are helping to improve the quality of life for residents.
- **rural areas:** With the world increasingly urbanizing, there is a danger of the urban-rural divide becoming even bigger.

migration

- **the search for a better life — voluntary migration:** In the future, the demand for high-skilled people will facilitate them to migrate; nevertheless, high-skilled migrants will prefer the quality of life over economic opportunities.
- **involuntary migration:** There is no indication the levels of forced migration will decrease in the future. In addition, environmental and cataclysm events will be factors for forced migration.

introduction

economics

socio-cultural

politics

ecology

technology

demographics

conclusion

production
consumption
finance
global economy
labor market
government
economic change

Throughout history, the key trends impacting economic activity within communities and cities revolved around efficiency. Looking toward the future, the main influences shaping economies are no different. From the automation in production to the utilization of digital assets as a form of currency to advancements in technology, these factors continue to make economic activity more efficient. While efficiency continues to be a priority, humanity has additionally gained a greater consciousness of sustainability. The new rise in sustainable business models and increased awareness of environmental factors have reshaped the future of economic life. Together, these are only some of the key trends that individuals, institutions, and governments have noticed in analyzing the future of economies around the world. +

1. the future of production

Manufacturing is no longer simply about making physical products. Today, shifts in consumer demand, the nature of products, and the economics of production have led to significant changes in the way people create products. Simply put, production is the process of combining several inputs, such as labor and (raw) materials, to create a certain output that is appropriate for consumption. This end-product creates value for customers or end-users. In economic terms, production enables the making of goods humans are willing to pay for. In turn, the goods satisfy their needs. This process keeps the economic system going. Moreover, economic well-being could be measured by the level of satisfaction with goods for customers.[1]

The production sector, also known as the manufacturing sector, has changed dramatically over the past hundred years.[2] Still, it remains a highly important factor in both developing and advanced economies. The change this sector has experienced creates opportunities for innovation and brings challenges that need to be overcome. What is important to note is the changing role of manufacturing. For example, in advanced economies, manufacturing does not focus solely on employment and growth anymore; it is also about capturing innovations, increasing productivity, and trade.[3]

This section will elaborate on this by addressing the key trends that are impacting production, supply chains, and sustainable business models.

+ Elias Sohnle Moreno
In my opinion, efficiency is only a means to an end. The end goal is economic growth, sparkling the main debate: whether unlimited economic growth is at odds with ensuring a sustainable future. I would argue that we are not using all the necessary factors to compute economic growth. For example, in the GDP, we don't include the destruction of resources, natural catastrophes, and biodiversity loss in our factoring for growth and misleading political and economic systems goals. Currently, many economists try to include the natural resources' economic value in the evaluation. The best example of such an attempt is carbon pricing. We are slowly moving toward a new way to define economic growth, which may have important implications for our conception of the economic system.

1. Study Finance, "What is production? Meaning, Types, Examples, Theory" in Study Finance, 2020. Viewed on December 19, 2021, https://studyfinance.com/production/
2. P. Swinney, "After the Golden Age: 100 years of change in manufacturing," in Centre for Cities, 16 March 2015, viewed on December 19, 2021, https://www.centreforcities.org/blog/cities-change-and-the-role-of-manufacturing/
3. J. Manyika, J. Sinclair, R. Dobbs, G. Strube, L. Rassey, J. Mischke, J. Remes, C. Rox-burgh, K. George, D. O'Halloran & S. Ramaswamy, "Manufacturing the future: The next era of global growth and innovation," in McKinsey, November 1, 2021, viewed on December 19, 2021, https://www.mckinsey.com/business-functions/operations/our-insights/the-future-of-manufacturing

+ Elias Sohnle Moreno
By reading this, two questions come to my mind: Could this affect employment significantly? How could this impact economies that are heavily relying on the first and secondary sectors?

1.1 key trends — digitalization, cybersecurity, & the environment

Today, advances in technology have procured further innovations, which can contribute to greater efficiency and production productivity. However, looking toward the next era of global growth, companies are continuously innovating systems and products, which will lead to profound changes within the next decade. As a consequence, a variety of stakeholders, industries, and individuals will be influenced. For example, with advances in artificial intelligence (AI) and machine learning (ML), there have been calls for greater regulation and governance concerning consumers' data privacy. With greater efficiencies within the global supply chain, new opportunities arise for trade and investment. Greater production inherently entails greater use of natural resources and greater attention to sustainability. Together, these have an impact on the human capital and skills necessary to manage production lines and, most importantly, to meet the demands of consumer expectations. Therefore, there are three key trends impacting production throughout the world:

1. The digitization of the supply chain,
2. The negative cybersecurity threat posed, and
3. A greater emphasis on environmental risks.

Together, these trends create a narrative for the future of production.

Firstly, the digitization of the supply chain has long been expected and will continue to shape the efficiencies in production for generations to come. With advanced technologies and new techniques for production coming into fruition, it is expected that manual labor will slowly be replaced by automation. With regard to advanced technologies, AI, and ML have disrupted traditional economic dynamics and the production process, inherently redefining the value chain. In addition, technologies have succeeded in processing unimaginable amounts of data through their employment, providing valuable recommendations to overall decision-making. +

Furthermore, throughout the supply chain, greater analytics have not only benefited efficiencies toward the business side of the process but have also allowed

greater transparency on behalf of consumers. This transparency has been of great benefit in enriching consumer retention.[4] With regard to new techniques for production, 3D-printing technologies promise avenues to save costs and promote innovation for a promising future. An interesting example of its use is 3D-printed bridges throughout cities in the Netherlands, Spain, and China. Designers begin by entering basic parameters, such as size and materials, into sophisticated 3D-modeling software, which generates its optimal form. The resulting structural element is produced within a matter of days, on-site, allowing manufacturers to deposit materials only where they need the structure. As a result of using necessary materials, the technology allowed for the production of bridges that are easier to maintain and manufactured with a smaller environmental footprint.[5] Together, these enhancements of advanced technologies and new techniques for production have hastened the digitization of production and have opened the door to greater analytics, reduced environmental impact, and improved overall productivity. +

The second key trend impacting production is the negative cybersecurity threat posed by the digitization of the supply chain. Although advanced technologies promise greater efficiencies in productivity and provide innovative solutions, they come at the cost of the vulnerability of their security by any hacker around the world. In short, a crippling cyberattack that compromises large segments of critical infrastructure and production processes can cost millions, or even billions, of dollars in potential revenue lost.[6] In the eyes of the hacker, this may be beneficial for sending a message to governments worldwide that their vital infrastructures can be disrupted with the push of a button. A key example of this was in July 2021 when Co-Op Sweden was forced to temporarily close their stores due to a ransomware attack. After one of its suppliers, Visma Esscom, was hit by an IT attack, it affected the operations of the supermarket's point-of-sale tills and self-service checkouts. Consequently, stores were forced to close and millions of euros in revenue were lost.[7]

Many manufacturing companies have seen an increase in cyber-related incidents associated with the control systems used to manage industrial operations. Therefore, with the increased implementation of advanced technologies, equally sophisticated cybersecurity standards are necessary. In this high-stakes environment, the

+ Lara Hemels
The accessibility of 3D printing can also make an incredible impact on the democratization of design. Through 3D printers being available in schools and generally being relatively low-cost, younger generations are much more likely to experiment and participate in thinking about how we interact with our objects. Design is no longer purely in the hands of the 1% but can be completely reimagined through 3D printing.

4. World Economic Forum, "Shaping the Future of Production: Four Contrasting Perspectives in 2030" in World Economic Forum White Paper, March 2021, viewed on December 9, 2021. https://www3.weforum.org/docs/WEF_White_Paper_Shaping_Future_Production_.pdf
5. D. Michaels, "3-D-Printed Bridges Promise Smarter, Greener Transit Links," in The Wall Street Journal, November 2021, viewed on December 8, 2021. https://www.wsj.com/articles/3-d-printed-bridges-promise-smarter-greener-transit-links-11635947943?mod=-foesummaries
6. See note 1.
7. Retail Insight Network, "Coop Sweden Stores Close Temporarily Due to Ransomware At-tack," in Retail Insight Network, July 2021, viewed on December 9, 2021. https://www.retail-insight-network.com/news/coop-sweden-ransomware/
8. R. Hajj et al. "Cybersecurity for Smart Factories" Deloitte Analysis. January 2020. pp. 1–16.
9. B. Gant, "The Tokyo Olympics are a Cybersecurity Success Story," in Security, August 2021, viewed on December 23, 2021. https://www.securitymagazine.com/articles/95880-the-tokyo-olympics-are-a-cybersecurity-success-story
10. United Nations, "Goal 12: Ensure Sustainable Consumption and Production Patterns," in United Nations Sustainable Development Goals, April 2018, viewed on December 6, 2021. https://www.un.org/sustainabledevelopment/sustainable-consumption-production/
11. Ibid.
12. Ibid.

solution comes solely through increasing defenses. This means that organizations and companies need to perform cybersecurity maturity assessments, establish a formal cybersecurity governance program, prioritize actions based on risk profiles, and build holistic security.[8] Furthermore, public and private initiatives need to be designed together to instill greater protection, not only for the manufacturing industry but for society as a whole.

An example of a successful initiative on cybersecurity was the set of protective measures taken prior to the 2021 Tokyo Olympics. They were able to monitor digital activity in real-time, collect all alerts, and escalate abnormal activity when necessary. In addition, intelligence agencies and cybersecurity experts increased preventive measures, which stopped numerous cyber-related attacks targeting ticketing, scorekeeping, and media broadcasting.[9] Thus, the security and future of production, hinge on its ability to instill greater security.

Lastly, it is no secret that production, throughout several industrial revolutions, has played a primary role in the effects of climate change. For centuries, economic and social progress has come at the expense of environmental degradation, which endangers the very systems on which our futures and survival are dependent. The United Nations estimates that the global population will reach 9.6 billion in 2050, an equivalent of almost three planets could be required to provide the natural resources needed to sustain current lifestyles.[10] Furthermore, each year, the effects of climate change have become more severe, whereby the global average temperature now stands at a point about 2°C above where it was fifteen years ago.[11]

In light of this pattern, governments and multinational companies are beginning to assume more responsibility for responding to these worsening circumstances. Through the Paris Agreement, the establishment of the United Nations (UN) Sustainable Development Goals, and most recently COP26, world leaders have engaged in numerous programs to reduce their emissions footprint and to implement policies aimed at mitigation. As of 2018, over 93% of the world's 250 largest companies are now reporting on sustainability.[12] As fossil fuels may have finally peaked, infrastructures have been developed to bring renewable energy into the picture. Since reliance on solar, wind, and other renewable energies are being

built into new grids, investment choices are being made with regard to smart roads, battery storage resources, and electric vehicles.[13] In effect, the establishment of private-public partnerships to combat climate change will be instrumental to not only the future of production but the future of the world as a whole. With generational positive-impact insight, efforts to reduce a company's carbon footprint and to invest in greater environmental, social, and governance (ESG) initiatives have become a priority.

1.2 relevancy, responsibility, and resiliency of supply chains

Supply Chains are likely to be transformed by three influential trends:

1. Automation within the manufacturing line,
2. Greater investment into advanced technologies such as AI and ML, and
3. Putting the customer central in making important decisions.

Reflecting on the lessons we have learned through the Covid-19 pandemic, the survival of a business is heavily dependent on a company's supply chain. From meeting a surge in consumer demand to fulfilling environmental and social responsibilities, the resiliency of the supply-chain function has truly been tested in recent years. More importantly, the efficiency of supply-chain technology has become a source of competitive advantage. Looking toward the future of supply-chain management, three advances in technology have become pivotal in testing the relevancy, responsibility, and resiliency of its future.

While advanced technologies have already transformed the way humans work across many organizations and industry verticals due to the restrictions of Covid-19, the future of supply chains rests its hope on automation as the future of logistics. Many businesses are increasingly reliant on automation technologies to operate at a faster pace and in a more efficient way. As a result, Robotic Process Automation (RPA), AI, and other advanced automation tools are allowing businesses to automate complex processes and achieve better business outcomes. This includes a range of tasks, including order processing, invoicing warehousing, etc. through which

13. United Nations, "Goal 12: Ensure Sustainable Consumption and Production Patterns," in United Nations Sustainable Development Goals, April 2018, viewed on December 6, 2021. https://www.un.org/sustainabledevelopment/sustainable-consumption-production/
14. The European Business Review, "Intelligent Automation: The Catalyst for the Future of Supply Chain," in The European Business Review, August 2021, viewed on December 9, 2021. https://www.europeanbusinessreview.com/intelligent-automation-the-catalyst-for-the-future-of-supply-chain/#
15. A. Dekhne et al., "Automation in Logistics: Big Opportunity, Bigger Uncertainty," in McKinsey & Company, April 2019, viewed on December 9, 2021. https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/automation-in-logistics-big-opportunity-bigger-uncertainty
16. Ibid.
17. KPMG, "Future of Supply Chain," in KPMG International, October 2021, viewed on December 9, 2021. https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/11/future-of-supply-chain-the-road-to-everywhere.pdf
18. Ibid.

automation can optimize processing times and operational costs and reduce human errors.[14] Furthermore, the developments in autonomous trucks and heightened interest in automation technology and the drastic rise of e-commerce have allowed businesses to transition to a more efficient supply chain. In the United States alone, growth in e-commerce has averaged 15% annually over the past decade with many large logistics companies struggling to fulfill e-commerce orders.[15] But as volume expands, the solution for resolving these challenges comes in the form of automation. According to McKinsey & Company, the transportation and warehouse industries possess the third-highest automation potential of any sector, having found over fifty technologies that could be used to automate some part of the supply chain.[16] Looking forward to the future, logistics companies can make more informed decisions, cut costs, and enhance productivity through automation.

For businesses, the Covid-19 pandemic became the driving factor that amplified the need for supply chain organizations to make informed decisions faster and more efficiently. For many, social-distancing measures and delays in the supply chain caused unforeseen shifts in the manufacturing line. To ensure the success of supply-chain management, many companies looked toward AI and advanced analytics capabilities to enable real-time analysis of manufacturing assembly lines, transportation movements, and customer delivery times. It is expected that by 2024, 50% of supply-chain organizations will invest in applications that support AI and advanced analytics capabilities.[17] These technologies offer a whole host of benefits; from predicting supply-chain risks, remodeling network flows, and empowering business planning processes, analysis of big data can improve core competencies and supply visibility as well as transparency. Nevertheless, companies will prioritize the use of these technologies for greater customer retention.[18] Investments in advanced analytics, therefore, will be instrumental to a company's key decision-making capabilities.

Lastly, the influence of automation and greater data analytics has allowed businesses to build a customer-centric supply chain, prioritizing the interests of consumers. Traditionally, when shipments leave a warehouse, consumers do not know the whereabouts of their packages or the status of their shipments. Hence,

real-time transportation platforms address this visibility problem, allowing customers to gain a personalized and frictionless experience. Today, successful businesses offer same-day or next-day deliveries, real-time shipping, and easy returns on seamless and interactive platforms.[19] The future of logistics, nevertheless, will build on this foundation and allow customers to buy into value-added, premium fulfillment services. Hence, the future of supply-chain digitization could greatly benefit from effective supply-chain segmentation strategies, which can help maximize net profitability across a diverse set of segments. Supply chains with knowledge of consumer behavior are the future of consumer experience and will enhance consumer retention.

1.3 creating sustainable business models

In recent years, sustainability has become more and more the new standard for businesses. Nearly every day there is something in the news about a company announcing a new (and more) sustainable strategy or commitment their company will embrace and work on, e.g. to have fewer carbon emissions in the future.[20] Moreover, millennials and Generation-Zs prefer environmentally friendly decisions and investments from companies, regarding their production processes, among other sustainable practices. As a result, there is more pressure on companies to take responsibility for their ecological footprints,[21] especially since companies publish reports on Corporate Social Responsibility (CSR), which are available and accessible for everyone. In the European Union, for example, the law requires that certain companies, such as banks, insurance companies, and others labeled as public-interest entities by national authorities, must publish information regarding operations and the environmental and social challenges faced.[22] Companies applying sustainable practices to their production processes, for instance, have gained importance. One reason for this is consumers will look for unique selling points when the product's market is saturated.[23] +

A study by BCG found that 40% of consumers are planning on becoming more sustainable in their practices. As a result, implementing a sustainable business model will be of greater importance for companies in the future.[24] A sustainable business model can be defined as follows: "A business model that creates, delivers, and

+ Daphne Prieckaerts
Pressure on these organizations leads to more awareness and commitment: 29 of the top 30 financial institutions have committed to net-zero by 2050. Unfortunately, it might also lead to 'greenwashing.' Of these 29 financials, only 11 have short-term targets. None of them has fossil fuel financing policies aligned with IEA/IPCC net-zero scenarios. We don't need promises but factual behavior if we want to change.

19. S. Hippold, "Gartner Predicts the Future of Supply Chain Technology," in Gartner, February 2021, viewed on December 9, 2021. https://www.gartner.com/smarterwithgartner/gartner-predicts-the-future-of-supply-chain-technology
20. D. Young, "Four Steps to Sustainable Business Model Innovation," in BCG, April 29, 2021, https://www.bcg.com/publications/2021/four-strategies-for-sustainable-business-model-innovation
21. D. Newman, "How Leading Global Companies Are Using Sustainability As A Market Differ-entiator," in Forbes, July 24, 2021, https://www.forbes.com/sites/danielnewman/2020/07/24/how-leading-global-companies-are-using-sustainability-as-a-market-differentiator/
22. European Commission, "Corporate sustainability reporting." Viewed on December 16, 2021. https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en
23. D. Newman, "How Leading Global Companies Are Using Sustainability As A Market Differ-entiator," in Forbes, July 24, 2021, https://www.forbes.com/sites/danielnewman/2020/07/24/how-leading-global-companies-are-using-sustainability-as-a-market-differentiator/
24. B. Garner, "5 Sustainable Business Trends To Watch In 2022," in Business Because, Octo-ber 22, 2021, https://www.businessbecause.com/news/mba-jobs/7861/sustainable-business-trends?sponsored

captures value for all its stakeholders without depleting the natural, economic, and social capital it relies on."[25] By implementing a sustainable business model, a company could obtain new sources of value. As a result, a company can maintain or even gain a competitive advantage.[26]

Because of these reasons, (sustainable) business models will undergo various changes in the future. First of all, business models will be adapted in such a way that they will have a global sustainable impact. Moreover, new digital technologies will be implemented by companies. By doing this, digital technologies will become the connective tissue of global economies; examples include 3D printing and AI, and its implementation will optimize production.[27] Another future change will be companies needing to reconsider their operational footprints and evaluate the new risks present in the global economy. This is due to the shifts that will happen in value chains from new technological innovations and the importance of implementing sustainability in the production process, Companies are likely to place their manufacturing plants closer to their consumers in the future. As a result, fewer movements will be made, resulting in lower carbon emissions, etc.[28] Already today and even more in the future, incorporating sustainability in the business model is fundamental in doing business. In the future, sustainable investments will accelerate because sustainability will become more central within organizations and their business models.[29] Moreover, companies gain a competitive advantage by being sustainable and production will be optimized by implementing digital technologies. The big question remains, will all these actions help to achieve net-zero emissions for companies?

2. shifting towards a futureproof consumption pattern

Climate change and rising inequality are clear signals we need to change our economic system. Recently, social activism has prioritized the topic of sustainability, which has changed consumer behavior and corporate activity. For example, today, consumers expect fundamental changes in the way businesses positively impact the environment and how they adapt their behaviors accordingly. As a consequence, two key trends have arisen; the future of consumption is motivated by a shift

25. F. Lüdeke-Freund, "Working definitions of 'sustainable business model' & business model for sustainability," June 9, 2014, https://sustainablebusinessmodel.org/2014/06/09/working-definitions-of-sustainable-business-model-business-model-for-sustainability/
26. D. Young, "Four Steps to Sustainable Business Model Innovation," in BCG, April 29, 2021, https://www.bcg.com/publications/2021/four-strategies-for-sustainable-business-model-innovation
27. A. Herve, C. Schmitt. & R. Baldegger, "Internationalization and Digitalization: Applying digital technologies to the internationalization process of small and medium-sized enterprises". Technology Innovation Management Review. Volume 10, issue 7. 2020.
28. S. Lund, J. Manyika, J. Woetzel, J. Bughin, M. Krishnan, J. Seong, & M. Muir, "Globaliza-tion in transition: The future of trade and value chains," in McKinsey, January 16, 2019, viewed on December 5, 2021, https://www.mckinsey.com/featured-insights/innovation-and-growth/globalization-in-transition-the-future-of-trade-and-value-chains#part4
29. B. Garner, "5 Sustainable Business Trends To Watch In 2022," October 22, 2021, viewed on December 12, 2021, https://www.businessbecause.com/news/mba-jobs/7861/sustainable-business-trends?sponsored
30. O. Wright, "Covid-19: Knowing How Consumer Trends Impact CPGs," in Accenture, Au-gust 2020, viewed on December 13, 2021, https://www.accenture.com/us-en/insights/consumer-goods-services/coronavirus-cpg-consumer-needs
31. World Economic Forum, "Vision Towards a Responsible Future of Consumption: Collaborative Action Framework for Consumer Industries," in World Economic Forum Community Pa-per, October 2020, viewed on December 13, 2021, https://www3.weforum.org/docs/WEF_Vision_Towards_a_Responsible_Future_of_Consumption_2020.pdf
32. T. Wernink & C. Strahl, "Fairphone: Sustainability from Inside-Out and Outside-In," in Sus-tainable Value Chain: CSR, Sustainability, Ethics & Governance, D'heur M. (eds), Springer International, Switzerland, November 9, 2014, viewed on December 13, 2021, https://doi.org/10.1007/978-3-319-12142-0_3
33. OECD, "Making Better Policies for Food Systems," in OECD Publishing, January 11, 2021, viewed on December 14, 2021, https://doi.org/10.1787/ddfba4de-en.
34. Ibid.

toward a positive environmental impact and a consumer-centric approach. These changing consumer needs have only been strengthened by the Covid-19 pandemic, which further emphasized societal problems and initiated a surge in healthy consumer decisions.[30] The World Economic Forum foresees a future in which these consumer needs are addressed,[31] a future in which we can consume responsibly and create value for both business and society. To get there, disruptive business models should emerge that create value in new ways. Future business models could embrace circularity, enable digital engagement, or collaborate with consumers throughout their activities. An example of a socially responsible business is Fairphone, which is a social enterprise aiming to make its entire value chain transparent by producing sustainable smartphones. To achieve this, the company collaborates with industry partners, non-governmental organizations (NGOs), and local governments across the value chain. It raises awareness of malpractice in the industry and works toward a sustainable and fair value chain.[32] The Fairphone case highlights that collective action is key in achieving systemic change. By working together, firms and governments can speed up the shift toward a futureproof consumption pattern.

Together, it is important to foresee a future of consumption that prioritizes sustainability and users. Consequently, the products and services that we consume on a daily basis will have a minimal negative impact on the environment while promising a significant positive influence for a wide range of consumers.

2.1 the importance of sustainable food systems

The Organisation for Economic Cooperation and Development (OECD) sees opportunities in sustainable consumption but adds some critical side notes to these opportunities.[33] Food systems are a key area in which consumption might become more sustainable. A trend toward healthier diets could emerge, together with a reduction in overconsumption and food waste.[34] Currently, a substantial part of the world consumes too many calories for a healthy diet, potentially causing health-related issues. More sustainable food consumption could tackle these health issues by decreasing the meat and dairy intake in diets (in developed countries). Since meat and dairy production constitute a substantial

part of our greenhouse gas (GHG) emissions, a reduction in their intake has positive environmental effects.

In order to combat the environmental effects of agricultural overproduction, a digital transformation might pose an opportunity for sustainable food systems. The increased access to data that comes with a digital world, increases transparency and traceability in the supply chain. This helps consumers in identifying sustainable products and could reduce waste and losses in the production process.

Nonetheless, the responsibility for sustainable consumption does not have to rest solely on the shoulders of consumers. Supply-side policies may be even more effective, as they could incentivize sustainable consumption by altering the price of unsustainable products. An example is carbon pricing, which would shift consumption away from carbon-intensive products and toward products with a lower environmental footprint. So far, studies comparing firms regulated by the European Union Emissions Trading System to similar firms below the coverage threshold, estimate the carbon price caused relevant firms to reduce their emissions by around 10%.[35] Furthermore, research on the carbon tax in British Columbia found that a gradual increase in the carbon price reduced emissions by 5% to 15% with negligible effects on the overall provincial economy.[36] On a national or even a broader level, these price policies could aim at reducing the use of fuel, pesticides, and fertilizers in the production process, for example by decreasing subsidies and tax cuts.

Hence, shifting agricultural overproduction to more sustainable food systems will not only benefit the environment but, more importantly, motivate collective action between public and private stakeholders.

2.2 changes in consumer behavior

Consumer behavior is constantly changing. Traditionally, consumers were attracted to physical products, and advertisements on billboards or newspapers would direct one's attention to them. Today, and in the future, consumers are increasingly influenced by digital marketing tools seen throughout social media and other online platforms. In essence, changes in consumer behavior are driven by a whole host of factors. It could be social life changes or even influential trends within technology; nevertheless,

35. G. Jacobsen & C. Fischer, "The Green New Deal and the Future of Carbon Pricing," in Re-sources for the Future, June 2021, viewed on December 14, 2021. https://www.rff.org/publications/all-publications/the-green-new-deal-and-the-future-of-carbon-pricing/
36. Ibid.
37. P. Allen Clark, "The Metaverse Has Already arrived. Here's What That Actually Means," in Time, November 2021, viewed on December 14, 2021, https://time.com/6116826/what-is-the-metaverse/
38. M. Bobrowsky, "Big Tech Seeks Its Next Fortune in the Metaverse," in The Wall Street Journal, November 2021, viewed on December 9, 2021, https://www.wsj.com/articles/big-tech-seeks-its-next-fortune-in-the-metaverse-11636459200

consumer behavior is continuously evolving. When the Covid-19 pandemic struck, it impacted on all sectors of the economy, which consequently forced producers and consumers to live in the so-called *new normal*. Whereas future trends such as the digitization of the consumer experience and shopping had been predicted, recent events forced society to adopt these trends more quickly than expected. Thus, the future of consumption can be traced to the adoption of digital technologies.

One of the changes currently present in society, which will develop more in the future, is the increase in digital adoption. As a consequence of the Covid-19 pandemic, we saw visible changes in consumer behavior. For example, people were forced to change their lifestyles and adopt social-distancing measures while shifting to digital platforms to fulfill their daily needs: grocery shopping, social interactions, entertainment, etc. Nevertheless, in the future, digital adoption will be even more present and become ever-present for consumers of all ages. An influential trend in the consumer space is the promotion of the metaverse. Known as the future of social interaction, the metaverse is an augmented reality environment whereby users are able to work, shop, and interact with other users from all corners of the globe. It promises a greater overlap of our digital and physical lives in terms of wealth, productivity, and entertainment while blurring the boundaries of interactions online and in real life.[37] As a result, consumers will gain an immersive experience while shopping. For example, they will be able to rotate, test, and try items of clothing through their digital avatar. Furthermore, in terms of digital advertising, the harnessing of data within the digital sphere provides advertisers with avenues to experiment in immersive ways with building brand recognition.[38] Customers will not just be able to talk to brands on social media. Now, they'll be able to interact with them in a 4-D realm. What the future of the metaverse tells us is that geographic locations will become less relevant in the future. As long as there is an Internet connection, people can interact with others, shop online, and work remotely anywhere around the world.

Another change set to keep evolving — and related to the digitalization of shopping in the future — is livestream shopping. This is a new type of online shopping that originated in China more than five years ago. In 2020, it gained popularity in the United States as well. Via Facebook,

Instagram, and TikTok, retailers show the newest products they offer to consumers. It can be seen as entertainment for consumers as well. The difference between old-school teleshopping/home-shopping channels and livestream shopping is that consumers can actually interact with the retailers and ask questions about the products they want to buy. Moreover, consumers can buy the products from the same device they're using to watch the livestream; this makes it easier to actually purchase the product. According to analysts at PingAn securities, the value of goods sold through live streams will double this year to over 313 billion dollars.[39] Over time, sellers on social media platforms have gained greater consumer trust and are likely to turn over huge volumes of items throughout the next decade. +

Lastly, in the future, the purchasing behavior of consumers is expected to change.

Changes in purchasing behavior have already happened sooner than expected. As a result, increasing trends suggest that consumers will spend their money differently in the future. For example, consumers will shift toward more value-based purchasing, whereby individuals value quality over quantity. Ultimately, consumers will spend less on goods they consider unnecessary and greater importance will be placed on the long-term use of products.[40] As consumers become more mindful of what they buy, they will make more sustainable choices when buying new products; this is not only about how the products are made, but the possibility of reusing and recycling will also become important.[41] With all these factors in mind, consumers will become more aware of their actions and the effects that their purchases will have on the environment. +

> Nearly 1 in 3 consumers claimed to have stopped purchasing certain brands or products because they had ethical or sustainability-related concerns about them (Deloitte, 2021).[42]

Therefore, the future of consumption is likely to continue the trend of constant change. Whereas throughout the past few centuries, our consumer experience has been defined by brick-and-mortar stores, the future of consumption will be even more digital, interactive, and sustainable.

+ Kim Tan
This is becoming popular and successful in Southeast Asia as well. A lot of Filipinos do this full-time! The average GMV growth in the Philippines in terms of live-selling is 309%, the highest in Southeast Asia. Source:

+ Elias Sohnle Moreno
Let's be aware that the increasing demand for sustainable products pushes companies to become more sustainable and "appear" more sustainable; greenwashing — is an interesting discussion together with consumer behavior. Many studies show that although consumers want sustainable products, they are not willing to go to great lengths to find out how sustainable their products are. This provides a strong incentive for companies to highlight one specific sustainable product feature that is often dwarfed by the social/environmental damage to other features of the product produced.

39. E. Olcott, "Alibaba Challenged as TikTok Generation Starts Shopping on Short Video Apps," in Financial Times, December 2021, viewed on December 14, 2021, https://www.ft.com/content/43f58eda-05c0-40c9-bf5c-cafb8f24c0b0
40. M. Vautier, "EY Future Consumer Index: Consumers Are Choosing to Live with Less and Re-Evaluating Purchases," in EY, November 2021, viewed on December 14, 2021, https://www.ey.com/en_gl/news/2021/11/ey-future-consumer-index-consumers-are-choosing-to-live-with-less-and-re-evaluating-purchases
41. Deloitte, "Shifting Sands: Are Consumers Still Embracing Sustainability," in Deloitte, March 2021, viewed on December 14, 2021. https://www2.deloitte.com/uk/en/pages/consumer-business/articles/sustainable-consumer.html
42. Ibid.
43. F. Caro, A. Guhan Kok & V. Martinez-de-Albeniz, "The Future of Retail Operations," Manu-facturing & Service Operations Management, vol. 22 (1). December 2021, pp.47–58. https://doi.org/10.1287/msom.2019.0824
44. P. Adhi et al., "Omnichannel Shopping in 2030," in McKinsey & Company, April 2021, viewed on December 9, 2021, https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/omnichannel-shopping-in-2030
45. P. Pluim, "3 Trends Shaping the Future of Retail," in Forbes, July 2021, viewed on Decem-ber 9, 2021, https://www.forbes.com/sites/sap/2021/07/13/3-trends-shaping-the-future-of-retail/

2.3 online retail

One of the key events that we have experienced from being quarantined in our homes is a shift in the way people purchase goods and services. Say goodbye to the days of walking into physical stores, and instead, say hello to buying our groceries, household appliances, or even our favorite pair of shoes within a few clicks of a button on our mobile phones. As more retailers are using technology and cloud-based business models to adapt to evolving competition and consumer behavior, online retail will continue to be defined by its ease of use.

For business, the future of online shopping will optimize the customer experience. Firstly, brands will prioritize seamless experiences to win new customers. Whether people are scrolling through Instagram or searching the depths of a brand website, customers now have access to nearly unlimited products, complemented by customer reviews and even manufacturer information.[43] Secondly, brands will build creative new digital experiences to unlock the future of retail. Shopping will feel incredibly personalized, and one is likely to see your digital mannequin quickly change outfits, depending on the products you have selected.[44] Third and lastly, retailers are looking toward the use of virtual reality, artificial reality (AR), and 3D technology to interact with customers. A virtual 'try-before-you-buy' experience can be applied to a diverse range of products and across numerous omni channels, including websites, apps, and social media. Imagine testing to see how a new coffee table or couch fits in your living room or a pair of sunglasses on your face; these are customer experiences that are likely to reshape the future of online retail. The consumer is the focus.[45] Businesses, therefore, are shaping their supply chains and operations for the improvement of the customer experience.

An important aspect of online retail for the future is a greater emphasis on sustainable practices and greater consciousness about our environment. Already, consumers are gravitating to brands that offer fast, free, and sustainable shipping. As seen in Europe, almost one-quarter of consumers would change stores if they did not think that the available products were sustainable. Greater focus on hygiene, organic products, and sustainability have become much more important than ever before

in light of the novel Covid-19 pandemic. Furthermore, brands are designing a future customer experience that places people's social needs, such as feeling a sense of community, at the forefront of their product offerings. For example, Walmart is already changing the marketplace experience by enabling more branding opportunities like lifestyle photography to replace a massive product dump.[46] With 38% of consumers already intending to shop online and visit stores that provide greater experiences, it is likely that a community-focused approach will be the norm.[47] More importantly, it cements the future of online retail in our daily lives.

Looking toward the future, greater emphasis will be placed on online retail. Brands are no longer looking to expand their brick-and-mortar stores. Adapting to changes in consumer behavior and greater consciousness of our environment, brands are investing in the online experience. E-commerce is currently at an all-time high. As countries locked down and retailers were forced to close, e-commerce had 10 years of growth in 3 months.[48] In the future, e-commerce will only grow and improve.

Nevertheless, in recent years, online retail has attracted severe criticism due to excessive forms of pollution. Researchers in the United Kingdom have estimated that shopping at brick-and-mortar stores for frequently bought items results in lower greenhouse emissions than ordering the products online.[49] This is because shoppers purchase more goods online, which produces more carbon emissions through packaging waste, transportation, warehouse activities, and delivery.[50] In order to combat the environmental impact of online retail, Walmart and Amazon have provided electric vehicle chargers at more than a hundred of their store locations and have worked with suppliers to reduce emissions from their global supply chain. Amazon CEO Jeff Bezos has also announced a more general plan to fight climate change by making the company carbon neutral by 2040 and meeting the Paris climate agreement ten years early.[51] Although online retail poses many risks to the environment, the world's largest retail companies have taken proactive measures to ensure the sustainability of their products and services. Hence, the future of consumption promises benefits for the user and the world.

Thus, looking at the key trends that will impact consumption in the future, it is clear that three stand out. One, sustainability will be at the forefront of important public and private decisions, impacting the food and retail industry. Two, technological advances promise greater efficiency and effectiveness to produce a more engaging consumer experience. Three, in the digital space, the retail industry will prioritize consumers, designing online applications to improve consumer retention.

46. Shopify, "The Future of Ecommerce Report 2021," in Shopify Plus, January 2021, viewed on December 9, 2021, https://enterprise.plus.shopify.com/rs/932-KRM-548/images/Shopify_Future_of_Commerce.pdf
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50. Ibid.
51. Ibid.
52. A. Hayes, "Capital Markets," in Investopedia. August 30, 2021, viewed on December 7, 2021, https://www.investopedia.com/terms/c/capitalmarkets.asp.
53. PWC Netherlands, "Six key challenges for financial institutions to deal with ESG risks," in PWC Netherlands. Viewed on December 7, 2021, https://www.pwc.nl/en/insights-and-publications/services-and-industries/financial-sector/six-key-challenges-for-financial-institutions-to-deal-with-ESG-risks.html.
54. S. Das, "Digital Transformation in Capital and Security Markets," in Wipro. Viewed on De-cember 7, 2021, https://www.wipro.com/capital-markets/digital-transformation-in-securities-and-capital-markets/.
55. M. Blake & A. Shah, "6 issues that will define the future of capital markets," in World Eco-nomic Forum. September 8, 2021, viewed on December 7, 2021, https://www.weforum.org/agenda/2021/09/six-issues-to-define-the-future-of-capital-markets/.

3. money, money, m... cryptocurrency? financial developments

Money makes the world go round. And for the world to keep spinning, the finance industry needs to adjust to the world around it. The finance industry is majorly influenced by global developments regarding technology and sustainability concerns. This section discusses some of the main changes in capital markets and cryptocurrencies.

3.1 capital markets

Many believe that the global capital market began to take on its modern form when the first stock exchange was founded in Antwerp in 1531. Over the past four centuries, the way individuals and institutions trade financial securities has evolved drastically. What will be the upcoming changes?

In capital markets, the supply and demand for money, in the form of savings and investments, come together. The suppliers are generally institutions or people with capital, and they can invest or lend this to those who need it.[52] Here, there are three visible dynamics:

1. The increased importance of ESG factors,[53]
2. Digitization of financial products and processes,[54] and
3. Incorporation of new risks.[55]

The incorporation of ESG factors includes a wide range of possible company policies and stretches from climate change response to ethical labor standards and dealing with, for instance, data and privacy management. For

capital suppliers, ESG is increasingly an important measure by which to evaluate companies. The idea is that companies that have more developed ESG policies are better prepared for the future, and thus are a safer investment.[56] Not only does this mean that sustainability considerations are more and more present, but there are also more funding options available for companies who do wish to invest in their ESG. A 2020 report shows that while only 37% of banks in 2019 considered climate change increasingly as an emerging risk, in 2020 it was up to 52%.[57] Additionally, European Union (EU) regulation has made it mandatory for companies with over 500 employees to disclose how they manage social and environmental challenges.[58] Moreover, in research conducted by the NYU Stern Center for Sustainable Business, it was concluded that implementing more sustainable practices will often increase financial performance. Furthermore, a positive correlation between ESG and financial performance was found in 58% of the studies they reviewed.[59] The current developments show that actors within the capital market have the chance to influence as well as benefit from incorporating sustainable initiatives.[60] +

Given that the capital market is very much based on data, it might not come as a surprise that there are great opportunities for digitizing it. So far, the degree of digitization of the capital market has been relatively low in comparison to other financial services, which, as a whole industry, trails behind consumer goods and retail businesses. New technologies such as AI, ML, and automation can contribute to improving efficiency, reducing costs, and generating greater benefits for their customers.[61] Still, banks are struggling with finding the correct strategy to digitize their processes, and they often lose themselves in the web of different IT solutions. McKinsey & Company concluded that there are two successful approaches to the digitization of banks. First, banks can opt for the all-in approach: banks fully embrace digital technologies, apply them to their value chains, and adapt their business models accordingly. This method is, however, only suitable for banks with a successful track record in electronic trading. Second, banks can choose a targeted approach: they focus their digital investments on reducing operating costs and protecting client franchises. In this way, they avoid unproven technologies and keep their business models.[62] Moreover, digitization and the reduction of costs allow for the democratization

+ Chadia Mouhdi
This is very interesting. In today's day and age, a 'small' company with few employees can generate significant revenue and have a lot of impact and influence. Surprisingly, such companies are not mandated by law on how they address social and environmental challenges. So, I think that company size ≠ (potential) influences or impacts.

56. PWC Netherlands, "Six key challenges for financial institutions to deal with ESG risks," in PWC. Viewed on December 7, 2021, https://www.pwc.nl/en/insights-and-publications/services-and-industries/financial-sector/six-key-challenges-for-financial-institutions-to-deal-with-ESG-risks.html.
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61. S. Das, "Digital Transformation in Capital and Security Markets," in Wipro. Viewed on De-cember 7, 2021, https://www.wipro.com/capital-markets/digital-transformation-in-securities-and-capital-markets/.
62. McKinsey & Company, "Two Routes to Digital Success in Capital Markets". McKinsey Working Papers on Corporate & Investment Banking, No. 10, October 2015, pp. 1–40.
63. M. Blake & A. Shah, "6 issues that will define the future of capital markets," in World Eco-nomic Forum. September 8, 2021, viewed on December 7, 2021, https://www.weforum.org/agenda/2021/09/six-issues-to-define-the-future-of-capital-markets/.
64. M. Watson & A. Gennarini, "Why digital resilience must be a top priority for banks," in EY. October 12, 2021, viewed on December 7, 2021, https://www.ey.com/en_gl/banking-capital-markets-risk-regulatory-transformation/why-digital-resilience-must-be-a-top-priority-for-banks.
65. M. Blake & A. Shah, "6 issues that will define the future of capital markets," in World Eco-nomic Forum. September 8, 2021, viewed on December 7, 2021, https://www.weforum.org/agenda/2021/09/six-issues-to-define-the-future-of-capital-markets/.
66. G. Lofts & T. Groom, "How sustainable finance can help decarbonize the real economy," in EY. November 30, 2021, viewed on December 7, 2021, https://www.ey.com/en_gl/sustainability-financial-services/how-sustainable-finance-can-help-decarbonize-the-real-economy.
67. M. Watson & F. Guerreri, "How COVID-19 has changed the role of the chief risk officer," in EY. July 5, 2021, viewed on December 7, 2021, https://www.ey.com/en_gl/banking-capital-markets-risk-regulatory-transformation/how-covid-19-has-changed-the-role-of-the-chief-risk-officer.
68. M. Watson and A. Gennarini, "Why digital resilience must be a top priority for banks," in EY. October 12, 2021, viewed on December 7, 2021, https://www.ey.com/en_gl/banking-capital-markets-risk-regulatory-transformation/why-digital-resilience-must-be-a-top-priority-for-banks.

of public markets, which allows more actors to invest and borrow money.[63]

All of these developments are not without additional risks, though. As a result of the Covid-19 pandemic, technological developments have massively accelerated. These bring about new questions and issues for cybersecurity, and unintended consequences; for instance, AI technology or risks associated with migration to cloud systems.[64] Moreover, the democratization of public markets allows more players to participate, and as new wealth opportunities are created, additional risks are created.[65] Furthermore, the implementation of ESG is related to reducing risks. Failing to act on climate change, for example, can reduce global economic output by $23 trillion (more than one thousand times the U.S.'s current gross domestic product (GDP)) annually by 2050.[66] All of this has re-awakened the role of Chief Risk Officer (CRO) in many companies; a job almost forgotten but now in charge of figuring out how to govern such new risks.[67] The multinational EY polled CROs on what they expected their jobs to focus on in the coming years. 88% expected to focus on the implementation of process automation, 66% on the modernization of core IT functions, and 64% on the use of analytics to further customer insights.[68] CROs will have to deal with many new technologies, among which are cryptocurrencies.[69]

3.2 the rise of cryptocurrencies

The rise of cryptocurrency has led to fundamental disruptions in the global financial system. Since the creation of Bitcoin in 2009, this new type of money, secured by cryptography, has rapidly gained popularity worldwide. Thousands of different cryptocurrencies have been launched, adopted, and traded over the past decade. From diverse payment options in our everyday lives to the evolution of banking regulations, cryptocurrency is reshaping the global financial landscape.

At the individual level, cryptocurrency brings efficiency and lowers transaction costs because of the way it works; a central or government authority is not needed in the transaction process as most cryptocurrencies work on decentralized networks. The use of blockchain technology also allows online secure payments or so-called tokens. Those features give cryptocurrency

more flexibility as a medium of exchange across the world compared with fiat money and commodity money. Cryptocurrencies make it easier to transfer funds directly between two parties, without the participation of traditional financial institutions.[70]

Given this, some argue that cryptocurrency could promote financial inclusion on a global scale by providing banking for the unprivileged. Cryptocurrency creates the opportunity for the "unbanked," who have no access to any form of banking infrastructure, to establish their credit.[71] This also explains why cryptocurrency gained popularity rapidly in some developing economies such as Kenya, Nigeria, Vietnam, and Venezuela. A Chainalysis, a blockchain data platform, report cites the reasons behind the high crypto adoption in emerging markets as follows: many residents buy a cryptocurrency and carry out international transactions for individual remittances on peer-to-peer (P2P) platforms because they do not have access to centralized exchanges. Apart from being a medium of exchange, cryptocurrency is considered a good store of value in some countries where the local financial system is on the verge of collapse. In the case of Venezuela, cryptocurrency is mainly used as a tool to protect wages from inflation and manage cash flows more efficiently.[72]

At a governmental level, the high level of uncertainty and volatility in the cryptocurrency environment has brought about significant challenges for financial regulators. Given the anonymity and portability of cryptocurrencies, there has been increasing concern among regulators about the illicit use of cryptocurrencies, such as money laundering and terrorist financing. In addition, the emergence of decentralized finance (DeFi) and crypto payments has raised questions about the ability of financial regulatory authorities to ensure consumer protection, as the use of cryptocurrencies often does not fit into existing regulatory frameworks.[73]

In response to the crypto boom, central banks around the world have taken policy actions. Some countries are open to the possibility of accepting cryptocurrency as legal tender,[74] while authorities of some economies, such as China and India, are preparing to ban private cryptocurrencies and allow central banks to launch official digital money, so-called central bank digital currency (CBDC).[75]

69. M. Watson and F. Guerreri, "How COVID-19 has changed the role of the chief risk officer," in EY. July 5, 2021, viewed on December 7, 2021, https://www.ey.com/en_gl/banking-capital-markets-risk-regulatory-transformation/how-covid-19-has-changed-the-role-of-the-chief-risk-officer.
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73. A. Siripurapu, "Cryptocurrencies, Digital Dollars, and the Future of Money," in Council on Foreign Relations. September 24, 2021, viewed on December 2, 2021, https://www.cfr.org/backgrounder/cryptocurrencies-digital-dollars-and-future-money
74. L. Casanova & John Ninia, "Why Emerging Markets Are Early Adopters of Crypto as Legal Tender," in International Banker. November 30, 2021, viewed on December 2, 2021, https://internationalbanker.com/brokerage/why-emerging-markets-are-early-adopters-of-crypto-as-legal-tender/
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77. H. Whipps, "How Ancient Trade Changed the World," in Live Science. February 18, 2008, viewed on December 7, 2021, https://www.livescience.com/4823-ancient-trade-changed-world.html.

Looking ahead, the upward trend in the crypto industry is expected to continue for years. A report published by Allied Market Research estimated that the global cryptocurrency market will reach $4.94 billion by 2030, more than triple its estimated size of $1.49 billion in 2020, with a projected compound annual growth rate of 12.8% between 2021 and 2030.[76] Although no one can precisely predict what our financial world will look like in the distant future, it is getting harder to imagine a future without cryptocurrencies.

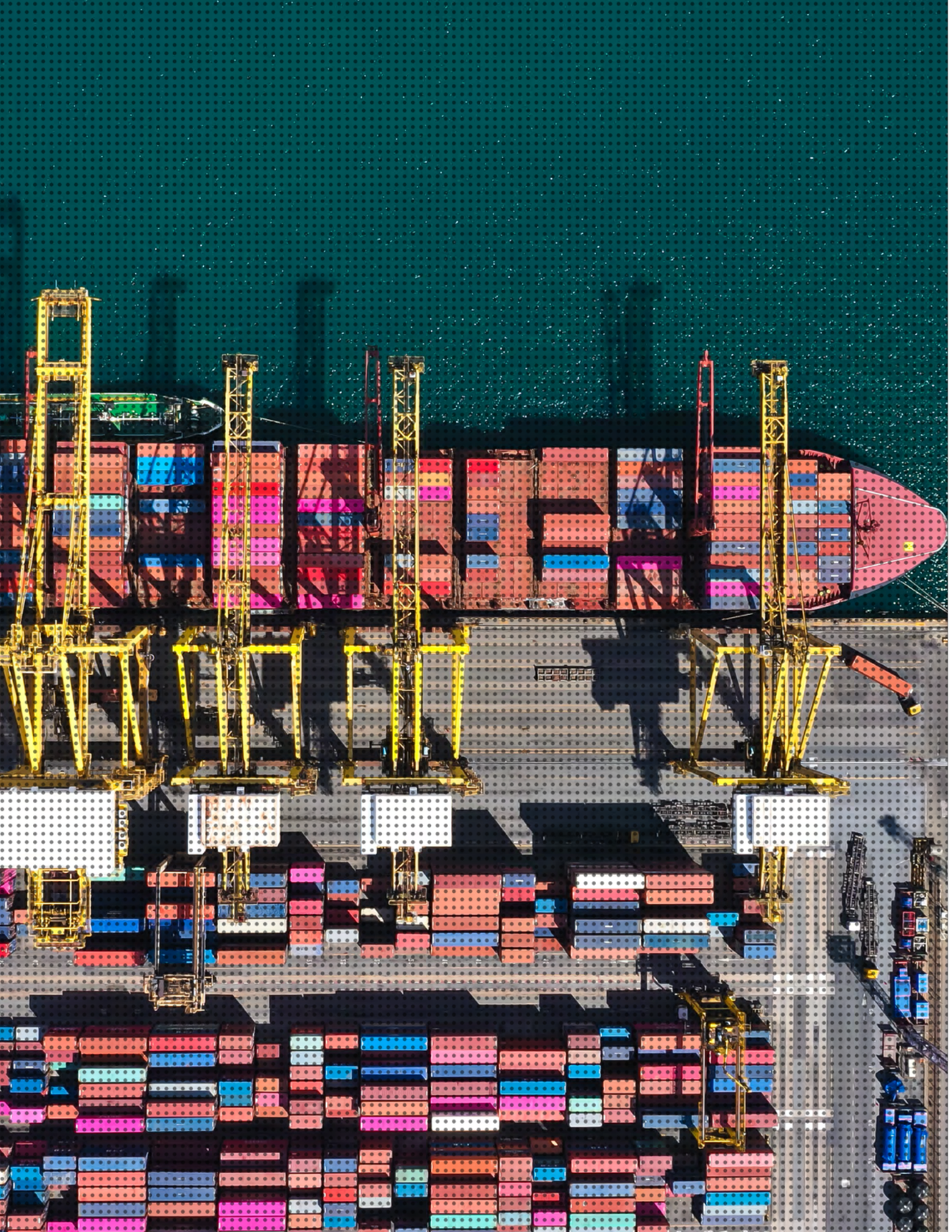
4. the global economy — trade & interdependence

Historians believe that the first long-distance trade happened between the Indus Valley in Pakistan and Mesopotamia, around 3000 B.C.[77] This means that the idea of trade, or even international trade, is in itself nothing new. That does not, however, not mean that trade is static or never changes. International trade does not exist in isolation. The interests of the parties involved change; the economic settings develop, and political interests can overshadow economic considerations. For this reason, it is valuable to understand how political interests and economic concerns interplay, and that is what global (or international) political economy focuses on. In this section, the following topics are discussed:

1. International trade and global value chains
2. Trade policies

4.1 international trade & global value chains

Chances are that if you check the country-of-origin label of the five products closest to you, none of these products will have been made in the country in which you currently reside. This is only a small indication of how much our daily lives are influenced by international trade. When analyzing international trade, the main actors are the countries that exchange goods, services, and money. There is disagreement as to why countries truly participate in trade, but the neoclassical economic idea persists: the parties involved are better off when they exchange their products or services, instead of having to provide all they need by themselves. When other



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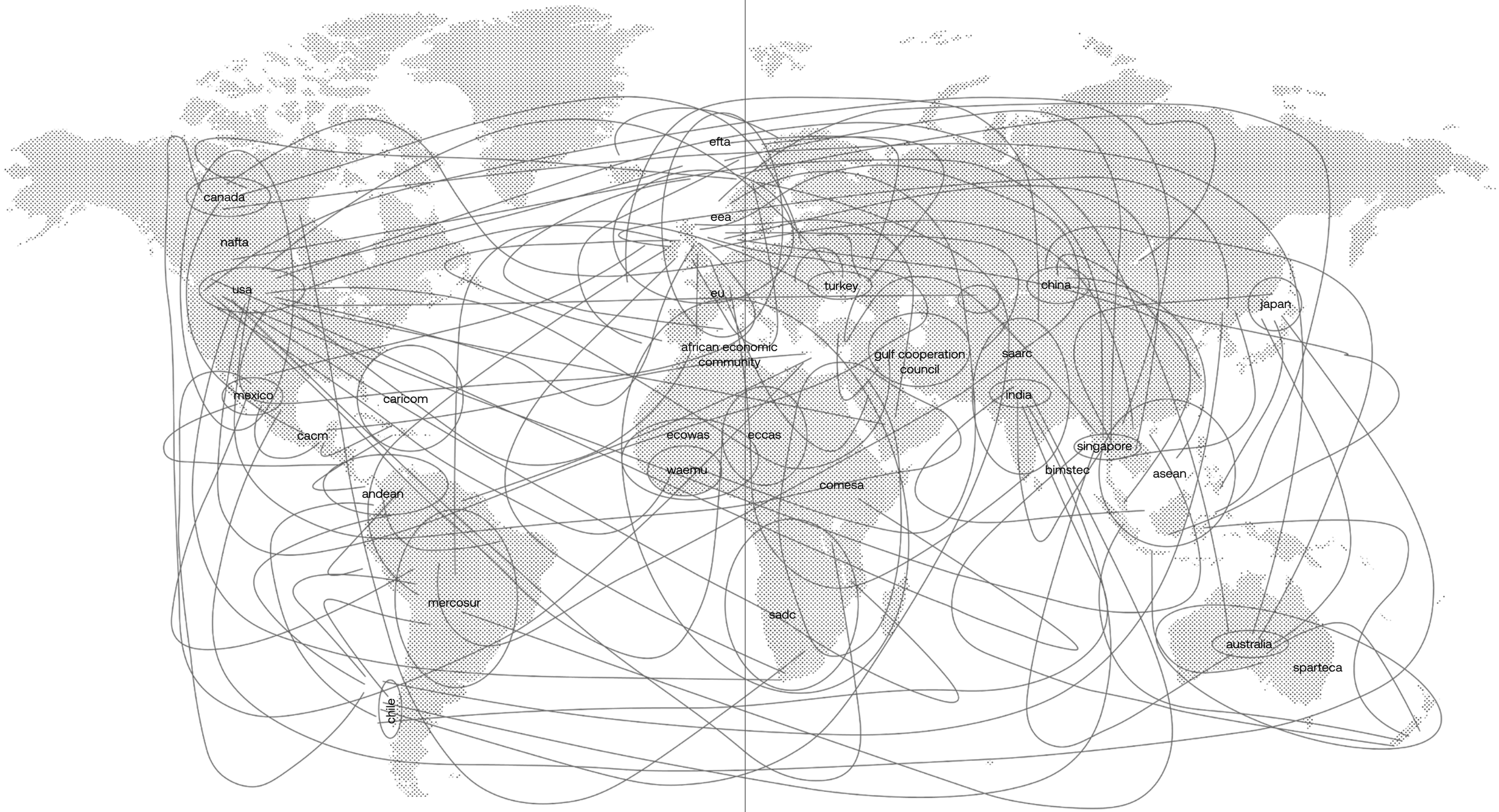
countries can produce a specific product cheaper, it can be beneficial for a different country to just buy their products instead of having to produce the goods themselves.[78] Without opening up the debate as to whether trade truly benefits countries or for which reason countries specifically choose to participate in trade (for this you are recommended to read up on Adam Smith, David Ricardo, or Eli Heckscher and Bertil Ohlin once you finish this book), it cannot be denied that most countries in the world participate in trade. Even North Korea, one of the most isolated countries in the world, participates, although little, in international trade.[79]

In recent decades, there has been a general trend toward ever-closer economic cooperation. This is important since currently there are many overlapping agreements. The graph named ‘The Spaghetti Bowl Effect’ shows what is known as the Spaghetti Bowl Effect. This shows the complicated nature of overlapping agreements. The map is not intended to be read easily, but more as an indication of how difficult it is to understand all the different regulations in place. The sheer number and the different types of overlapping agreements will continue to add to the complexity of trade regulations in which states and companies have to navigate themselves.[80]

Furthermore, the Covid-19 pandemic has also brought about fundamental questions about dependence on international trade. Worries have arisen about whether it is actually smart to depend on other countries for products, and especially products of incredible importance/sensitivity, such as, for instance, those needed for health care. An example of this is Taiwan’s government, which has for decades discouraged the production of relatively cheap products like medical face masks and instead opted for buying them from China. With the Covid-19 pandemic, the Taiwanese government decided that face masks should be produced in Taiwan again. Not only did the economic value (due to the increased global demand) stimulate the policy change, but it was also the awareness that some products are simply too important to be dependent on their availability internationally.[82] Additionally, Covid-19 also meant that, since part of the world was in lockdown, international supply chains came to a standstill and created massive delays in the delivery of products.

Such concerns are related to Global Value Chains (GVCs) and international interdependence. GVCs are defined by

the spaghetti bowl effect[81]



Pol Antràs, professor of economics at Harvard University, as consisting of "a series of stages involved in producing a product or service that is sold to consumers, with each stage adding value and with at least two stages being produced in different countries."[83] This means that in order to finish one product, different states are involved. This might make the production process cheaper, but it also adds certain complexities for both states and companies. Multiple trends are noticeable when analyzing the future of GVCs.

There is increased awareness that national economies are vulnerable to shocks that take place somewhere in the value chain. The blockage of the Suez Canal in March 2021 is one such example, and it reminded the world that 12% of global trade passes through this single canal, which is about $3 billion to $9 billion worth of cargo passing through on a single day.[84] For comparison, Mauritania's annual GDP is $8.2 billion.[85] The overall cost of the Suez blockage is difficult to estimate, but it is believed that it held up $9.6 billion of trade each day. This is equivalent to $400 million and 3.3 million tons of cargo an hour, or $6.7 million a minute.[86]

Additionally, the Covid-19 pandemic has also increased awareness about trade vulnerabilities. Since different countries have different Covid-19 and quarantine regulations, production processes are often slowed down by a Covid-19 wave somewhere along the GVC.[87] Similarly, the pandemic has contributed to the current shortage of containers in most parts of the world. As a result of the lockdowns, not only did international shipping halt but the processes of collecting the containers stopped too. With parts of the world opening up again, the demand for containers is once again on the rise, which has drastically increased the cost of container shipping.[88] Moreover, the impact of Covid-19 on international trade is expected to have a lasting impact. Covid-19 is not yet over, and other pandemics could occur in the future, so companies and government policies are working to mitigate such risks. This includes, for instance, less reliance on labor (i.e., automation), holding larger inventories, and diversifying or reshoring production processes in order to be less affected by international disruptions.[89]

Furthermore, the development of new technologies influences the way actors interact with each other in GVCs. One such technological advancement is robotization.

83. P. Antràs, "Conceptual Aspects of Global Value Chains". World Bank Group - Policy Re-search Working Paper, nr. 9114, pp. 1–34.
84. G. Topham, "How the Suez Canal blockage can seriously dent world trade," in The Guardi-an. March 26, 2021, viewed on December 7, 2021, https://www.theguardian.com/business/2021/mar/26/how-the-suez-canal-blockage-can-seriously-dent-world-trade.
85. International Monetary Fund, "World Economic Outlook Database," in IMF. Viewed on De-cember 8, 2021, tinyurl.com/49u8dzjw.
86. M. Russon, "The cost of the Suez Canal blockage," in BBC News. 29 March 2021, viewed on December 7, 2021, https://www.bbc.com/news/business-56559073.
87. Organisation for Economic Cooperation and Development, "Global value chains: Efficiency and risks in the context of COVID-19," in OECD. February 11, 2021, viewed on December 8, 2021, https://www.oecd.org/coronavirus/policy-responses/global-value-chains-efficiency-and-risks-in-the-context-of-covid-19-67c75fdc/.
88. F. Youd, "Global shipping container shortage: the story so far," in Ship Technology. April 29, 2021 (updated October 1, 2021), viewed December 8, 2021, https://www.ship-technology.com/features/global-shipping-container-shortage-the-story-so-far/.
89. C. Arriola, P. Kowalski, & F. van Tongeren, "The Impact of COVID-19 on Directions and Structure of International Trade". Organisation for Economic Cooperation and Development (OECD) Publishing, nr. 252, pp. 1–39.
90. J. Kwiatkowski, "Will Robots Reshuffle World Trade Directions?," in IHS Markit. November 8, 2021, viewed on December 8, 2021, https://ihsmarkit.com/research-analysis/will-robots-reshuffle-world-trade-directions.html.
91. S. Lund, J. Manyika, J. Woetzel, J. Bughin, M. Krishnan, J. Seong, & M. Muir, "Globaliza-tion in transition: The future of trade and value chains," in McKinsey & Company. January 16, 2019, viewed on December 7, 2021, https://www.mckinsey.com/featured-insights/innovation-and-growth/globalization-in-transition-the-future-of-trade-and-value-chains.
92. N. Bonifai, I. Nooruddin, & N. Rudra, "The Hidden Threat to Globalization," in Foreign Af-fairs. December 3, 2021, viewed on December 9, 2021, https://www.foreignaffairs.com/articles/world/2021-12-03/hidden-threat-globalization.
93. B. McDonald, "Back to Basics: Why Countries Trade," in International Monetary Fund. De-cember 2009, viewed on December 7, 2021, https://www.imf.org/external/pubs/ft/fandd/2009/12/basics.htm.
94. A. Alsamawi et al. "Returns to intangible capital in global value chains: New evidence on trends and policy determinants". OECD Trade Policy Papers, No. 240, 2020. https://doi.org/10.1787/4cd06f19-en.

+ *Emma Datema*
For those interested in understanding more about free markets, capitalism, and development economics, I truly recommend Ha-Joon Chang's "Bad Samaritans: The Myth of Free Trade and the Secret History of Capitalism." Critical and informative, this book sheds much-needed light on how many developed countries became rich from closing their economies off during phases of development but demand openness from countries labeled as currently developing. Furthermore, it discusses the role of IMF and World Bank regulations and how often the conditions imposed on countries have the exact opposite effect of what the loans, policies, and conditions were supposedly intended to achieve.

It is expected that the use of robotics in production processes will increase the importance of capital and replace repetitive labor-intensive work. This could result in a change of where and who produces what. Countries with much capital and advanced technology and R&D are expected to benefit from this change. Therefore, currently, there appears to be a tendency for countries (e.g., China) to join the race for robotics and AI, as to be among those benefiting from the robotization of GVCs.[90] In addition, the development of new digital platforms, data-processing advances, and logistics technologies will continue to lower cross-border transaction costs. According to McKinsey & Company, the use of new logistics technologies can reduce the time needed for shipping and customs by 16% to 28%.[91] This means that technological advancements can have a big impact on international trade.

4.2 trade policies

Countries introduce trade policies to enhance the benefits they gain from participating in international trade and decrease how vulnerable their populations are to exploitation and economic developments from abroad. Here, two important developments are noticeable:

1. Countries are actively employing trade policies, including protectionism, and
2. The weaponization of trade.

With globalization and international trade, not all actors who are involved are winners.[92] Specific industries might suffer when countries have their borders open for imports.[93] The value of international trade is not in the quantity but more in the type of products (quality) that a country imports or exports. Completed products are much more valuable than mere resources just taken from the ground. The true profit in trade can be found in the value that a country can add to the production process, and this means that knowledge, R&D, and data-intense production allow countries to add much more value, and thus benefit from trade.[94] +

Governments, therefore, have an interest in influencing which industries are developed and not leaving this completely up to market forces. There is a special interest here in strategic markets, which are important

for countries since they are key for the continued economic growth of the country. An example of such a market is the technological sector, and, specifically, that of semiconductors. The current global shortage in semiconductors makes essentially all GVCs much more timely and costly. Products from cars to anything technological rely on the availability of semiconductors, and countries have become aware of ensuring they have access to semiconductors.[95] Governments are increasingly implementing protectionist policies to ensure their technological innovations. By employing protectionist policies, countries try to use restrictions such as tariffs to boost their own industries.[96] This means they are trying to ensure an advantageous economic advantage in their access to technological developments and limit other countries from buying that knowledge and technology from them. How governments use such industries and trade policies to their competitive advantage also relates to the trend discussed a little further below: that of the weaponization of trade.

Additionally, there are governments who instead opt for a strategy known as Import Substitution Industrialization (ISI). ISI is focused on reducing the dependence of a country on imports, and thus aims to develop domestic markets so as to produce products that would otherwise be imported.[97] This policy was very popular in the 1950s to 1970s, especially in Latin America and East Asia. Nowadays, African countries are increasingly voicing their discontent with their economic dependence on China and European countries. Increasingly, African economic policies are implemented so as to move away from agriculture and move more toward manufacturing and services.[98] This also ties in with the trend seen in international trade, that countries and companies want to be less dependent on one another.

Since 2018, the China–U.S. Trade War is an example of how protectionism and awareness of the dependency on imports from other countries come together. Under instruction from former U.S. President Donald Trump, the U.S. introduced a wide range of products from China, making these more expensive and less appealing to U.S. customers. This was done in order to reduce what Trump perceived as the dependence of the U.S. on China.[99] Additionally, this trade war can also be seen as the prime example of the second trend: the weaponization of trade. Countries are aware of their interdependence on trade.

95. C. Baraniuk, "Why is there a chip shortage?" in BBC News. August 27, 2021, viewed on December 9, 2021, https://www.bbc.com/news/business-58230388.
96. BBC News, "Trade wars, Trump tariffs and protectionism explained," in BBC News. May 10, 2019, viewed on January 7, 2022, https://www.bbc.com/news/world-43512098.
97. D. Irwin, "The rise and fall of import substitution." Peterson Institute for International Economics, Working Papers, 20–10, July 2020.
98. The Economics, "How manufacturing might take off in Africa," in The Economist. Novem-ber 6, 2020, viewed on December 9, 2021, https://www.economist.com/middle-east-and-africa/2020/06/11/how-manufacturing-might-take-off-in-africa.
99. BBC News, "Trade wars, Trump tariffs and protectionism explained," in BBC News. May 10, 2019, viewed on January 7, 2022, https://www.bbc.com/news/world-43512098.
100. A. Reinsch, "Weaponizing Trade," in Center of Strategic & International Studies. December 7, 2021, viewed on December 9, 2021, https://www.csis.org/analysis/weaponizing-trade.
101. Ibid.
102. E. Zalan, "EU plans new trade defence tool to deter economic coercion," in EU Observer. December 9, 2021, viewed on January 7, 2022, https://euobserver.com/world/153761.

However, certain trade sectors can be, when effectively used, turned into a weapon that can severely damage another nation's economy. For this reason, senior advisor of the Center of Strategic & International Studies, William Alan Reinsch, defines the weaponization of trade as "using trade as a tool of foreign policy rather than as an economic goal in and of itself."[100]

The weaponization of trade can take place by introducing sanctions (which prohibits parties from country A from selling and/or buying specific products from country B) or tariffs (which make products from country B more expensive and thus less appealing to customers from country A). According to Reinsch, there are two future trends visible with regard to the weaponization of trade:

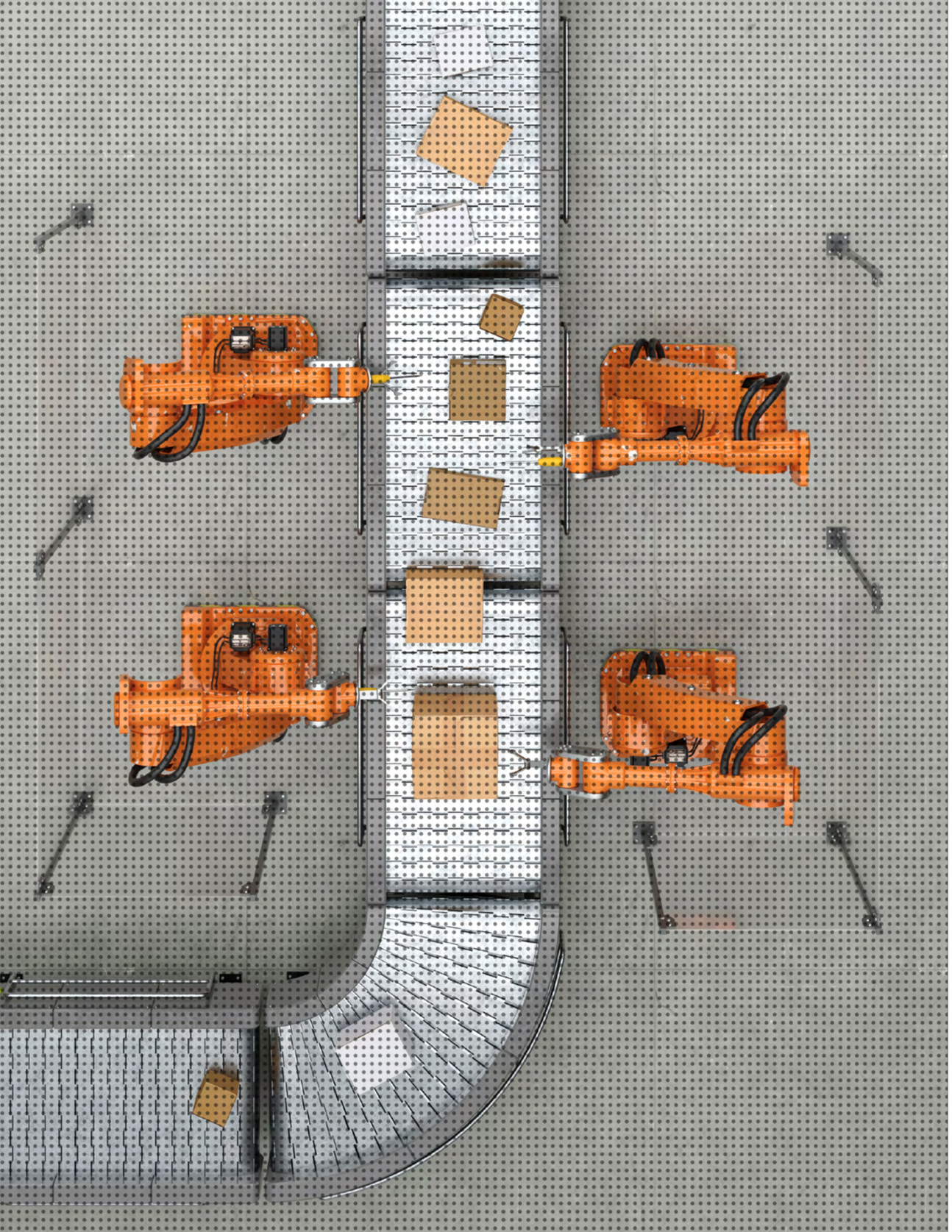
> The particularization of sanctions means that a sending country (those implementing the sanction) can target very specific industries of the receiving country (those that are attacked).

The weaponization of trade is taken to new heights, meaning that countries are becoming extreme in their reasons for introducing trade restrictions, as well as using much more extreme policies.

These will result in the erosion of the trade principles created globally after the World Wars, and it means that countries will interact differently in economic terms with one another. Such an example is already visible nowadays: when Australia demanded an independent international analysis of the origins of Covid-19, China responded with trade restrictions and prohibited the import of Australian coal.[101] Additionally, this also means that countries and international institutions are looking for different ways to protect themselves against such economic attacks. The EU announced that it has plans to create a new trade defense tool to counter economic coercion by third parties.[102] Such current policies and plans to expand the weaponry of economic tools show that the weaponization of trade will increase in the future.

5. the labor market

Many graduating young professionals experience anxiety concerning job security and the opportunity to pursue one's passion. Looking toward the future, many



103. J. Hagel, J. Schwartz & J. Bersin, “Navigating the Future of Work”. Deloitte Review, No. 21, July 2017, pp. 1–22.
104. S. Lund et al., “The Future of Work After COVID-19”. in McKinsey Global Institute. Febru-ary 2021, viewed December 8, 2021. https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19
105. M. H. Jarrahi, “Artificial Intelligence and the Future of Work: Human-AI Symbiosis in Organ-izational Decision Making”. Business Horizons, vol 61, July-August 2018, pp. 577–586.

have continued to doubt the security of their careers as the characteristics of our labor market are constantly changing. From the occupational stereotype of an office desk and hours of wearing uncomfortable suits, the future of the labor market expands the confines of the office to the digital sphere, distinguished by greater flexibility and connectivity. Say goodbye to being stuck in traffic at the break of dawn and hello to online virtual meetings, technological innovations, and a more diverse workforce. The future of our labor market holds promise for more opportunities than ever before.

5.1 the future of work

Covid-19 has provided an insight into the future of work. Many have lost their jobs while others are rapidly adjusting to working from home as their offices are closed. For a long time, the confines of an office defined how we conducted our occupations. However, our perception of work is quickly being redefined from the traditional nine-to-five and into a profession with greater flexibility and opportunities within the digital sphere. Hence, the future of work will simply not be the same. Key forces of change in technological developments will influence the demand for professionals and how we interact within society. Nevertheless, the implications for individuals and companies are clear: to keep pace with technological advancements, upskilling and training are necessary for complementing the future of work with machines.[103] Together, they will play an influential role in improving organizational decision-making, increasing supply-chain efficiency, and promoting productivity.

The key forces of change are highly influenced by technological advancements. The emergence of digitalization and AI along with Covid-19 has hastened technological adoption, especially in work areas with high physical proximity.[104] For a long time, AI technology has been recognized for its data analysis potential due to its superior quantitative, computational, and analytical capabilities.[105] In the future, AI is likely to play an essential role within the digital value chain as it matches skills to employers, capital to investors, and consumers to suppliers. In relation to organizational decision-making, AI can help process, analyze, and evaluate large amounts of data, which will then be used to understand the key strengths and weaknesses of the business. Within the

office, AI promises a significant impact for businesses identifying the talent they need.[106] Alone, AI promises significant changes in the way businesses make important decisions, in the talent that they attract, and in the automation of specific tasks.

In terms of our day-to-day lives, the confines of the office will likely expand to our homes. Remote work and virtual meetings are likely to continue and be a common practice for multinational companies. Meanwhile, the availability of certain jobs is likely to change as well. Workers in food services, customer sales, service roles, as well as less-skilled office support roles are likely to see their jobs disappear. As a result of automation, middle-wage occupations in manufacturing and some office work face the same reality.[107] On the other hand, demand for workers in healthcare-related occupations will continue to grow, with increased attention to health, rising population age, and availability of new technologies.[108] According to current trends, managers and business and legal professionals are likely to stay. This underlines a future trend that we are likely to see: as compared to before the Covid-19 pandemic, as many as 25% more workers may need to switch occupations. [109] Given these facts, it is apparent that the concentration of job growth in more skilled occupations, retraining, and upskilling are necessary to complement the future of work with machines. +

Lastly, the nine-to-five job will likely be eliminated as companies and professionals seek out greater meaning and relevance in what they do. Traditionally, society has grown used to a fixed occupational identity where a person's occupation defines who they are. This is illustrated best by the ubiquitous question, "What do you do for work?" For many, occupations are temporary, not permanent. Research suggests that people work in over ten or more jobs across multiple industries across their lifetimes.[110] Hence, how can individuals define themselves by what they do if they are continuously switching jobs? As a result, in recent years, greater emphasis has been placed on young professionals to connect to the motivation that comes from purpose. More importantly, many continue to search for occupations through which they can build on their creativity and identify their passions. Hence, many firms have started to communicate corporate purpose and values effectively. By building and maintaining trust with employees and society as a whole, corporate purpose/values have become a fundamental requirement for many companies.[111] Furthermore, purpose-driven businesses are not only able to bring purpose to their employees but also distinguish themselves from competitors with improved consumer retention and engagement. For example, Unilever's twenty-eight "sustainable living" brands (which focused on reducing the brand's environmental footprint and increasing social impact) delivered 75% of the company's growth and grew 69% faster on average than the rest of its business in 2018.[112] Thus, in stating future trends for the future of work, it is important to highlight the effectiveness of purpose as a core differentiator and the power in passion. + + +

+ Anne Clerx
The Covid-19 pandemic has probably greatly accelerated this development. I wonder if we would have ever reached the current remote work and virtual meetings levels if the pandemic had not existed.

106. PricewaterhouseCooper, "Workforce of the Future," in PWC, May 2018, viewed on De-cember 9, 2021. https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf
107. S. Lund et al., "The Future of Work After COVID-19," in McKinsey Global Institute. Febru-ary 2021, viewed December 8, 2021. https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19
108. OECD, "What is the Future of Work," in OECD, August 2020, viewed on December 12, 2021. https://www.oecd.org/future-of-work/#ensuring-job-quality
109. World Economic Forum, "Preparing for the Future of Work," in World Economic Forum System Initiative on Education, Gender and Work, June 2020, viewed on December 12, 2021. https://www.weforum.org/projects/future-of-work
110. A. Griffin, "The Future of Work is Rooted In Purpose," in Forbes, September 2019, viewed on December 12, 2021. https://www.forbes.com/sites/alisongriffin/2019/09/16/the-future-of-work-is-rooted-in-purpose
111. PricewaterhouseCooper, "Workforce of the Future," in PWC, May 2018, viewed on De-cember 9, 2021. https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf
112. D. O'Brien et al., "Purpose is Everything," in Deloitte, October 2019, viewed on December 12, 2021. https://www2.deloitte.com/us/en/insights/topics/marketing-and-sales-operations/global-marketing-trends/2020/purpose-driven-companies.html
113. S. Zahidi et.al, "Future of Jobs Report 2020," World Economic Forum Chapter 2 "Forecasts for Labour Market Market Evolution 2020-2025," in World Economic Forum, October 2021, viewed on December 12, 2021.
114. Ibid.

+ Camera Ford
This is very interesting research! It brings to mind Rob Hopkins' book "From what is to what if: unleashing the power of imagination to create the future we want." Hopkins' message is that society needs to rekindle its collective imagination to build a better future. Around the world, people and communities are tapping into the power of imagination and free play as a way to connect back to the natural world and nurture collective health and mental freedom. I can imagine that this desire to be creative and identify passions and professional purpose stems from a similar urge to feel more alignment in one's work life. The shifting landscape of the work world could give opportunities to place more emphasis back on developing intuition and imagination at all stages of life rather than forcing people to mold themselves to fit whatever a restrictive job market requires of them.

+ Pieter Hemels
Recently, ftrprf did an intensive study on 'work in 2030' in the Netherlands (when you read Dutch and want to have the survey, send a mail to info@ftrprf.com, and we'll make sure you get the 200-page book). Interpreting 20 big influencers of work in the coming decade (like 'aging,' 'flexibilization,' 'social security,' and 'opportunities equality'), we developed four scenarios on the future of work, defined by two significant uncertainties: the access to welfare & the impact of technology. The way we organize these two (individually or collectively, focusing on efficiency or participation) will have a tremendous effect on the way of working and society as a whole.

+ Line Gammelgaard Jensen
It is one thing to communicate about purpose and values; it is another thing to actually act it out and make it part of the entire company/organization. From past experiences, I've seen a disconnect between the two.

+ Line Gammelgaard Jensen
As our work moves more and more from the office to our homes, it brings new challenges to work-life balance. It can be difficult to really switch off work when working from home, and, therefore, the workday often becomes much longer. On the other hand, working from home also brings more freedom to your day and allows you to plan much better. However, it is something to be mindful of.

As Covid-19 continues to affect our daily lives, the future of work is expected to redefine the traditional nine-to-five job to an occupation with flexibility, innovation, and purpose. Despite a high degree of uncertainty, one thing can be promised: the future of work is likely to be different than ever before. +

5.2 emerging and declining skills & jobs

In predicting the next decade, the advancement of technology is expected to be instrumental in the emergence and decline of certain skills and jobs. The resulting set of emerging professions will reflect the adoption of new technologies and increasing demand for innovative productions and services. Employers expect that low-skilled jobs will decline (from 15.4% to 9%) while the adoption of emerging professionals will drive greater demand for green-economy jobs and roles in engineering, cloud computing, and product development (from 7.8% to 13.5%).[113] As a result, the long-term trends from advanced technologies will have a significant impact on labor markets. More importantly, an opportunity to plan and strategize toward a better future for work will unfold.

The threat of these declining jobs comes in the form of the replacement of human labor with machines. Research suggests that by 2025, over 85 million jobs may be displaced by a shift in the division of labor between humans and machines.[114] With regard to professions, it is likely that new technologies will displace jobs with recurring tasks. This includes data entry clerks, administrative and executive secretaries, accounting and bookkeeping

and payroll clerks, accountant and auditors, assembly and factory workers, as well as business services and administrative managers.[115] This is important to note as the reallocation of autonomous tasks from humans to machines is already in motion. Consequently, developing and enhancing human skills and capabilities will be key drivers in occupational retention and development.
In light of future developments, the emergence and retention of jobs come in the form of soft skills and occupations in technological development. In recent years, growing demand has been demonstrated for certain jobs in the technology industry, including data analysts and AI and ML specialists. Nevertheless, the importance of soft skills and human interaction is best demonstrated in the care economy. Here, employers will emphasize key characteristics such as care, critical thinking, and problem-solving skills.[116] Together, they show that roles with a certain aptitude for innovation and human interaction will be critical to their occupational relevancy.

To overcome the effects of technological displacement, governments and organizations need to invest in upskilling opportunities and provide greater avenues for job transition. On average, research suggests that 40% of workers will require reskilling for six months or less.[117] Nevertheless, through focused efforts, these individuals could acquire and master essential skills to excel within a new industry.[118] In light of our transition to the future, leaders should encourage life-long learning and allow their employees to demonstrate their potential.

5.3 work and demographics

Looking ahead, the demographic of participants in the labor market is likely to shift. With increasing trends toward an aging workforce, technological demand, and international migration, it is important to note that the range of goods and services currently available will be tailored to the changing needs of society. Nevertheless, such rapid advancements mean that there will likely be jobs and careers available for you and your children that have not yet been considered but that offer real opportunities for everyone in the future.

By 2030, it is estimated that there will be at least 300 million more people aged sixty-five and older than there were in 2014. As people age, their spending patterns

115. Ibid.
116. Ibid.
117. Ibid.
118. World Economic Forum, "Preparing for the Future of Work," in World Economic Forum System Initiative on Education, Gender and Work, June 2020, viewed on December 12, 2021. https://www.weforum.org/projects/future-of-work
119. United Nations Department of Economic and Social Affairs, Population Division, "World Population Ageing 2019," in United Nations ST/ESA/SET.A/44, 2020, viewed on December 12, 2021.
120. James Manyika et.al, "Jobs lost, jobs gained: What the future of work will mean for jobs, skills and wages," in McKinsey Global Institute, November 2017, viewed on December 12, 2021. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages
121. UK Commission for Employment and Skills, "The Future of Work: Jobs and skills in 2030," Evidence Report no. 84, February 2014, pp. 1–198.
122. James Manyika et.al, "Jobs lost, jobs gained: What the future of work will mean for jobs, skills and wages," in McKinsey Global Institute, November 2017, viewed on December 12, 2021. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages

+ Pieter Hemels
What often remains underexposed in the discussion about a rapidly aging society is that in the coming decade, there will be three movements co-occurring in Europe:

1. The number of retirees is rising fast
2. The number of workers between the ages of 45 and 65 is decreasing and,
3. The number of workers between the ages of 25 and 65 is increasing rapidly.

The latter point is at least as relevant as the first point. In 2030, most of the working population will consist of generations Y & Z, generations far more concerned than their parents and grandparents with sustainability and the future of the planet. They also actively look for purpose in their work and are very aware of the scarcity of labor and, therefore, their value. This offers a particularly positive outlook for purpose-driven organizations that involve young generations in their entire business operations. Sources:

+ Chia-Erh Kuo
I love this short conclusion! Perhaps it's also interesting to look into how the Japanese government has been trying to keep the elderly in the labor market longer to sustain the country's economic competitiveness. A more elderly labor market is believed to benefit countries facing an acute labor shortage. Source:

shift with a more pronounced increase in spending on healthcare and other personal services. Consequently, this is likely to create new demand for a range of healthcare-related occupations, including doctors, nurses, and personal care aides. Additionally, this will put increased financial pressure on old-age support systems. In countries where public transfers are high, including many in Europe and Latin America, aging populations will increase the fiscal pressure on public transfer systems, especially if patterns of taxation and benefits remain unchanged. In countries where public transfers are relatively low, such as many in Southern Asia and South-Eastern Asia, individuals and families face greater pressure to finance their consumption during old age. Therefore, in order to maximize the benefits and manage the risks associated with population aging, governments have shifted their investment toward greater health care access for all.[119] +

Aging will not only procure greater investment in healthcare but will ultimately lead to a more elderly labor market. By 2030, researchers estimate that healthcare and related jobs from aging could grow by 50 million to 85 million.[120] An aging workforce will ultimately lead to a higher retirement age and the likelihood of four-generational working. In other words, younger people will likely enter the workforce while their grandparents, or even great-grandparents, are pursuing careers. It is not surprising that the number of economically active people aged sixty-five and over is projected to increase by one-third over the next decade.[121] Knowing that the future of work will likely consist of the old and young, just remember to say hi to your grandparents when you bump into them at work. +

Shifting our lens toward a global scale, it is likely that a rapidly growing workforce, such as in India, may enjoy a "demographic dividend" that boosts GDP growth. If young people are employed, the combination of bright minds and a motivated labor market will allow companies to cherry-pick top talent and innovate within our technological world. Meanwhile, countries with a shrinking workforce, such as Japan, can expect lower future GDP growth, solely driven by increases in production efficiencies.[122] This shows that the potential of the labor market is influenced by certain trends in communities such as age. This reflects the ability of certain countries to prosper and grow their workforce.

On the topic of an evolving workforce, gender diversity has established profound shifts. In each country within the OECD, gaps in the employment rate between men and women are projected to close by half in 2050.[123] Corporations are likely to tap into the potential of female workers and implement programs to inhibit inclusivity. The ability to build a business that recognizes the value and contribution of workers of all backgrounds has been crucial for prosperous and resilient companies. +

In reflecting on the changing demographics in the labor market, one thing is for certain: there is a positive shift from the concentration of opportunities from the few to the hands of the many. Hence, the future of the labor market will be redefined by diversity, age, and the industries themselves.

Although the future of work may be daunting to many, the future of the labor market holds promise for more opportunities than ever before. Unlike previous industrial revolutions, society has become considerate toward a work-life balance and greater diversity within the workforce. From our need to prioritize a work-life balance to exemplifying great care for our physical and mental health, many have recognized that a competent professional is a healthy professional. Looking toward the future, it is not necessarily a question of "Will machines and advancements in technology replace the number of available jobs?" Rather, it is a question of how society will use technological innovation to improve how it works and derives solutions for the world's most complex problems. + +

6. changing policies — governments' roles in economics

A government can steer the direction of a country's economy through various measures. Changes in policy design often reflect the structural changes we are currently facing. This section discusses the two main aspects of governments' roles in economic activity: central banking and taxation.

+ Chia-Erh Kuo
To foster inclusivity, companies must make meaningful changes. For many, narrowing the gender gap should be the priority. In my observation, a recent international regulatory trend might help us build a more equal workplace. Some governments have started pushing corporations to make their first step: UK companies are already required to publish an annual report containing data on their gender pay gap. In the future, companies employing at least 250 people in the EU will also have to start providing data on wage data. Sources:

+ Elias Sohnle Moreno
This chapter talks extensively (and very well) about job displacement but doesn't consider the potential scenario of net job destruction due to automation. It seems to take for granted that automation will create as many employment opportunities as it replaces. What if automation destroys more jobs than it creates? How could this scenario impact demographics and livelihoods, especially given that the available workforce will grow significantly?

+ Chia-Erh Kuo
Agree! I think automation will likely become a nightmare for vulnerable employment, especially in some labor-intensive industries or developing countries.

123. OECD, "Promoting an Age-Including Workforce: Living, Learning and Earning Longer," OECD Publishing, Paris, December 2021. https://doi.org/10.1787/59752153-en

6.1 central banking

Central banking plays a vital role in macroeconomic and financial stability. Although not all central banks are government agencies or legally owned by governments, as financial institutions, they carry out the nation's monetary policies. Central banks, often regarded as the lenders of last resort, are in charge of the supply of money, and conduct related policies to ensure price stability and the smooth functions of financial markets. The role of central banks is evolving amid the structural changes in financial markets and the real economy.[124]

One trend worth observing is the emergence of CBDCs, which are the virtual form of government-issued currencies (fiat currencies). The idea of promoting such digital currencies is closely linked with the waves of digitalization. The rising need for non-cash payments worldwide has pushed central banks to rethink the forms of government-issued currencies. The system design of CBDC would likely vary between jurisdictions as central banks make choices that best suit their own circumstances. Common considerations include continued access to central bank money, resilience, a diversity of payments, an encouragement of financial inclusion, and improving cross-border payments.[125] +

A group of seven central banks — the Federal Reserve, the European Central Bank, the Bank of Canada, the Bank of England, the Bank of Japan, Sveriges Riksbank, and the Swiss National Bank — has been working with the Bank for International Settlements to explore the potential of CBDCs. Many other central banks have also shown interest in the digital version of fiat currency. Since the end of 2020, more than 80% of central banks globally have been engaged in studying CBDC; some of them have progressed past conceptual research to experimenting and running pilots.[126]

Among central banks, the People's Bank of China has been spearheading work on the digital version of the Chinese yuan, known formally as the digital currency electronic payment (DCEP), with real-world trials in major cities including Shenzhen, Beijing, and Shanghai. It is expected that the digital yuan could reach 1 billion addressable users in ten years, 1.6 trillion yuan ($229 billion) in issuance, and account for 15% of total consumption payments.[127]

+ Elias Sohnle Moreno
I consider that central banks are entering the digital currency arena as a response to the threat to the central banks' control over money circulation caused by the adoption of cryptocurrencies.

124. T. Koss, "What is the role of the central bank of the future," in EY. June 22, 2021, viewed on December 1, 2021, https://www.ey.com/en_gl/eu-institutions/what-is-the-role-of-the-central-bank-of-the-future
125. The Bank for International Settlements (BIS), "Central bank digital currencies: system de-sign and interoperability," in the BIS. September 2021, viewed on December 1, 2021, https://www.bis.org/publ/othp42_system_design.pdf
126. The BIS, "Central bank digital currencies: motives, economic implications and the research frontier," in the BIS. November 4, 2021, viewed on December 1, 2021, https://www.bis.org/publ/work976.htm
127. Coindesk staff, "Goldman Sachs Expects Digital Yuan to Reach 1B Users Within 10 Years," in Coindesk. November 20, 2020, viewed on December 1, 2021, https://www.coindesk.com/policy/2020/11/19/goldman-sachs-expects-digital-yuan-to-reach-1b-users-within-10-years/
128. S. Dikau & U. Volz, "Central Banking, Climate Change, and Green Finance," in Asian De-velopment Bank Institute. September 2018, viewed on December 1, 2021, https://www.adb.org/publications/central-banking-climate-change-and-green-finance
129. Network of Central Banks and Supervisors for Greening the Financial System (website). viewed on December 1, 2021, https://www.ngfs.net/en/about-us/membership
130. G. Boehl, G. Goy & F. Strobel, "The Federal Reserve and quantitative easing: A boost for investment, a burden on inflation," in VoxEU. August 30, 2020, viewed on December 1, 2021, https://voxeu.org/article/feds-quantitative-easing-boost-investment-burden-inflation
*Source: https://www.investopedia.com/terms/q/quantitative-easing.asp)

Another trend in central banking is green finance. In addition to ensuring financial and macroeconomic stability, central banks could also play an active role in enhancing sustainable finance. Through their regulatory oversight and regulatory tools over the financial system, central banks are considered to be in a powerful position to support the development of green finance models, enforcing adequate pricing of environmental and carbon risk by financial institutions.[128] Against this backdrop, central banks have been teaming up to enhance the financial system's role in managing risks and mobilizing capital for green and low-carbon investments, through the establishment of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS).[129]

Aside from digital fiat currencies and green finance, it is worth monitoring how monetary policies would be implemented in the future, as well as the macro effects of those policy tools. In response to an unprecedented economic recession caused by the pandemic, central banks in many countries have adopted expansionary approaches to stimulate economies. Theoretically, quantitative easing (QE) — a form of unconventional monetary policy in which a central bank buys government bonds from the market — could encourage spending and investments. However, those massive money-printing schemes come at a cost, the risk of inflation. Tradeoffs created by the sustained use of QE are still open to debate.[130]

According to Investopedia "quantitative easing (QE) is an unconventional monetary policy in which a central bank purchases longer-term government bonds from the open market. Buying these securities adds new money to the economy (increasing the money supply), and serves to lower interest rates by bidding up fixed-income securities. The main objective of these actions is to encourage spending and investments in businesses."*

Going forward, central banks are bound to face a set of structural changes. Beyond financial sustainability, central banks are expected to have a growing role in addressing challenges brought by digitalization and the carbon transition. To deal with the uncertainties ahead, central banks must be ready to adapt to the changing nature of payments and the real economy.

6.2 taxation — the economic and social side

Taxation reflects the changing landscape in our daily economic activities. Taxation is not simply a major source of government revenue for providing public goods; it also plays an active role in resource allocation, such as mitigating income inequality and mobilizing investments in certain sectors. Since the economic sector constantly changes, tax authorities have to tackle a number of new challenges.

One upcoming challenge is how to design fair taxation in a globalized world. As cross-border services continue to evolve around the globe, there is rising concern about how new ways of doing business, such as the digital economy, may result in a relocation of core business functions and a different distribution of taxing rights.

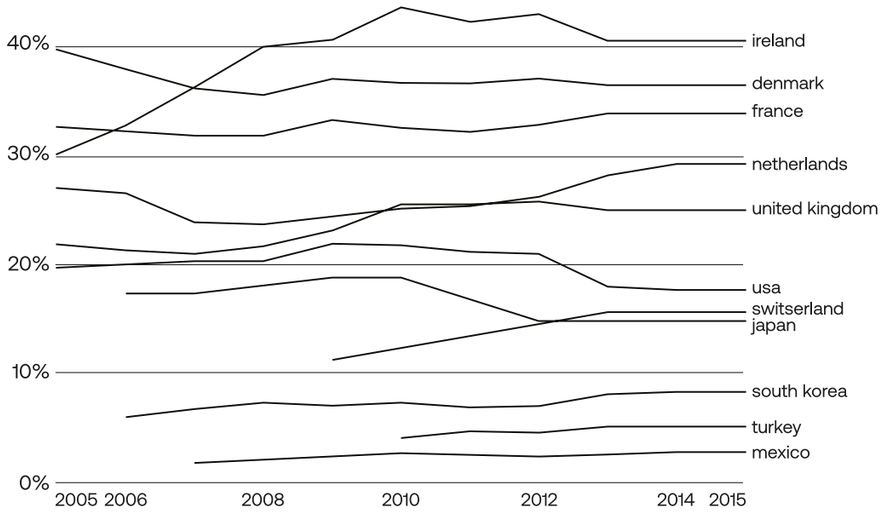
Traditionally, a local physical presence is often required if a company plans to expand businesses in a new market jurisdiction. Earnings from those in-country operations are subject to tax in the market country. However, advances in data technologies and business practices have allowed multinational corporations to centrally manage their business at their headquarters, with a less physical presence needed in overseas markets. This significant change has posed challenges for international taxation; data compiled by the OECD shows that $240 billion is lost annually from tax avoidance by multinational companies. In light of these concerns, the Base Erosion and Profit Shifting (BEPS) Action Plan was established to equip governments with domestic and international instruments to address tax avoidance.[131] The recently signed global minimum tax is an exciting move in the development of global tax reforms. A total of 136 countries, accounting for over 90% of the global economy, inked a historical deal aimed at ensuring companies pay a minimum tax rate of 15%, as part of the two-pillar solution under the BEPS. It is estimated that this minimum tax could generate $150 billion in additional global tax revenues annually.[132]

Another challenge for tax authorities is how to redefine the role of tax in post-Covid economic recovery. As the pandemic has turned into a human and health crisis, which deepens inequalities worldwide, tax-design discussions have moved toward a relatively broad focus on the link between taxation and inclusive economic

131. OECD, “Addressing the Tax Challenges of the Digital Economy,” in OECD. September 16, 2014, viewed on December 5, 2021, https://doi.org/10.1787/9789264218789-en
132. OECD, “International community strikes a ground-breaking tax deal for the digital age,” in OECD. October 8, 2021, viewed on December 5, 2021, https://www.oecd.org/tax/international-community-strikes-a-ground-breaking-tax-deal-for-the-digital-age.htm

tax reduction in income inequality[131]

percentage reduction in Gini coefficients before and after taxes and transfers



growth. Given the redistributive capacity of the tax system, tax policy can enhance equity by narrowing income and wealth gaps.[133] In addition, tax policy could play a role in steering investment and consumption choices in support of low-carbon alternatives. Many jurisdictions are already working to address climate-related risks and create incentives for businesses and individuals by using tax tools. For example, several tax-policy options have been discussed as part of the EU Green Deal, such as carbon excise tax, carbon border tax, and plastic tax.[134]

Some have argued that carbon pricing could be implemented as a core tool of a green tax-policy framework to foster decarbonization. Those investments, in return, could make a significant contribution to public finances by generating tax revenues.[135]

Looking forward, the challenge for tax authorities is to achieve both economic and social objectives, taking into account side effects that might last for generations. Structural trends, such as digitalization and rising inequalities, are pushing policymakers to reconsider the relationship between tax design, economic growth, and sustainability. +

+ Elias Sohnle Moreno
AI is improving the skills that we thought were unique to us, like creativity, empathy, etc. Could the emergence of Artificial General Intelligence (AGI) truly make humans obsolete? Even if it is highly speculative, can our welfare systems guarantee decent livelihoods for the majority of people if they become idle over the course of the next century?

133. OECD, "Tax and fiscal policies after the COVID-19 crisis," in OECD. October 14, 2021, viewed on December 5, 2021, https://www.oecd.org/coronavirus/policy-responses/tax-and-fiscal-policies-after-the-covid-19-crisis-5a8f24c3/#section-d1e937
134. KPMG, "Carbon Border Adjustment Mechanism (CBAM): Tax measures in EU Green Deal," in KPMG. Viewed on December 5, 2021, https://home.kpmg/xx/en/home/insights/2021/06/carbon-border-adjustment-mechanism-cbam.html
135. OECD, "Green budgeting and tax policy tools to support a green recovery," in OECD. Oc-tober 9, 2020, viewed on December 5, 2021, https://www.oecd.org/coronavirus/policy-responses/green-budgeting-and-tax-policy-tools-to-support-a-green-recovery-bd02ea23/

7. economic change — what's heading our way?

This chapter has outlined trends and changes concerning economics. Important changes as a result of, for instance, technological developments and sustainability concerns are very likely. Due to current circumstances, some changes expected to happen ten years in the future have already started evolving.

This chapter touches upon many different stakeholders, from individual consumer preferences to company interests, governmental decisions, and the global system. Yet, none of these are completely separate from the other. Greater automation and sustainable business approaches will drive the future of production. This is also in response to the changing behavior of consumers, who demand more and more sustainable and future-proof options. Such developments in production and consumption will also directly influence international trade and government policies.

Additionally, the rise of cryptocurrencies adds to both new opportunities and new risks for the future of economic systems. An aging labor force and progress in automation will change the way people and technology cooperate in the production and service sectors. Governments are very much included in all these changes, and their policies will directly impact how much society can benefit from new economic opportunities. This leaves one to wonder about the future of economies. Which other unexpected changes are upon us? Which role can new technologies play in your work?

cash. cards. cryptocurrencies. looking into the future, how will money evolve and change our economies?

introduction

economics

socio-cultural

politics

ecology

technology

demographics

conclusion

well-being
media & entertainment
purpose & spirituality
social standards
socio-cultural change

The world is constantly changing and so is society. Culture, cultural norms, and institutions need to change over time in order to stay dynamic. A static society would be considered a dead one. The description “socio-cultural” refers to anything related to social and cultural factors such as social standards, common traditions, habits, patterns, beliefs, the well-being of a society, and the arts. The change within these social and cultural factors is known as socio-cultural change. What happens is that, over decades, new ideas and traditions are added to different cultures. At the same time, society needs to adapt to new inventions and a new environment, leading to more socio-cultural change. In this chapter, some changes that are characteristic of this day and age are discussed.

To start off, this chapter will focus on the impact the future will have on society’s and individuals’ well-being. Questions such as “Will everyone in the future converse through Internet communities?” and “Will everyone be joined by a robot to alleviate loneliness?” will be answered by diving into the topics of social cohesion, the influence of future developments on society, and how change will influence an individual’s satisfaction, and desirable condition.

Following that, the chapter will dive into the future of media and entertainment. Will we be living in the metaverse? And how can we combat the challenge of “fake information?” In this section, the power shift to digital and how society will adapt will be discussed. Trends such as a decline of trust in media and the creator economy are touched upon.

After showing how digital our future will be, the importance of purpose and the change in spirituality and religion are mentioned in the third subtopic. Purpose and spirituality have always been important aspects of society, but what will these look like in the future?

Lastly, we discuss social standards. Individuals and organizations, as well as society as a whole, have absorbed societal norms about what people are expected to do. This topic focuses on the current urgent societal norms that are developed under ever-changing manmade social systems that can obstruct one’s ability to fully express one’s potential in society.

136. I. Kawachi & L. Berkman, “Social cohesion, social capital, and health,” Social Epidemiology, 2015, p. 174–190.
137. C. Botticello, “105 Online Community Stats to Know: The Complete List (2021), in Peerboard. Updated on October 25, 2021, viewed on November 29, 2021, https://peerboard.com/resources/online-community-statistics
138. Ibid.

1. societal & individual well-being — living happily ever after

Will everyone converse through Internet communities in the future? Or be joined by a robot to alleviate loneliness? This section attempts to answer these questions. The future of human well-being is crucial, and it will alter dramatically over the next few years. Imagine instead of going to a real-life party, you meet online in the Metaverse. This will affect the well-being of not only groups but also individuals. As a result, this section focuses on both societal and individual well-being. The primary focus of societal well-being will be social cohesion and how future developments will influence society as a whole. The discussion of individual well-being, on the other hand, will concentrate on how changes influence an individual’s satisfactory, and desirable condition.

1.1 a healthy community — societal well-being

Online communities — Social cohesiveness, defined as the strength of links and a sense of solidarity among members of a community, is a significant indicator of societal well-being.[136] With the current and upcoming developments in the world, the cohesiveness of societies is changing. One of these developments is the rise of online communities. Globally, 76% of Internet users are participants in an online community.[137] Online communities are seen as one of the most successful methods for businesses, consumers, workers, and individuals in certain sectors to interact with each other.

As a consequence of the Covid-19 pandemic, online communities became even more significant. An example of an online community is a Facebook group. Nowadays, there exist more than 10 million Facebook groups with 1.8 billion users who engage in them. In 2020, the world’s population was estimated to be 7.7 billion people, which implies that over a quarter of the world’s population is a member of a Facebook group.[138] This number will grow in the upcoming years.

Why are these groups so important? People feel a sense of belonging and togetherness when they are part of a

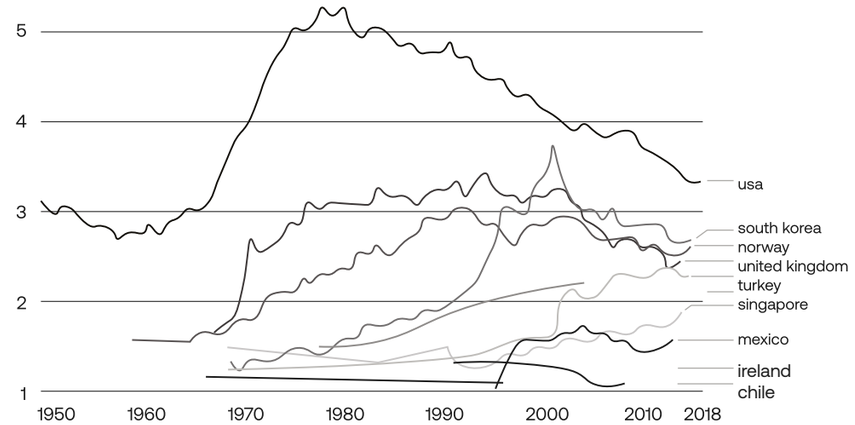
community. With the arrival of the Internet, face-to-face communities were replaced and supplemented with online communities. People may meet others online who have similar interests, at their own speed, regardless of where they are or the physical limitations they face. Relationships are built directly or indirectly with known or unknown individuals. Online communities have social purposes but also serve as important tools for economic purposes. Decentralized autonomous organizations (DAO) are examples of this. As a result of the Covid-19 pandemic, decentralized finance was pushed further into the mainstream as individuals sought alternative methods of earning money. DAOs are online communities that regulate capital to achieve shared goals. They have been reimagined with sophisticated tooling and collaborative approaches, enabling hyper-cooperation among groups, although they are still in the early phases of development.[139]

As numerous opportunities arise through the use of online communities, challenges arise as well. Individuals might have tunnel vision. Algorithms and grouping with people who share the same interests may lead to people focusing on a single point of view on particular issues. This has a detrimental impact on social cohesiveness because as more individuals exclusively associate with those who share the same beliefs, less mixing occurs and more people become antagonistic to one another, which affects social cohesion.

Another expected change for online communities is the launch of virtual reality worlds like the Metaverse.[140] The Metaverse is a combination of apps and technology that will assist individuals in connecting, finding communities, and growing enterprises in a visual way. Instead of connecting through Google Meet, for example, people will see each other in a virtual world that is similar to the physical world. What if everyone ends up living in these virtual worlds and limits their face-to-face interactions? There is a possibility that limiting face-to-face contact and the rise of online communities could have implications for societies. Imagine going to a party in the Metaverse instead of going there in real life. This is way different than meeting new people in real life. For some, it will lead to more opportunities, but others might suffer. So, on the one hand, the rise of the Internet and online communities allows individuals to become more connected to the world. On the other hand, researchers

139. M. O'Rourke, "The Future is DAO: How Are Online Communities Evolving?" in Cryptonews, October 26, 2021, viewed on December 29, 2021, https://cryptonews.com/exclusives/the-future-is-dao-how-are-online-communities-evolving.htm
140. Meta, "Introducing Meta: A Social Technology Company," in Meta. October 28, 2021, viewed on November 29, 2021, https://about.fb.com/news/2021/10/facebook-company-is-now-meta

divorces per 1000 people[143]



argue that offline communities are necessary for engagement in online communities. Members' online social bonds cannot be maintained without robust offline contacts. Both online and physical contacts should help community members feel more connected and encourage them to share information.[141] So, even though the Internet creates opportunities for many people, there is a risk that it will push people further away from those who they are already in close contact with.

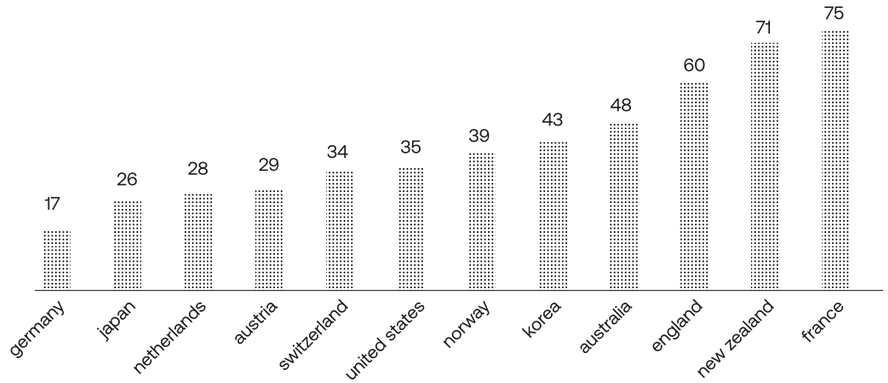
Marriage, family structure, and the rise of the individual — Another development that will affect societal well-being involves changes to family structures. Relationships are important for physical health and well-being, and individuals often seek support in their close communities. However, the typical family unit of parents with children is becoming less common. For instance, the stereotype of being single is changing in multiple countries mostly around the Western World, which can also be described as the rise of the individual. More and more people are voluntarily choosing to live alone. Priorities are changing, which influences individuals' decisions about being in relationships. People are willing to follow a more independent lifestyle than in the past, and this will probably grow in the future. Socioeconomic progress is a major predictor of a country's rising individualistic habits and ideals through time. Increasing individualism leads to outcomes such as a high number of divorce rates globally.[142]

Marriages are becoming less common nowadays, on a global level. Access to education correlates with higher divorce rates and lower marriage rates. Historically, women have had fewer opportunities to access education; nowadays, female education is increasing and empowering women.[144] One result of higher divorce rates is the emergence of single-person households. This form of household is expected to grow faster than any other type, with approximately 120 million new single-person households added globally by 2030.[145] These changes have an impact on social connectivity, and, thus, also on well-being. When individuals live alone, new issues emerge in connecting people and providing help to those who live alone, particularly in poorer nations where communication technologies are less developed and welfare governments are weaker.[146] Furthermore, according to researchers, single-person households have the lowest levels of life satisfaction of any household form. They are more likely to rent, have

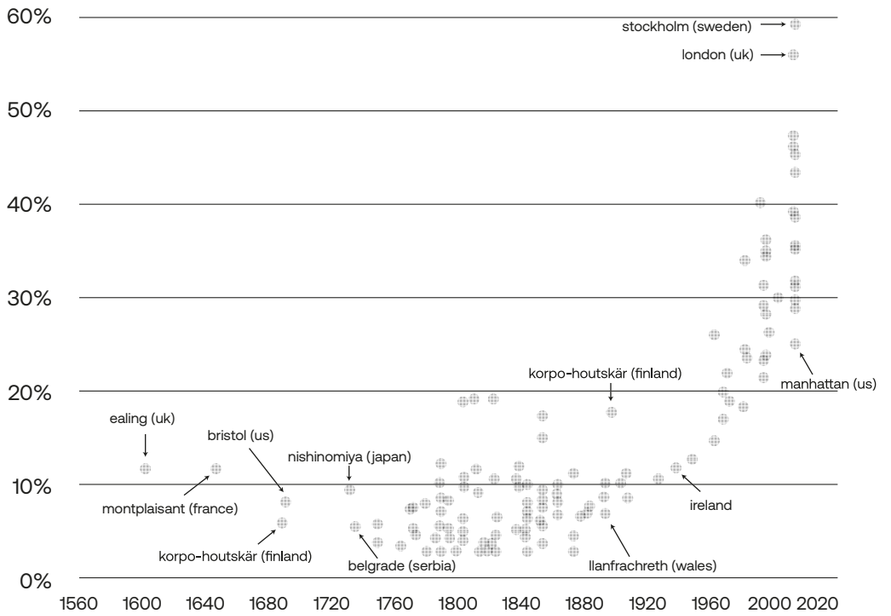
141. G. Panit, V. B. Hoo & N. Sa'ait, "Online, Offline Activities and Attitude of Virtual Communities," Asian Journal of Behavioural Science, Volume 3, Issue 2, June 6, 2021, p. 23–37.
142. E. Ortiz-Ospina & M. Roser, "Marriages and Divorces". Published online at OurWorldInData.org, 2020, https://ourworldindata.org/marriages-and-divorces#divorces-by-age-and-cohort
143. Ibid.
144. M. Chen, E. L. Rizzi & P. S. F. Yip, "Divorce trends in China across time and space: an update". Asian Population Studies, vol. 17, 2021, pp. 121–147.
145. Euromonitor International, 2021, viewed on December 29, 2021, https://go.euromonitor.com/rs/805-KOK-719/images/wpGCT2019-v0.5.pdf
146. E. Ortiz-Ospina, "The rise of living alone: how one-person households are becoming increasingly common around the world," published online at OurWorldInData.org, December 10, 2019, viewed on November 30, 2021, https://ourworldindata.org/living-alone
147. D. Ivanova & T. Jack, "The Sustainability Implications of Single Occupancy Households," Buildings & Cities, February 9, 2021, https://www.buildingsandcities.org/insights/commentaries/sustainability-single-households.html
148. Euromonitor International, 2021, viewed on December 29, 2021, https://go.euromonitor.com/rs/805-KOK-719/images/wpGCT2019-v0.5.pdf
149. Ibid. p. 46

one-person households[148]

projected % increase in numbers of one-person households in selected OECD countries, from early 2000s to 2025-2030



the rise of one-person households[149]



greater housing expenditures, and have fewer savings, resulting in worse financial stability.[147]

Many of the aforementioned changes have been linked to greater rates of poverty and social exclusion. Primarily, poverty is more likely in smaller households, households led by women and the elderly, and immigrant families.[150] Poverty has been shown to have a deleterious influence on children's lives, with childhood poverty affecting a range of adult outcomes. Because social cohesiveness is linked to social inclusion, which emphasizes equitable chances for all, this is a development that will have a big impact on social cohesion in the future. Poverty may cause young people to stay in school longer and make transitions into the labor market riskier, which might lead to falling out of society and losing a sense of belonging.[151]

1.2 a healthy self — individual well-being

What about people's own well-being? This section will investigate changes that have an impact on a person's well-being. Promoting a population's mental well-being should have an additional economic advantage from a governmental perspective. According to research from Denmark, each increase in a population's mental well-being is linked to decreased health and social care expenses the following year.[152] Furthermore, for a country's long-term economic growth and ability to endure future crises, a social protection system is essential. According to an analysis by the Boston Consulting Group, countries with higher levels of well-being are less affected by crises. When an unexpected incident occurs, well-being may act as a "stabilizer," allowing a country to absorb and recover more swiftly from shocks.[153]

Mental health — One of the indicators of well-being is mental health. Mental health conditions and substance use problems have increased by 13% in the past decade worldwide and are expected to increase even more in the future. In fact, currently, suicide is the greatest cause of death among people between the ages of 15 and 29 years old. Additionally, depression is one of the top causes of disability.[154]

With the inclusion of mental health conditions and drug use problems in the Sustainable Development Goals, the relevance of mental health is becoming more widely

150. S. Harkness, "The future for low-income families and social cohesion," The Future of Families to 2030, 2012, viewed on December 29, 2021, https://read.oecd-ilibrary.org/social-issues-migration-health/the-future-of-families-to-2030/the-future-for-low-income-families-and-social-cohesion_9789264168367-4-en#page2
151. Ibid.
152. Z. I. Santini, H. Becher, Jørgensen, M.B. Davidsen, L. Nielsen, C. Hinrichsen, K. R. Madsen, C. Meilstrup, A. Koyanagi, S. Stewart-Brown, D. McDaid & V. Koushede, Economics of mental well-being: a prospective study estimating associated health care costs and sickness benefit transfers in Denmark. Eur J Health Econ 22, 1053–1065 (2021). https://doi.org/10.1007/s10198-021-01305-0
153. C. Schwaerzler et al., "Economic Resilience Is Built on Societal Well-Being: The Sustainable Economic Development Assessment," in BCG. June 8, 2021, viewed on December 7, 2021, https://www.bcg.com/publications/2021/prioritizing-societal-well-being-seda-report
154. WHO, "Mental health," 2021, viewed on November 30, 2021, https://www.who.int/health-topics/mental-health
155. WHO, "Online games encourage players to stay mentally and physically healthy at home," November 16, 2021, viewed on November 30, 2021, https://www.who.int/news/item/16-11-2021-online-games-encourage-players-to-stay-mentally-and-physically-healthy-at-home
156. Esteban Ortiz-Ospina, "Is there a loneliness epidemic?" in OurWorldInData.org, December 11, 2019, viewed on November 30, 2021, https://ourworldindata.org/loneliness-epidemic
157. J. Pirhonen, E. Tiilikainen, S. Pekkarinen, M. Lemivaara, H. Melkas, "Can robots tackle late-life loneliness? Scanning of future opportunities and challenges in assisted living facilities". Futures, vol. 124, December 2020. https://www.sciencedirect.com/science/article/pii/S0016328720301294

+ Daphne Prieckaerts
I'm happy to learn that there is more focus on mental health in recent times. I'm hoping that new technology will also lead to more consciousness and awareness about the relationship between mental, emotional, and physical health. We cannot see these as separate things.

+ Kim Tan
Such an interesting read! There are also websites (also non-profit) that provide virtual telemedicine services for mental health (most of which are very affordable, others even offer subscriptions such as asktia.com), which I think is very helpful in terms of accessibility and mobility! This also helps many people from countries where mental health is considered taboo; getting help for themselves would be much easier.

recognized. As more people become aware of mental health conditions, more remedies and interventions will be developed that aim to prevent them. With the rise of technology, mental health care has entered a new phase. Technologies such as smartphones and smartwatches are providing the general public, doctors, and researchers with new means to get aid, track progress, and gain better knowledge of mental health. In times of difficulty, some people might be able to contact a crisis center more easily to get appropriate help. Apps also provide new ways of collecting data about people's behaviors. In the future, apps could offer huge potential for people who suffer from mental health problems. +

The World Health Organization (WHO) already shows how technology can help and even try to prevent mental health problems in individuals. As a consequence of the Covid-19 pandemic, the WHO established the *#HealthyAtHome* initiative. Their goal with this challenge is to inspire millions of online gamers to live an active lifestyle and take care of their mental health. The WHO invited game developers to ask their users to participate in the challenge. According to the WHO, games can assist people in taking care of their mental health by decreasing stress, supporting loved ones, and creating and maintaining social ties.[155] This is just one example of a technological intervention that consciously deals with mental health issues. As mental health is seen as increasingly important, probably more companies and organizations will use online interventions in the future to prevent mental health issues or help people who suffer from mental health issues. +

Some people argue that certain Western countries are suffering from a "loneliness pandemic," which fits in with what was previously discussed regarding the trend toward more single-person families.[156] Although there is no real evidence to support this claim, loneliness is an important problem. The increase in life expectancy is, namely, another cause of the rise of single-person households mentioned in the Societal Well-being section. A large proportion of single-person households consist of the elderly. There are already multiple developments to combat loneliness in the elderly. One is the advancement of technology, which offers great potential in overcoming loneliness. Social robots have the ability to alleviate loneliness among the elderly, but also among other age-groups.[157] Social robots are devices that can provide companionship in order to improve psychological well-being. They can communicate

158. J. F. Helliwell, R. Layard, J. D. Sachs, J. De Neve, L. B. Aknin, S. Wang, World Happiness Report, 2021, viewed on December 1, 2021, https://worldhappiness.report/ed/2021
159. Kathleen Rellihan, "7 Lessons Learned from the Happiest Country in the World," in AFAR, March 19, 2021, viewed on December 1, 2021, https://www.afar.com/magazine/7-lessons-learned-from-the-happiest-country-in-the-world
160. Ibid.

in a human-like manner and they may be employed for a variety of functions, such as providing information or serving as a guide. In terms relevant to social loneliness, robots might foster attachment and social integration. Direct contact with social robots might open up new avenues for dialog and meaningful pastimes, which could benefit individuals with cognitive disabilities in particular. Although there are some ethical concerns about these social robots, the possibility exists for every (older) individual to have such a robot at home in the future.

Thinking about the future of well-being raises another question: which country can be seen as an example for living happily and improving well-being? The World Happiness Report from 2021 rated Finland as the happiest country in the world.[158] There are several theories as to what makes Finland the happiest country.[159] Forest therapy is something that is used in Finland, so everyone has the freedom to travel to nature. Forest therapy can be used to treat conditions such as high blood pressure and depression. Additionally, Finland provides an equitable and healthy start in life for all children. They try to combat a decreasing birth rate and increasing infant mortality by providing *baby boxes*. These boxes are filled with clothes and other necessities. Lastly, Finns have a comparatively substantial safety net, which includes low-cost daycare and almost free elementary, secondary, and university education.[160] So, is the well-being economy the future for every country?

2. media & entertainment

Over the past couple of years, a power shift has taken place in the media and entertainment industry, which is expected to continue into the future. Most media and entertainment products have significantly changed over the Covid-19 pandemic to fit into the digital era. Social media has become one of the most prominent products in this industry, leading to new trends such as a decline of trust in the media and the creator economy. Will these trends continue into the future?

2.1 the future of the digital era

This section will discuss the changes in different media industries and what we can expect the future to look like for these industries.

Looking at the movie industry, online entertainment has already stolen the limelight from physical entertainment (DVD, Blu-ray, rentals) which now only accounts for 9% of the total global theatrical and home-entertainment market.[161] However, the question today is whether online entertainment can also diminish the theatrical entertainment industry. The shift from theatrical to digital entertainment started years ago. The pandemic, though, has significantly sped up this power shift. Movie theaters had to close temporarily during the pandemic, affecting their revenues significantly.[162] A number of streaming services from prominent studios emerged and changed the movie industry significantly.[163] ow that movie theaters are open again, it is expected that the consumption patterns are actually here to stay, but normal cinemas are not dead yet. A new normal is expected where the online streaming movie industry can coexist with the traditional theatrical industry. A recent example of the new normal is the movie *Godzilla vs. Kong*, a production of Warner Bros and Legendary Pictures. The movie was simultaneously released in movie theaters and on HBO Max, earning $350 million globally.[164] Warner Brothers also announced in January 2021 that all their upcoming movies that year would be available on HBO Max at the same time as the premieres in U.S. cinemas.[165] According to Forbes, this will be the new model of the movie industry.[166] However, the industry is afraid that consumers will avoid theaters if they can enjoy movies in the convenience of their own homes.[167] A recent study showed that most people who go to the cinema stay loyal to the theatrical experience even when they have the option to watch the movie at home.[168] As a consequence, opening up new digital channels can be seen as an opportunity to reach a new audience instead of a zero-sum market.[169]

New digital channels were also introduced in other media industries, like the book industry. E-books have already been around for quite a while now but have not taken over from print. However, according to research, there is regional variation in preferences.[170] The PWC Global Entertainment & Media Outlook 2021–2025 states: "Regional variation in consumption preferences is significant, with the U.S. seeing strong growth in print, whereas in the U.K., print sales fell and audiobook sales rose by 47% in the first half of 2020. Over the same period, eBook sales grew 18% due to the government's decision to do away with VAT on digital books."[171] Thus, the dominance of print books is dependent on the region examined. Overall, the dominance of print is still expected to continue over the next few years. The same cannot be said about the newspaper and magazine industry, however. With most people reading their news online[172] and sales taking a steep decline over the past years, newsstands have been forced to reinvent their businesses.[173] Research expects a breaking point in 2024 where digital advertising of magazines will overtake print magazines.[174]

Another changing industry is that of music, radio, and podcasts. The consulting firm PWC expects to see a rise in revenue of 8.9% compound annual growth rate (CAGR) in this industry in 2025.[175] Even though they expect Spotify to expand to more than eighty new markets, live music will rebound after the Covid-19 disruption.[176] However, it is expected that live music will take on new forms. Cyril Bahsief, founder and promoter of Octopus (France) said, "It's probably the future: focusing on really tiny events (less than 5,000 people) and work on local artists, local public, local audience, local subsidiaries too. It was a trend that was actually starting before Covid, but we will have an acceleration after this crisis."[177] Physical recorded music sales and digital music downloading are expected to continue their decline with music streaming services like Spotify thriving.[178] Thus, it is expected that Spotify will continue its dominance, making the at-home-music industry fully digital. The digital music, radio, and podcast industry is expected to coexist with the live performance industry. +

Lastly, gaming might be the most transformed digital industry of all media and entertainment industries. Research expects PC gaming to be 99.8% digital by 2025.[179] With most games being bought online, the console market will remain the only physically sold piece in the global video games market. Taking examples from the video and music industries, subscription models might be an appealing opportunity for the gaming industry. Technology and gaming companies have already shown their interest, but the manufacturers of the hardware have a greater interest in keeping their closed platforms.[180] However, some companies, such as Microsoft, now provide access across console, PC, and mobile device generations, indicating a more open approach.[181]

Overall, the media industry will significantly change in the future. The biggest changes in this industry are the adaptation to platforms and streaming-based media.

161. B. Adgate. "The Impact COVID-19 Had on The Entertainment Industry In 2020". in Forbes, April 13, 2021, viewed on December 3, 2021, www.forbes.com/sites/bradadgate/2021/04/13/the-impact-covid-19-had-on-the-entertainment-industry-in-2020.
162. PricewaterhouseCoopers. "2021 Outlook Segment Findings". in PwC, 2021, viewed on December 3, 2021, www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html.
163. B. Adgate. "The Impact COVID-19 Had on The Entertainment Industry In 2020". in Forbes, April 13, 2021, viewed on December 3, 2021, www.forbes.com/sites/bradadgate/2021/04/13/the-impact-covid-19-had-on-the-entertainment-industry-in-2020.
164. Ibid.
165. G. Burtch, D. Cho, Y. Liang, & M. D. Smith. "Will Movie Theaters Survive When Audiences Can Stream New Releases?" in Harvard Business Review, January 15, 2021, viewed on December 5, 2021, https://hbr.org/2021/01/will-movie-theaters-survive-when-audiences-can-stream-new-releases
166. B. Adgate. "The Impact COVID-19 Had on The Entertainment Industry In 2020". in Forbes, April 13, 2021, viewed on December 3, 2021, www.forbes.com/sites/bradadgate/2021/04/13/the-impact-covid-19-had-on-the-entertainment-industry-in-2020.
167. G. Burtch, D. Cho, Y. Liang, & M. D. Smith. "Will Movie Theaters Survive When Audiences Can Stream New Releases?" in Harvard Business Review, January 15, 2021, viewed on December 5, 2021, https://hbr.org/2021/01/will-movie-theaters-survive-when-audiences-can-stream-new-releases
168. Y. Liang, G. Burtch, D. Cho & M. D. Smith, "Product Features, Physical Distribution Networks, and Effects of Digital Channel Introduction: Evidence from the Korean Movie Market," in Boston University Questrom School of Business Research Paper 3749476 (2021), January 15, 2021, viewed on December 5, 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3749476
169. G. Burtch, D. Cho, Y. Liang, & M. D. Smith. "Will Movie Theaters Survive When Audiences Can Stream New Releases?" in Harvard Business Review, January 15, 2021, viewed on December 8, 2021, https://hbr.org/2021/01/will-movie-theaters-survive-when-audiences-can-stream-new-releases
170. PricewaterhouseCoopers. "2021 Outlook Segment Findings". in PwC, 2021, viewed on December 5, 2021, www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html.
171. Ibid.
172. E. Shearer, "More than eight-in-ten Americans get news from digital devices," in Pew Research Center, January 12, 2021, viewed on December 9, 2021, https://www.pewresearch.org/fact-tank/2021/01/12/more-than-eight-in-ten-americans-get-news-from-digital-devices/
173. M. Strauss, "Decline in newspaper, magazine sales forcing newsstand retailers to reinvent business," in The Globe and Mail, February 10, 2019, viewed on December 12, 2021, https://www.theglobeandmail.com/business/article-decline-in-newspaper-magazine-sales-forcing-newsstand-retailers-to/
174. PricewaterhouseCoopers. "2021 Outlook Segment Findings". in PwC, 2021, viewed on December 6, 2021, www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html.
175. Ibid.
176. Ibid.
177. D. Grospiron, "Midem Music Pulse – Keys to Understand the Future of Live Music Industry," in Music Industry Insights, February 1, 2021, viewed on December 12, 2021, https://insights.midem.com/artists-creativity/5-key-facts-to-understand-the-future-of-live-music/
178. PricewaterhouseCoopers. "2021 Outlook Segment Findings". in PwC, 2021, viewed on December 5, 2021, www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html.
179. Ibid.
180. Ibid.
181. Ibid.

+ Kim Tan
I also heard about virtual concerts becoming more prominent, especially during the pandemic. Who knew we all could watch Maroon 5 perform all at the same time for $20? Source:

There is expected to be a big difference between the different media forms in how big the changes will be.

2.2 social media — every company online

In the section about the future of the digital era, some media and entertainment industries of the digital age were mentioned. However, one of the most characteristic forms of digital media has not yet been discussed; namely, social media. Currently, 4.66 billion people on the planet have access to the Internet, and 80% of them are using social networks.[182] This number is rapidly growing, and social media has become part of our day-to-day lives. Nonetheless, social media in itself is also changing, and people might not be able to keep up. What will the future of social media look like?

We have seen social media grow over the past couple of years from a platform where we share random thoughts with friends and family to a network of influencers, brands, and personalized advertising. Companies have started using social platforms to generate more profit and communicate effectively with their customers. As mentioned in the consumer behavior section, consumers are increasingly influenced by the digital marketing tools on social media. These platforms are now not just for brand coverage, engagement, and visibility, but are becoming their own online shops.[183] Some brands have even stopped using their websites and are 100% social-platform-based. Another impact social media has had on companies can be seen in their advertising campaigns. According to research, 73% of marketeers say their social media marketing activities have been "somewhat effective" or "very effective" for their business.[184] In the future, more companies will start using social media in their business plans and will even develop specialized advertising campaigns for mobile social media apps.

While society is still trying to figure out how to deal with the growth of social media, Meta CEO Mark Zuckerberg has already introduced the *next big thing*, the Metaverse. His company has built a network of connected social apps; however, Zuckerberg wants to take this further. In June 2021, he announced that Facebook would strive to build a world called the metaverse with a maximalist, interconnected set of experiences.[185] His idea is inspired by the 1992 sci-fi novel *Snow Crash* and refers to a shared online space where physical, augmented, and virtual reality combine.[186] According to Zuckerberg, this new reality will come with a lot of opportunities for individuals, especially for people who live in isolated parts of the world. The metaverse will make it possible for more people to access good education and to work from anywhere.[187]

The future of social media will be even more intertwined with our physical world than it is right now. Everyone will be expected to be online, and it might get even harder to distinguish real from virtual with the risk of losing physical interactions and real identity.

2.3 the decline of trust in media

Trust in media varies greatly between the different forms of media and between countries. For example, research from Ipsos in twenty-seven countries has shown that in India, 77% of consumers trust newspapers and magazines, while only 11% of consumers in Serbia have this trust in media.[188] Trust in television and radio is slightly higher than in online news websites and platforms. Overall, it shows a low trust in traditional media and even lower trust in online media sources. This is no surprise to most people because fake news and disinformation have been a hot topic the past few years. Since 2015, trust in the media has declined for about 34% of people worldwide.[189] Will this trend of declining trust continue? And what is the impact of this on the future of media? +

The decrease in trust in the media is worrying. Social media and online news are important news sources for young people but also for an increasing part of the older generation. Online news sites are one of the most important media channels, after public television. However, they are also seen as an industry with the greatest reputational challenges. Independent media is a crucial good in most countries, and social media is used as a way for individuals to add to news coverage. This is a great possibility but also comes with some negative effects, one of those being fake news. A large number of consumers expects that there is regularly fake news in newspapers and magazines and even more often on online news websites and platforms. This might explain why "fake news" was the U.S. word of the year in 2017. Many people think spreading fake news should be seen as a criminal offense.[190] However, detecting fake news has been a major issue. +

182. M. Brenner, "The Future of Social Media." in Marketing Insider Group, October 27, 2021, viewed on December 12, 2021, https://www.theglobeandmail.com/business/article-decline-in-newspaper-magazine-sales-forcing-newsstand-retailers-to/
183. Ibid.
184. "State of Social 2019" in Buffer, viewed on December 12, 2021, https://buffer.com/state-of-social-2019
185. C. Newton, "Mark Zuckerberg Is Betting Facebook's Future on the Metaverse." in The Verge, July 22, 2021, viewed on December 14, 2021 www.theverge.com/22588022/mark-zuckerberg-facebook-ceo-metaverse-interview
186. Ibid.
187. Ibid.
188. L Bridges, "The impact of declining trust in the media," in Ipsos MORI. August 1, 2019, viewed on December 1, 2021, https://www.ipsos.com/ipsos-mori/en-uk/impact-declining-trust-media
189. Ibid.
190. Ibid.

+ *Chia-Erh Kuo*
What caused the declining trust in media? I think the discussions about the rise and fall of the newspaper industry are highly relevant to this topic. Nowadays, traditional media outlets are struggling to find a new business model. Many of them largely rely on revenues from advertising, which has affected people's perception of journalism — If the content of a newspaper page can be 'bought' through native advertising, can we still trust news media?

Regarding the topic, I recommend reading "Native advertising may jeopardize the legitimacy of newsrooms" by Ava Sirrah. She argues that the trust newsrooms work hard to secure may be jeopardized by creating and disseminating native advertisements. Source:

+ *Chia-Erh Kuo*
Apart from independent media, I think the rise of citizen journalism and collaborative media could also describe how citizens play an active role in the process of collecting and reporting information, especially when traditional journalism is losing its legitimacy for readers.

Online platforms are having a hard time detecting what is fake and what is real. To make this even more challenging, different technologies are quickly emerging that bring "fake" to a whole new level. Deepfake uses AI technology to implement your facial features onto a video of another person. Most of the deepfake videos circulating in today's media landscape are fun and entertaining. However, this technology has no limit and can be used anywhere. Last year, Korean television channel MBN used a deepfake of their own news presenter to show what the future of deepfakes might look like.[191] MBN warned their viewers that they would be doing this so that there would be no confusion. In order to make the deepfakes as real as possible, a lot of material is needed for AI to learn from.[192] This is why mostly high-profile figures like politicians and celebrities are used. These videos look incredibly real and can cause disturbance in the future.[193]

So what will the future of media look like if real is nearly impossible to distinguish from fake? Many platforms have tried to trace down fake content with their algorithms but haven't been successful yet. Searching for what is fake and what is not, might not be the optimal decision. However, regulating the impact of fake content might be the right path. In order to combat this threat, many researchers have emphasized the importance of policies to decrease fake media and increase consumer trust.[194] For example, data protection and e-privacy laws will lead to a future of transparency and data minimization where the harm of fake news can be mitigated.[195] + +

2.4 the creator economy — 100 billion dollars, 50 million creators, and erowing

Together with the digitalization of the media and entertainment industry, a creator economy has emerged over the past few years. The creator economy refers to an economy built out of 50 million independent content creators, curators, and community builders.[196] Today, the creator economy is worth 100 billion dollars and has 50 million creators, of which 2 million are professional creators who create content full-time.[197] To facilitate this new economy, hundreds of tools emerge every day to create new content. Nowadays, 6 in 10 people have access to the necessary tools to produce movies, radio, and even music on a small scale for their own audience.[198]

+ Stefanie Sewotaroeno
I have spent a fair amount of time on social media and have personally witnessed several issues such as transparency and censorship. So how can we improve digital equity? Essentially, users use their anonymity online for both good and bad. Nowadays, users can limit/censor unwanted responses in their comment section. This can happen for many reasons, from bullying to escaping fair criticism. Let us take Taylor Swift as an example. Swift limited her comments on Instagram due to an onslaught of hateful comments a few years ago that affected her mental health.

Should all of us maybe receive an official online identity card? I realize that this can also result in the decline of fair criticism. After all, anonymity benefits both parties. This is new for us, but many things we have now were new to us at one point. Let us at least try.

+ Stefanie Sewotaroeno
An initiative on digital equity I have read about not too long ago is one from Archewell (Prince Harry and Meghan Markle). Source:

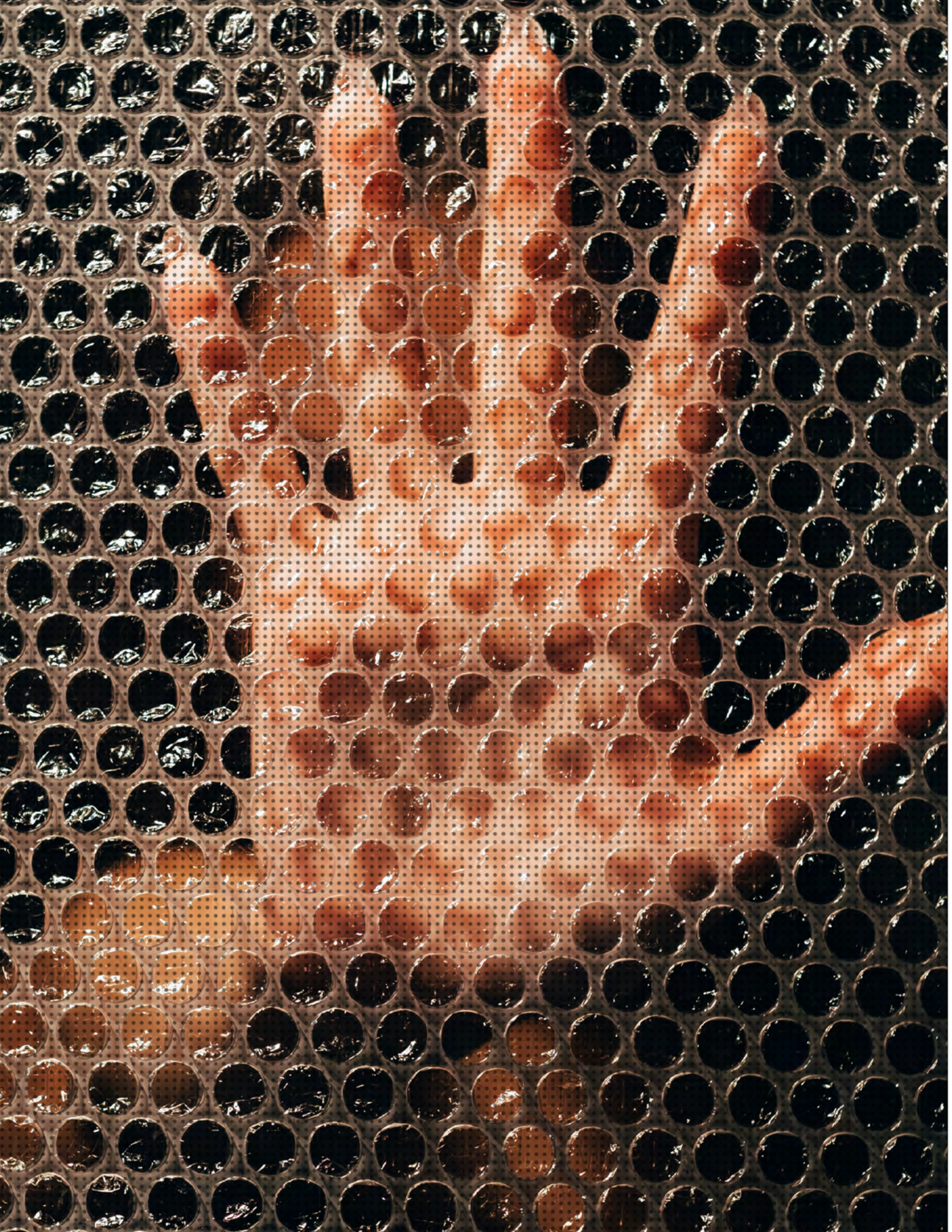
191. J. Foley, "14 deepfake examples that terrified and amused the internet," in Creative Bloq, June 1, 2021, viewed on December 14, 2021, https://www.creativebloq.com/features/deepfake-examples
192. Ibid.
193. B. Usukhbayar & S. Homer, "Deepfake Videos: The Future of Entertainment," in the future of deepfake videos, March 13, 2020, viewed on December 14, 2021, https://www.researchgate.net/profile/Binderiya-Usukhbayar/publication/340862112_Deepfake_Videos_The_Future_of_Entertainment/links/5ee2852ca6fdcc73be737b4a/Deepfake-Videos-The-Future-of-Entertainment.pdf
194. Ibid.
195. "What Is the Future for Fake News?" Maynooth University, viewed on December 9, 2021, www.maynoothuniversity.ie/research/spotlight-research/what-future-fake-news.
196. D. Roman, "The Creator Economy: Disrupting the Workforce of Tomorrow," in WeAreBrain Blog, August 23, 2021, viewed on January 15, 2022, https://wearebrain.com/blog/marketing/the-creator-economy-disrupting-the-workforce-of-tomorrow/
197. N. Murthy, "The Continuous Growth And Future Of The Creator Economy," in Forbes, September 8, 2021, viewed on December 9, 2021, www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2021/08/30/the-continuous-growth-and-future-of-the-creator-economy.
198. Ibid.
199. Ibid.
200. L. Jin, "The Creator Economy Needs a Middle Class," in Harvard Business Review, August 31, 2021, viewed on December 9, 2021, https://hbr.org/2020/12/the-creator-economy-needs-a-middle-class
201. D. Roman, "The Creator Economy: Disrupting the Workforce of Tomorrow," in WeAreBrain Blog, August 23, 2021, viewed on December 9, 2021 https://wearebrain.com/blog/marketing/the-creator-economy-disrupting-the-workforce-of-tomorrow/
202. L. Jin, "Li Jin on the Future of the Creator Economy," in The Economist, November 17, 2021, viewed on December 10, 2021, www.economist.com/the-world-ahead/2021/11/08/li-jin-on-the-future-of-the-creator-economy.
203. Stocksy, "A Platform Co-Op Created by Artists, United by Respect – About," in Stocksy United, viewed on December 9, 2021. www.stocksy.com/service/about

Even though in the creator economy, everybody could create content, only a small percentage can actually make a living from it. Currently, wealth in the creator economy is concentrated at the top 1–2% who are hugely successful.[199] The rest of the creators struggle financially and there is no middle class. According to the Harvard Business Review, the creator economy needs a middle class to continue into the future and not collapse.[200] In the near future, we will start seeing current platforms focus more on this middle class of creators and cater to them to grow their audiences. New platforms will also emerge dedicated to this newly developed middle class. These creators will be able to earn enough money to live off their content and continue being creative. It is expected that in the next years, we will start seeing a strong and growing middle class of creators who will make it possible for the entire creator economy to keep running while new creators emerge.[201]

The lacking middle class is not the only crack in the creator economy. The growing power imbalance between platforms and creators is becoming more and more of a problem. Creators are adding value to platforms every day by uploading content.[202] However, their entire careers are dependent on the platforms' algorithms. Because of this dependence, there is an imbalance between platforms and creators in terms of power, benefits, and protection. In the creator economy, all creators are their own companies without workers' rights and little impact on change. Platforms focus on their own success and do not credit the creators for the value they add. In the past, some creators have tried to change some of the platform's policies, but they are in a weak position.

"So what is the next step?" you might ask. Well, in the future, creators will start building, operating, and owning their own platforms to have more power over the content and value they create. A great example of what this future might look like is *Stocksy*.[203] This artist-owned cooperative is empowered by artists who are also the shareholders of the platform. According to Stocksy, this sense of community and ownership contributes to the level of passion that artists put into their work, resulting in the highest quality of content.

A challenge that comes with these cooperative ownership platforms is related to the decision-making and governance processes when the platforms are scaling



204. L. Jin, “Li Jin on the Future of the Creator Economy,” in The Economist, November 17, 2021, viewed on December 10, 2021, www.economist.com/the-world-ahead/2021/11/08/li-jin-on-the-future-of-the-creator-economy.
205. H. C. Peoples, P. Duda, F. W. Marlowe, “Hunter-Gatherers and the Origins of Religion,” in Human Nature, September 27, 2016, viewed on December 14, 2021, https://pubmed.ncbi.nlm.nih.gov/27154194/

+ *Anne Clerx*
An interesting addition to this is the work done by the European Academy on Religion and Society (www.ears.eu), showing how religion continues to play an important role in society. Religious topics are surprisingly present in European media and our day-to-day lives. Source:

up; Who is responsible? What process is used to make which legitimate decision? New technologies promise to help with this challenge. One of those new technologies is decentralized networks, built on the foundation of blockchain and where ownership is in the hands of the users. This concept of the decentralized Internet is further discussed in the Technology chapter.

In 2022, we will start seeing more of these decentralized networks. New platforms will emerge that will use these token-based distributions of power in order to compete with the existing centralized platforms. These new platforms will stop the conflict between creators and platforms and ensure fair benefits for all stakeholders.[204]

In conclusion, the digital transformation of media and entertainment will continue into the future. This will result in a future where online is intertwined with virtual, with new developments such as the metaverse, deepfakes, and decentralized networks.

3. purpose & spirituality

Purpose and spirituality have always been important aspects of humanity. Through the ages, the forms of purpose and spirituality have been adjusted to the then-current society. The oldest trait of spirituality can be found in hunter-gatherers and was called animism. Here, a belief in the afterlife and ancestor worship emerged.[205] It is thought that spirituality and purpose are an inevitable part of humanity and will stay in the future. However, the form in which these elements are present in society might change. +

3.1 change in religion

Through human history, many different religions have been born, have grown, and some have already disappeared. Many religions have in common that there is a sense of social cohesion. Religions can bring people together; hunters and gatherers used religion to create a hunting party, Romans to build temples, and in current times, people might join a political party based on religion. Thus, religion has been a social glue for humankind throughout its history. However, for some people, religion has also been a reason for war and conflict; for

others, religion has been a vehicle used to incite troops, divide societies, and pillage countries. In an age where secularism is on the rise, and many people in Western countries call themselves atheists, it is possible to get the impression that religions will disappear. What changes in religion can we expect over the next decades?

Nowadays, scientists provide the tools that are necessary to understand and shape the world.[206] However, through the decades, this has been an important aspect of religion. Sociologists used to believe that science's progress was leading to society's "disenchantment," in which supernatural answers to fundamental problems were no longer considered necessary.[207] Nonetheless, research from the Pew Research Center sees a pattern where religion will rise in economically and socially unstable areas, such as much of Sub-Saharan Africa, and shrink in stable areas.[208]

With an estimated 2.2 billion believers in 2010, Christianity was by far the world's largest religion, accounting for roughly a third of the world's population. [209] Islam comes in second with 1.6 billion adherents.[210] If current trends continue, the number of Muslims on the globe will nearly equal the number of Christians by 2050. Atheists, agnostics, and other non-religious persons will make up a smaller percentage of the global population in the future.[211] The Buddhist population is expected to remain relatively steady due to low fertility rates. All of the world's major religious groups, with the exception of Buddhists, are expected to increase in absolute numbers in the coming decades.

The previously mentioned developments differ widely per continent and country. Looking at fertility rates and aging partly explains these differences. For example, the steady population of Buddhists can partly be explained by low fertility rates and aging in the countries where this religion is most present, such as China. Other areas, such as Sub-Saharan Africa, are expected to have a rapidly growing population and are predicted to account for a large portion of the global growth of Islam and Christianity. In contrast, today's religiously unaffiliated population is primarily concentrated in regions like Europe, North America, China, and Japan, where fertility is low and populations are aging.[212] However, there are also shifts in religion within countries. In the United States, Christianity is expected to drop from more than

206. S. Paul-Choudhury, "Tomorrow's Gods: What is the future of religion?" in BBC Future, August 2, 2019, viewed on December 14, 2021, https://www.bbc.com/future/article/20190801-tomorrows-gods-what-is-the-future-of-religion
207. Ibid.
208. "The Future of World Religions: Population Growth Projections, 2010–2050," in Pew Research Center, April 2, 2015, viewed on December 14, 2021, https://www.pewforum.org/2015/04/02/religious-projections-2010-2050/
209. Ibid.
210. Ibid.
211. Ibid.
212. Ibid.
213. S. Bullivant, M. Farias, J. Lanman & L. Lee, "Atheists and agnostics around the world," in Understanding Unbelief, May 28, 2019, viewed on December 15, 2021, https://research.kent.ac.uk/understandingunbelief/wp-content/uploads/sites/1816/2019/05/UUReportRome.pdf
214. S. Paul-Choudhury, "Tomorrow's Gods: What is the future of religion?" in BBC Future, August 2, 2019, viewed on December 14, 2021, https://www.bbc.com/future/article/20190801-tomorrows-gods-what-is-the-future-of-religion
215. S. Illing, "The future of QAnon, explained by 8 experts," in Vox, March 3, 2021, viewed on December 15, 2021, https://www.vox.com/policy-and-politics/22252171/qanon-donald-trump-conspiracy-theories

three-quarters of the population in 2010 to two-thirds in 2050, and Judaism will no longer be the most popular non-Christian faith.

Other than the difference in population growth between different religious groups, there are also other aspects that will change the future of religion. The Understanding Unbelief project at the University of Kent conducted research among those who say they don't believe in God's existence — atheists — compared to those who think it is not possible to know if God exists — agnostics.[213] They found that there are many different ways to be an unbeliever. Other research found that many people are turning away from organized religion but are starting to focus on practices that look at the sense of who they are and how to develop as an individual.[214] Another alternative is where new religions base their beliefs on old religions. One example of this is the Sunday Assembly. Without mentioning God, the Sunday Assembly seeks to reproduce the ambiance of a dynamic church session. However, without the deep roots of established religions, these new religions can struggle. The Sunday Assembly, which grew rapidly at first, is now battling to maintain its momentum. As a result, the community of non-believers may evolve into a mix of "apatheists," people who simply don't care about religion, and practitioners of what you would call disorganized religion, rather than atheists or even secularists.

In conclusion, the size and ratio of different religions are going to change. Where some are rapidly growing due to population growth, others will stay the same or even shrink in size due to an older population. Within the group of non-believers, a big shift is happening too.

3.2 the power of conspiracy theories & cults

Conspiracy theories and cults are an increasing part of today's conversations. In a world of uncertainty, due to a pandemic and the impact of online algorithms, more and more conspiracy theories are seen as reality. Since conspiracy theories are so adaptable, they are extremely powerful. They never have to make sense; all they have to do is explain what is otherwise incomprehensible and, most importantly, provide the believer with a sense of direction in a confusing world.[215] One of the biggest conspiracy theories is QAnon, which is an American far-right

political conspiracy theory and a movement based on claims made by an anonymous individual or individuals known as Q. QAnon followers believe that a group of Satanic, cannibalistic pedophiles run a global child sex-trafficking ring, and they conspired against former U.S. President Donald Trump, during his term in office. QAnon can be seen as a cult; however, some argue it is a religion.[216] Many new religions have been seen as conspiracy theories and even cults, but the difference here is not clear. So what is the future prospect for new religions, conspiracy theories, and cults?

Before looking at the future, it is important to understand the difference between a cult and a religion. Followers of a certain belief or theory usually see themselves as believers and not as cult members; while others like family, media, and law enforcement might see them as a cult.[217] The term cult refers to a social movement, however, some cults might meet the requirements of a religion. Movements like Scientology and Mormonism have publicly published their beliefs as scripture. Those who are part of the movement consider it a religion. Ori Tavor, a senior lecturer at the University of Pennsylvania who teaches a class on new religious movements, sees the question of cults versus new religions as a matter of perspective.[218] A good reason for people to call new religious movements cults is that they distrust them because of their growing popularity.[219]

So what does the future look like for new religious movements? Due to the Internet and many people being on social media, new movements spread easily. It is expected that new religions will become more visible through social media. Social media makes it possible for people to express their religious beliefs online and reach a broad audience. At the same time, both unorganized and organized religions will grow. The opposition to religion from people at the government, particularly from minority religions and cults, will disappear, though popular and media rejection will persist.[220] +

3.3 what does ‘purpose in work’ entail?

Other than religion, purpose is also an important aspect of humanity. Imagine the following; it is a Wednesday morning in the year 2050. The traditional smell of coffee has filled the office space while you commute from the kitchen to your office. Well, “office” might be a bit of an exaggeration; it is actually your dining table. Today is your second but also last workday of the week. New technologies and automation have made it possible to work for just two days a week. The other days you spend on learning, creativity, family, and friends while relying on AI to complete your *work*. Work has completely digitalized and the working environment has significantly changed. Back to today, a world in which many fear what technological changes will mean for our work and purpose in life. This idea of being replaced by robots is daunting to us. At the same time, we learn that the more digitized our world is, the more human we need to be. “It’s essential that we strengthen what makes us human at our core, and master what we already know instinctively. No machine can ever rob us of connection, empathy, imagination, storytelling, negotiating, ethics, and creativity, and that is our power.”[221]

Purpose is something that can benefit people working in a highly digitalized workforce. Having a sense of purpose in both your personal life and your professional life has a significant impact on your productivity, happiness, and even your health.[222] Young people want this purpose in their careers, which might explain the number of start-ups emerging. Entrepreneurs work the longest hours, yet they are also among the happiest and healthiest workers. Pay is not a problem, and stress can be controlled if the entrepreneur is doing something they enjoy.[223] A recent study that followed thousands of Americans as part of the Midlife in the United States (MIDUS) project[224] illustrated the importance of purpose in our lives. People who have a sense of purpose earn approximately $5,000 more per year than their aimless counterparts, and they also live longer and healthier lives, according to the study. So, what’s keeping us from achieving this sense of purpose? A new report from the Chartered Institute for Personnel and Development (CIPD) may be able to help us achieve purposeful work in the future.[225] It looked at the phenomena of “purposeful leadership,” which is when your executives are just as invested in the mission of their company as the rest of their workforce. Working under purposeful leaders boosts our own performance significantly, which, naturally, makes us less likely to want to leave.[226] + +

It is apparent that having a sense of purpose benefits us as individuals and as companies, so we should strive to

+ Chadia Mouhdi
Another interesting aspect regarding cults and conspiracies is the power of AI.

When someone shows interest in a certain conspiracy through different types of media, they are more likely to receive similar content. This results in your online experience being completely different from that of someone else. While some may think conspiracy believers are gullible, it is mind-blowing to think that they have a different perception of reality due to the information they consume.

The fact that the underlying algorithms that can shape our view of reality lie are a corporate secret only known to a few is worrying. What is even more worrisome is that these inner workings are no one knows the exact inner workings because the underlying mechanisms are so complex. Source:

+ Chia-Erh Kuo
This reminds me of the Great Resignation/ Great Reshuffle — millions of Americans quit their jobs in the summer of 2021, and resignations in the U.S. have remained abnormally high for several months. Although the reasons behind the numbers remain difficult to interpret, many have attributed the phenomenon to long-lasting job dissatisfaction.

I think this real-life example reflects a fundamental change in how people perceive their careers: When getting a job is not simply about money, what do people really want at work? Sources:

+ Kim Tan
It reminds me of the quote, “Entrepreneurs are willing to work 80 hours a week to avoid working 40 hours a week.” — Lori Greiner!

216. S. Illing, “The future of QAnon, explained by 8 experts,” in Vox, March 3, 2021, viewed on December 15, 2021, https://www.vox.com/policy-and-politics/22252171/qanon-donald-trump-conspiracy-theories
217. T. Rodia, “Is it a cult, or a new religious movement?” in Penntoday, August 29, 2019, viewed on December 16, 2021, https://penntoday.upenn.edu/news/it-cult-or-new-religious-movement
218. Ibid.
219. Ibid.
220. M. Introvigne, “The future of new religions,” in Futures, May 21, 2004, viewed on December 16, 2021, https://www.sciencedirect.com/science/article/pii/S0016328704000461
221. K. Barcelo, “Purpose & Culture-Driven Organizations Will Survive the Future, Here’s Why,” in Delivering happiness, viewed on December 16, 2021, https://blog.deliveringhappiness.com/karissas-future-of-work
222. Brightpeople, “Why finding your purpose is so important in the future of work,” viewed on December 16, 2021, https://www.brightpeople.dk/why-finding-your-purpose-is-so-important-in-the-future-of-work/
223. Ibid.
224. C. D. Ryff, M. E. Lachman, “Midlife in the United States (MIDUS 2): Cognitive Project, 2004–2006,” in Inter-university Consortium for Political and Social Research, November 17, 2017, viewed December 16, 2021, https://www.icpsr.umich.edu/web/NACDA/studies/25281/publications
225. Brightpeople, “Why finding your purpose is so important in the future of work,” viewed on December 16, 2021, https://www.brightpeople.dk/why-finding-your-purpose-is-so-important-in-the-future-of-work/
226. Ibid.

live a purposeful work life as much as possible. As mentioned before, purpose will become even more important in our work lives in the future. In order to keep humanity in a digitalized world, a sense of purpose is critical. +

In conclusion, purpose and spirituality will be persistent in our lives. However, much is changing in religion and purpose. The size and ratio of religions are quickly changing due to population growth. New movements and religions can also spread more easily in the future due to the use of social media to share their messages. Both organized and unorganized religions are going to grow. At the same time, more people will look for a sense of purpose at home and at work, which will benefit us as individuals and as companies. Purpose is also essential for keeping humanity in a world that is becoming more and more digital. +

4. social standards — navigating future expectations

Individuals and organizations, as well as society as a whole, have absorbed societal norms about what people are expected to do. It is a socio-cultural atmosphere in which people's actions are impacted by imagined reference groups or communities.

This topic focuses on the current pressing societal standards formed under ever-changing manmade social structures, which can hinder expressing one's full potential in society.

4.1 beauty standards — towards diversity and body positivity?

Botox procedures alone have increased by 759% since the 2000s.[227] Although beauty standards and expectations have changed over time, the pressure of keeping up with these constant changes has had an impact on many individuals and on how they perceive their own body images. We live in a world where beauty standards are affected by how our society — depending on different cultures and trends — defines and displays unrealistic expectations of what we should look like.

+ Jonna Klijnsma
Besides benefiting individuals and companies, cultivating purpose has the potential to restructure our economies at large.

Globally, there are growing ecosystems of purpose-driven entrepreneurs, investors, organizations, researchers, and business leaders rethinking our economy's fundamentals. From "regenerative" to "Doughnut" to "Purpose" economics, these schools of thought propose viable alternatives to the shareholder-first paradigm.

Further readings:

- Kate Raworth, Doughnut Economics
- Kees Klomp & Shinta Oosterwaal, Thrive - Fundamentals for a New Economy
- Aaron Hurst, The Purpose Economy - How Your Desire for Impact, Personal Growth & Community is Changing the World

+ Kim Tan
Studies in some developing countries, such as the Philippines, have shown that 70% of Filipinos are dreamless because they are in survival mode. Having dreams/goals is highly significant in the foundation of seeking one's sense of purpose, but what happens when the majority of a country is dreamless?

227. E. Hahn, "The Toxicity of Beauty Standards" in The Catalyst, November 15, 2019, viewed on December 19, 2021, https://millardwestcatalyst.com/10919/opinion/the-toxicity-of-beauty-standards/

Most of society's current standards are based on stereotypical Western beauty and have been increasingly adopted in other parts of the world. These include a man needing to be six foot tall, have wide shoulders, a prominent jawline, and a perfect body, while women are told to have slim waists, effortless figures of runway models, and picture-perfect skin to be considered attractive. These expectations are destructive to a person's self-esteem and might lead to problematic judgments on one's self.[228] +

What we see in the media has a huge impact on society. The growing variety of series, television shows, and films today feature attractive, fit individuals who appear to be flawless to young teens and adults. According to a study by Now.org, 40–60% of elementary school girls are anxious about their weight or afraid of being "too fat," and 46% of 9–11-year-olds claim that they are often on "diets." A study by Stanford University and the University of Massachusetts found that 70% of university-age women say that reading women's magazines makes them feel worse about their appearance.[229]

Not only does the impact on body image affect the perspective of oneself, but it can be detrimental to one's mental and physical health. According to the same study, over half of teenage girls skip meals, fast, smoke cigarettes, vomit, and take laxatives to lose weight.[230] These behaviors become habits, which might lead to serious psychological problems, and these developed issues can cause severe trauma, damaged organs, and even death. +

Lack of diversity is also one of the biggest causes of unrealistic beauty standards. A study from the University of California sampled 167 films and found that only 19% of the leads were people of color. The absence of representation of all colors, skin textures, and sizes greatly contributes to the unfeasible social construct of beauty.[231]

In this day and age, body positivity and diversity are also on the rise. Although the struggle about body image has lasted for decades, brands have now changed their ways of advertising their products by celebrating and promoting inclusivity outside the unrealistic norm. In addition, the increasing numbers of body-positive social-media influencers and full-time models today

+ Cato Hemels
Next to the harmful consequences for individuals, it can be argued that some beauty norms are harming the planet. The *#SustainabilityAgainstShame* campaign addresses this. In their own words: "The movement that stops shaming for profit and saves the world." Source:

+ Cato Hemels
There are extremely shocking studies on this topic. ANAD (a U.S. nonprofit that provides free support services to anyone struggling with an eating disorder) reports, for example, that a study in 2020 found that every 52 minutes, someone dies as a direct result of an eating disorder. Source:

228. E. Hahn, "The Toxicity of Beauty Standards" in The Catalyst, November 15, 2019, viewed on December 19, 2021, https://millardwestcatalyst.com/10919/opinion/the-toxicity-of-beauty-standards/
229. National Organization for Women, "Get the Facts — Body Image," in Now.org. 2021, viewed on December 18, 2021, https://now.org/now-foundation/love-your-body/love-your-body-whats-it-all-about/get-the-facts/
230. E. Hahn, "The Toxicity of Beauty Standards" in The Catalyst, November 15, 2019, viewed on December 19, 2021, https://millardwestcatalyst.com/10919/opinion/the-toxicity-of-beauty-standards/
231. Ibid.

232. R. Beighton, "Plus-Size Models Have a Positive Effect on Women's Mental Health, Says Study," in Elle. December 6, 2017, viewed on January 24, 2022, https://www.elle.com/uk/beauty/body-and-physical-health/news/a36388/plus-sized-models-postive-effect-womens-mental-health/
233. C. Green, "Forget About Society's Beauty Standards" in Refresh Psychotherapy, 2021, viewed on December 17, 2021, https://www.refreshtherapynyc.com/forget-about-societys-beauty-standards/
234. S. Andrews, "How Culture Impacts Our Value of Women" in Forbes, April 6, 2020, viewed December 7, 2021, https://www.forbes.com/sites/forbescoachescouncil/2020/04/06/how-culture-impacts-our-value-of-women
235. J. Schalkwyk, "Questions about culture, gender equality and development cooperation," in OECD. June 2000, viewed December 11, 2021, https://www.oecd.org/dac/gender-development/1850708.pdf
236. Ibid.

+ Romy Grim
Maybe this article about the future of makeup is an interesting source to read:

have been found to boost women's mental health in comparison to when slimmer models were made up more of the advertising.[232] +

It is important to realize that these beauty standards are never constant. What was attractive ten to twenty years ago might not even be considered attractive today—this shows that there is no concrete definition of beauty, and that beauty can be defined in many ways, starting with oneself. Experts emphasize body neutrality, wherein individuals are appreciative of what their own bodies are capable of, and place less emphasis on what society today thinks beauty is.[233] Body positivity and acceptance are the new norms, and old, misconfigured standards are out.

4.2 female emancipation — women's role in society

For decades, women have been expected to conform to the norm of what is defined as their only accepted contribution and role to society — cleaning, cooking, and doing all the necessary work for the household.[234] But why is this only normally expected from women?

The way gender roles are defined in society affects the way women think about themselves and others based on how they were taught to act in relation to their gender. The social construct that gets formed impacts the way women behave, speak, and even the way they set their goals in life. From the color indication of gender (blue and pink) to the words and norms that are absorbed in homes, children's shows, and schools, there is pressure on women to only behave in a way that is considered permissible in society.

Gender roles are vital components in each culture since they shape the way women live their daily lives.[235] ecause of the cultural implications attached to being male or female, gender serves as an organizing basis for society. This is shown widely by the gendered division of labor; there are distinct patterns of *women's labor* and *men's labor* in most cultures, both in the household and in wider society, including cultural reasons for why there are distinct patterns and why they occur.[236] Girls are expected to be responsible for things that men are not, and there are also greater expectations placed on girls and women to appear and act a specific way.

While gender relations vary in each society, the tendency is for women to have less personal freedom, fewer resources, and little control over the decision-making processes that form their societies and lives. One Filipino-American student shared her experience on the differing standards in their household; while it was demanded of her that she prioritize her schoolwork over going out with friends on a regular basis or starting a romantic relationship, her brother got away with disobeying these rules because her parents explained that this behavior was “normal” for a boy to do.[237] She explained that these cultural norms have harmed her communication abilities, and she now finds it difficult to speak out for herself, particularly in situations where there is conflict or disagreement. This pattern of gender imbalance is both a problem about human rights and development.

The standards set for women can hinder their confidence as regard speaking up for themselves and fighting for what they believe in. Women’s rights are human rights — and if women’s rights had already been achieved decades ago, the popularity of the feminist movement would not have reached an all-time high in 2020 in the United States alone.[238] + +

Patterns and explanations about gender roles differ from society to society and change over time. Not only is it useful to recognize these patterns of unbalanced expectations but it is never too late to change this way of thinking either. Both men and women have the same power and ability to learn life’s essential skills and set the same goals — all without having to standardize which gender is fit to perform it. + +

4.3 anti black racism and black lives matter — a voice for racial injustice

Social norms establish what is acceptable and unacceptable, and altering the applicable norms about them can possibly shift stereotypes and bias. Racism is defined as “an ideology of racial dominance” in which one or more racial groups’ claimed biological or cultural superiority is used to justify or dictate the inferior treatment or social position(s) of other racial groups.[239]

+ Romy Grim
If you are interested in more feministic topics, I recommend the (Dutch) podcast “Damn Honey.” It is a feministic platform that discusses all things women have to deal with these days. The topics differ from women in politics to not being a mom and catcalling.

+ Emma Datema
With issues such as gender inequality, racism, and class inequality, I think it is important to stress that many of these issues do not stand isolated. This intersectionality creates different modes of discrimination and privilege. One interesting take on it is the White Woman’s Burden idea. The White Man’s Burden is an 1899 poem by Rudyard Kipling, which proposes that the white race is obliged (morally) to civilize non-white people and encourage their progress through colonialism. The White Woman’s Burden can be understood as the imperialist-feminist equivalent, with non-white women suffering in far-off countries and needing to be saved. However, Western vocabulary with words like ‘oppression’ and ‘freedom’ often misses out on important cultural nuances and ignores the actorhood of non-white women. An incredibly book that touches upon similar issues is "Do Muslim Women Need Saving?" by Lila Abu-Lughod.

+ Jonna Klijnsma
In “Invisible Women,” Caroline Criado Perez exposes how women (and the female experience) are structurally underrepresented in the world’s data. From medical research to smartphone design, this gender data gap creates and perpetuates structural inequality. A powerful and important read in a world that’s designed for men and increasingly reliant on Big Data!

+ Chadia Mouhdi
This was a super interesting section! An extra consideration is that not only women fall prey to gender stereotypes. Society may also have some expectations on how men should conform.

For example, men might feel like they cannot show their emotions. They may also be hesitant to take parental leave for fear of stigma or being penalized at work. This 2019 Forbes article gives some more insight into this:

237. S. Andrews, “How Culture Impacts Our Value of Women” in Forbes, April 6, 2020, viewed December 7, 2021, https://www.forbes.com/sites/forbescoachescouncil/2020/04/06/how-culture-impacts-our-value-of-women
238. K. Watson, “Feminism’s Popularity Reaches All Time Highs, Study Shows,” in MS Magazine, August 10, 2020, viewed December 12, 2021, https://msmagazine.com/2020/08/10/feminism-popularity-reaches-all-time-highs-study-shows
239. M. Clair & J. Denis, “Racism, Sociology of,” volume 19, pp. 12721–12723, 2015, viewed December 10, 2021, https://projects.iq.harvard.edu/files/deib-explorer/files/sociology_of_racism.pdf
240. D. R. Jhangiani, D. H. Tarry, & D. C. Stangor, “Reducing discrimination,” in Principles of Social Psychology 1st International Edition, September 26, 2014, viewed on December 2, 2021, https://opentextbc.ca/socialpsychology/chapter/reducing-discrimination/
241. T. J. S. De Lima, C. R. Pereira, A. R. Rosas Torres, L. E. Cunha de Souza, & I. M. Albuquerque, “Black people are convicted more for being black than for being poor: The role of social norms and cultural prejudice on biased racial judgments,” in NCBI, September 20, 2019, viewed on December 10, 2021, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6754140/
242. J. Nagumo & N. Shibata, “#BlackLivesMatter shines light on racism in Japan and across Asia,” in Nikkei Asia, August 11, 2020, viewed on January 17, 2022, https://asia.nikkei.com/Spotlight/Asia-Insight/BlackLivesMatter-shines-light-on-racism-in-Japan-and-across-Asia
243. A. Tikkanen, “Black lives matter,” in Encyclopædia Britannica, 2020, viewed on December 1, 2021, https://www.britannica.com/topic/Black-Lives-Matter

The Black community has faced racial discrimination and inequality that has impacted them on their everyday lives in areas including work, salaries, financial prospects, housing, educational opportunities, and basic healthcare.[240] The prejudice against Black people and the misrepresentation of the majority of them as offenders have been pressing issues for many years and have recently sparked even more controversy when public assault, police brutality, and justice systems have treated people of color negatively. Black citizens in the United States are substantially more likely to be convicted of felonies that carry heavier and lengthier terms, and this causes them to be disproportionately overrepresented in the prison population. In the United States alone, more than five times as many Black people than white people are imprisoned.[241] During the early stages of the coronavirus outbreak, groundless accusations toward Africans residing in Guangzhou, China have emerged after five Nigerians tested positive for Covid-19, causing most of them to get evicted from their apartments, and banned from entering restaurants.[242] These events and their adjacency to the subjective accusations are mere evidence of how part of society reacts in bias when seeking an unidentified wrongdoer.

People around the world have united under the Black Lives Matter or BLM movement to fight racism and address police violence. Started only as an online protest in 2013 by Patrisse Khan-Cullors, Alicia Garza, and Opal Tometi, the BLM movement began after George Zimmerman was freed of charges related to the fatal shooting of Trayvon Martin, an unarmed Black teenager, in Sanford, Florida, in February 2012.[243] Zimmerman, a volunteer member of Sandford’s neighborhood watch, shot and killed Martin after he saw him walking around the neighborhood and thought that he looked “suspicious” despite being completely unarmed. After police got to the crime scene, Zimmerman claimed that he fired shots as a self-defense response, and not long after, was acquitted of all charges. However, this case opened the conversation to highlight the injustice hidden under the root of racism and sparked national controversy all around the globe. Although this movement was online, it sparked a national protest in the United States, demanding proper prosecution for the murder of Martin. Zimmerman was then arrested in April 2012 on charges of second-degree murder — but was easily discharged in 2013. This event is one of the many

cases that showed the biases of the justice system of the United States, which are still present even today. +

Many people are afraid to speak up regarding issues of racial discrimination based on the fear of saying something wrong, or because they and no one they know are affected by discrimination against race.[244] Despite the clear evidence of assault in broad daylight or the clear lack of reasoning by offenders, the majority of trials that go to court against Black people are longer than trials for non-Black people and most of the verdicts are inequitable.

Many cases have been left aside and offenders are set free and live their lives unaccountable for the crime(s) they have committed while the families and friends of the victims are pleading for help with voices that remain unheard. Racial discrimination has been a long-going societal issue globally. Most of the wrongfully convicted crimes are only given a chance for justice when it sparks a national or global controversy. Ending racism is possible, even with the current injustice and apathy from others; when an issue comes to light because of a united movement and a collective voice for justice, it is truly possible to spark the needed change in the current misconfigured legal and social system.

+ *Elias Sohnle Moreno*
An interesting contrast is the George Floyd case because it shows how social movements can play a role in change by fighting the complacence of the justice system towards police brutality.

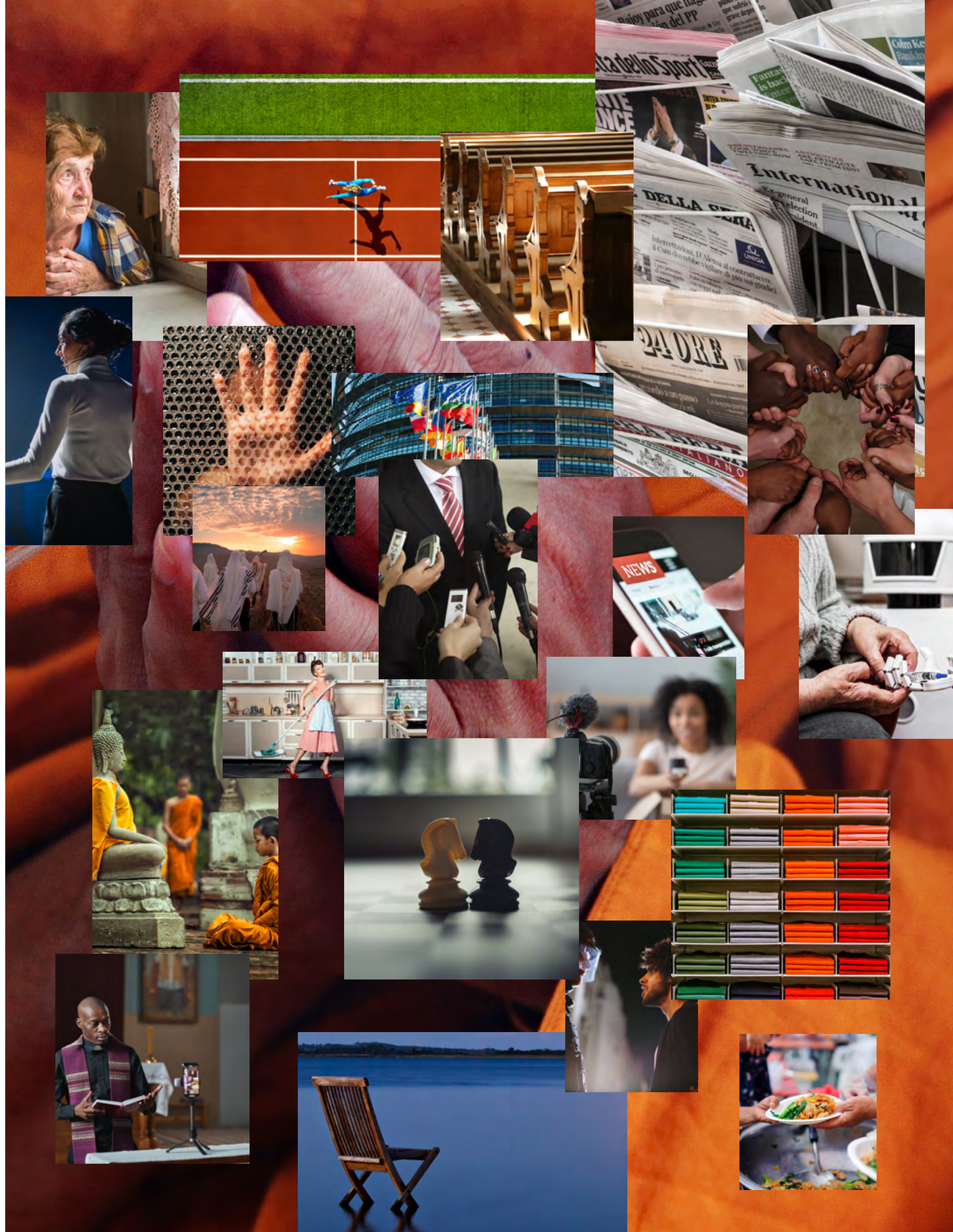
244. J. Lailder, "A key to ending racism: Make it personal, in The Harvard Gazette, February 22, 2021, viewed on December 2, 2021, https://news.harvard.edu/gazette/story/2021/02/social-psychologist-offers-key-to-ending-racism/

5. socio-cultural change — what's heading our way?

Maintaining societal and individual well-being is crucial in keeping society on track. Digitalization is having an impact on this by providing new options, but it is also causing other issues, such as a lack of face-to-face social interactions. One of the options that have developed, however, is in relation to the media. With new advancements such as the metaverse, deep fakes, and decentralized networks, this will result in a future where online and virtual are linked. In general, the media sector will alter dramatically in the future. Making distinctions between fake and real information will be affected and probably become even harder in the future. In addition to this, religion will alter as well, particularly in terms of the number and proportion of different religions. Others will remain the same or even decline in size due to an aging population, while some will swiftly rise due to population growth. Another trend is seen in changes in social standards. For instance, both men's and women's beauty standards have evolved considerably over time, and beauty trends from ten years ago may no longer be deemed attractive now. Additionally, racial discrimination has been a long-running issue, with prejudiced legal systems continuing to discriminate against people of color. +

+ *Stefanie Sewotaroeno*
I would like to offer one other perspective here: identity. I would like to use myself as an example. On social media (especially TikTok), there are many people (around my age) who are doing DNA testing to know where they might be from. My great grandparents came to Suriname to work on the plantations after slavery. The how and why of their decision (if it was their decision at all!) to come to Suriname will probably forever remain unknown. Identity remains a big question for me. I feel that I deserve to know my lineage, as does everyone else. I might do DNA testing (too expensive now!) to have this question answered one day. I also wonder if it is fair to expect that the countries that benefitted from slavery and indentured laborers should be responsible for these costs, such as DNA testing.

social and cultural norms, beliefs, and practices are transforming faster than ever. which socio-cultural construction would you change for a more inclusive future?



introduction
economics
socio-cultural
politics
ecology
technology
demographics
conclusion

political climate
geopolitics
international cooperation
individual regions
governments
political activism
leaders of tomorrow
political change

"An election is coming. Universal peace is declared, and the foxes have a sincere interest in prolonging the lives of the poultry."[245] Politics is probably one of the most universal topics of discussion in the world. Everyone has an opinion. The majority of people pick a political party and stick to it, not unlike the way people support football teams. The best thing about politics is that it is a project that is never done. There are still unanswered questions and future prospects to be considered. Questions such as where does polarization come from? What does activism look like in the twenty-first century? This chapter on politics in relation to change attempts to answer these questions, as well as multiple others. For example, what will be the future of international conflicts? What factors could really spark political change in different regions around the world? What trends are there in international cooperation? And, how can the use of technology change the public sector? This chapter begins with a description of developments in the world's political climate. Next, it addresses some of the main trends in geopolitical relations and the future of conflicts. Additionally, it discusses some of the major international institutions through which different actors around the world cooperate. It also touches upon how several factors can bring on political upheaval and reforms in different regions around the world. After this, there is an analysis of the increasing role of technology in the political sphere and how that changes the way governments respond to developments in our societies. The chapter ends with a discussion on trends in social activism and what activism might look like in the future.

1. political climate — dealing with polarization, populism, & xenophobia

How does one define a political climate? When people think of the word "climate," the problems of the twenty-first century have conditioned us to think of climate change and global warming. But the heat of modern political debate can be equally concerning. Everyone has strong opinions as to where our political climate is heading. All one needs to do is take a look at the titles of books that hatched from the Trump administration to be hit with a sense of impending dread: *Rage*, *Hoax*, *Disloyal, Too Much and Never Enough*, *The Reckoning*, *Betrayal, Fear, and A Plague Upon Our House*. The many authors of these books paint a picture of politics in the twenty-first century that is not too colorful. This section aims to lay out the positive and create a jolt of inspiration with regard to our political climate. In the words of Michelle Obama, "When they go low, we go high."[246] It is paramount that we solve the problems facing our political climate, therefore, this section will delve more into solutions than descriptions of the problems themselves. The reason we must tame the way the world conducts politics is best said by the second President of the United States, John Adams:

> I must study Politics and War so that my sons may have the liberty to study Mathematics and Philosophy. My sons ought to study Mathematics and Philosophy, Geography, Natural History, Naval Architecture, navigation, Commerce and Agriculture, in order to give their children a right to study Painting, Poetry, Music, Architecture, Statuary, Tapestry and Porcelain.[247]

This section first covers polarization, moves on to populism, and ends with xenophobia.

1.1 polarization — when societies divide

It's the year 2019. Two researchers by the names of Thomas Carothers and Andrew O'Donohue set out to write a book on polarization around the world. They compare Brazil, India, Kenya, Poland, Turkey, and the United States. In Carothers' words, polarization can "cause legislative gridlock, it can drive politicians to undermine the independence of the judiciary. Polarization shatters basic democratic norms like compromise, mutual respect. It can lead to disturbing rises in hate crime and political violence. [...] dragging countries into a negative downward spiral."[248] Polarization can feel inevitable; like a fish trap where the only way forward is deeper into the entrapment. If one follows the political discourse of their own country based solely on the front pages of the media, the situation feels like the British House of Commons, with two groups sitting opposite one another. A world where the following quote by novelist Joe Abercrombie seems to be the mantra.

> I am here to do business, not to take sides.
> Only thing on neither side o' the street is the sewer![249]

245. G. Elliot, Felix Holt, The Radical, in Project Gutenberg, 1866, viewed on January 26, 2022, p.58.
246. M. Obama, "Michelle Obama: When they go low, we go high" in CNN, July 26, 2016, viewed on December 8, 2021. https://www.youtube.com/watch?v=mu_hCThhzWU.
247. J. Adams & A. Adams, Familiar Letters of John Adams and His Wife Abigail Adams During the Revolution, by John Adams and Abigail Adams and Charles Francis Adams, in project Gutenberg, 2010, viewed on January 26, 2022, p.381.
248. Carnagie Endowment, "Thomas Carothers & Andrew O'Donohue on 'Democracies divided'," September 23, 2019, viewed on December 8, 2021, https://www.youtube.com/watch?v=V7naQvsdhMk&t=7s.
249. J. Abercrombie, Red Country (London: Orbit 2012), p.205.

This begs the question: what remedial actions are needed, according to O'Donohue's and Carothers' research? To preface this brief sum of actions, it is necessary to note that the root cause of polarization is one of the most complex political topics to date. This research does not attempt to simplify the problem, but rather, it attempts to display a problem-solving attitude over a cynical analysis of the current state of affairs with regard to the political divide; ample books have been written in such a fashion already.

The first possible course of action involves dialog and bridging efforts.[250] The list of institutions that can undertake these actions is endless: universities, mediation groups, religious organizations, and many more. Bridging efforts can, for example, be used to bridge the political divide at the "elite level," to attempt to improve bipartisanship among elected representatives. O'Donohue and Carothers bring up the example of interfaith dialog in India to check communal riots in Mumbai and Hyderabad. A second method is institutional reform. Democracy can take on many forms; take, for example, the difference between the bipolar American system and the heavily fragmented Dutch parliament. Both are democratic nations but the way they conduct the democratic process is radically different.

One example of democratic reform to bridge polarization is the tackling of gerrymandering, reforming campaign finance laws, or experimenting with ranked voting. Institutional change is tremendously difficult.

O'Donohue and Carothers provide a detailed analysis of Belgium, Kenya, and Brazil, where multiple efforts have been made to take on polarization through institutional reform.[251] However, these countries remain deeply divided. A third method is individual leadership. A single person has the potential of strengthening democratic institutions and healing the wounds of their political predecessors. Take the example of Ecuadorian politician Lenin Moreno, who came to power in 2017. Moreno moved away from the divisive politics of his predecessor from the same political party, Rafael Correa.

A fourth remedy is closely tied to the chapter on technology in this book, namely media reform.[252] Companies like Facebook and Google were heavily scrutinized for their role in the spreading of misinformation, and both

250. T. Carothers & A. O'Donohue, Democracies Divided: The Global Challenges of Political Polarization (Washington D.C.: Brookings Institutions Press 2019), p. 289.
251. Carothers & O'Donohue, Democracies Divided, p.290–291.
252. Ibid.

253. Siladitya Ray, "The Far-Right Is Flocking to These Alternate Social Media Apps — Not All of Them Are Thrilled," in Forbes, January 14, 2021, viewed on January 26, 2022, https://www.forbes.com/sites/siladityaray/2021/01/14/the-far-right-is-flocking-to-these-alternate-social-media-apps---not-all-of-them-are-thrilled.
254. Carothers & O'Donohue, Democracies Divided, p.294.
255. G. Heltzel & K. Laurin, "Polarization in America: Two Possible Futures," in Current Opinion in Behavioural Science 2020/34, viewed on January 26, 2022, p. 179–184, https://pubmed.ncbi.nlm.nih.gov/32391408/#:~:text=We%20describe%20two%20possible%20futures,apex%20of%20its%20pendulum%20swing.
256. Heltzel & Laurin, "Polarization in America: Two Possible Futures," p. 180.
257. Ibid.
258. Ibid., p. 181.

companies took steps to *pop* media bubbles and curb the spread of fake news. However, many political organizations and individuals consider this to be media censorship. New media platforms, promising no censorship, have popped up far and wide over the last decade.[253] O'Donohue and Carothers end their research with a call for more local research and study.[254] They bring up the example of Turkey, where the first research into local polarization was conducted as recently as 2017. Qualitative data is needed for any meaningful steps to be set. In short, the problem of polarization is multifaceted and cannot be solved by the adoption of one of the aforementioned remedial actions alone. There are tools to be found and solutions to be created, however, using a palette of solutions working together in tandem.

Apart from these remedial actions, there are also projections for the future. Two American scientists, Hetzel & Laurin, wrote a paper in 2020 laying out two scenarios for the future of polarization with a case study of the United States.[255] The case study on the United States possible future is grim. It portrays polarization as a self-reinforcing cycle that will spin out of control.[256] This is caused by a behavioral tendency that can only be described as a dog biting its own tail, getting scared of its self-incurred pain, and biting harder. Hetzel & Laurin describe it as follows: Americans overperceive polarization and, as a response, they distance themselves from the perceived opponent, which increases polarization in the real world, creating a self-perpetuating loop: a dog infinitely biting its own tail. Luckily, Hetzel & Laurin point out that this is unlikely to be a reality: polls that analyze polarization are often heavily framed (Republicans report more polarization against the opposing party than the Democratic party does). Secondly, only 10% of Americans are on the extreme side of politics, making them the loud minority. And lastly, negative news is overrepresented, meaning that actual polarization is often exaggerated.[257]

The second case study on a possible future is more optimistic. Polarization is a pendulum that has reached its peak.[258] The writers argue that earlier research points out that a majority of Americans think political debate has become too negative and a return to civility is needed. Most are embarrassed by their own politicians' hostile behavior. For example, when a politician becomes too hostile and close-minded, Americans are likely to distance themselves from them and hold more moderate

positions.[259] The future the world ends up with is up to the people themselves, but one key indicator is whether our institutions are able to combat media misperceptions on polarization; if so, then one day, the dog has a chance to stop biting its own tail. +

1.2 populism — the supposed rule of the people

One of the most well-known simplified definitions of democracy is a political system "of the people, by the people, for the people," spoken by Abraham Lincoln at the Gettysburg Address more than 150 years ago. But as Margaret Canovan, writer of *The People*, points out, "'The people' is undoubtedly one of the least precise and most promiscuous of concepts,"[260] and, she points out, it is inherently political. It offers convenient support for different causes because of its "indeterminacy and ambiguities."[261] But can science analyze politics without the concept of "the people," even with its ambiguities? As an answer to this question, Canovan ends her book with the following warning. "In conclusion, then, the concept of 'the people' — or to be more precise, the cluster of ideas and discourses associated with the term — may be hard to deal with, but within contemporary politics, it is harder to do without. We certainly cannot afford to ignore it."[262] +

Michael Kazin, author of *The Populist Persuasion*, argues that universal identities forged during the enlightenment, and rekindled by liberals and socialists, are becoming less and less politically mainstream. Populism is alive and well, but politicians rarely refer to the people as "the proletariat," or "the common people" anymore.[263] Cornel West, professor of African American studies and political activist, notes that "the people" can at times make morally wrong decisions where elite bodies do not. For example, in his estimation, *Brown v. Board of Education*, which paved the way for desegregated schools, would not have passed if it had been a referendum instead of a Supreme Court ruling.[264] Appealing to "the people" as a working-class entity is not solely a left-wing tactic. According to Kazin, it is resoundingly a right-wing tactic in the United States, where "the people" are perceived as "hard-working, God-fearing, patriotic citizens abused by elite bureaucrats."[265]

But what gives rise to populism? Paul Taggart, writer of *Populism*, sheds light on this specific question.

+ Sam Slewe
Reading more on political polarization (from a psychological perspective), I recommend reading this book: *The Psychology of Political Polarization*.

+ Adlan Hidayat
If you would like to delve deeper into the dynamics of democratic accountability, I would highly recommend reading the article 'Re-Assessing Elite-Public Gaps in Political Behavior' by Joshua Kertzer. In his research, he finds that political scientists actually tend to overstate and misunderstand the consequences of elite-public gaps in political behavior. In reality, public officials (the 'elites' who make decisions) and the masses (the public) share similar preferences in decision-making. Most of the time, the differences between the public and the masses are actually caused by misperceptions by elites. Source:

259. J. Druckman, "How incivility on partisan media (de)polarizes the electorate," in J Polit 2019/81, viewed on January 26, 2022, p.291–295, https://www.journals.uchicago.edu/doi/abs/10.1086/699912.
260. M. Canovan, The People (Cambridge: Polity Press 2005), p.140.
261. Ibid.
262. Ibid., p.141.
263. M. Kazin, The populist Persuasion: An American History (London: Cornell University Press), p.384–388.
264. Ibid.
265. Ibid.
266. P. Taggart, Populism (Buckingham: Open University Press 2000), p.116.
267. B. Jones, 'Increasing share of Americans favor a single government program to provide health care coverage', in Pew Research Center, September 29, 2020, viewed on January 26, 2022, https://www.pewresearch.org/fact-tank/2020/09/29/increasing-share-of-americans-favor-a-single-government-program-to-provide-health-care-coverage/.
268. J. Jones, "U.S. Support for Legal Marijuana Steady in Past Year," in Gallup, October 23, 2019, viewed on December 17, 2021, https://news.gallup.com/poll/267698/support-legal-marijuana-steady-past-year.aspx.

According to him, "populism grows from, into and out of representative politics. It is something of an irony that populism is given the capacity to maintain itself in the form of systematic political movements only under systems of representative politics but that the impetus for populism comes from frustration with representative politics."[266] In that sense, the system that populism pushes away from is the same system that allows for the creation of populism. Taggart identifies populism as one of the main threats to liberalism, together with nationalism and religious fundamentalism. But is populism truly nothing more than a threat, as Taggart seems to imply? Is it an ambiguous concept that needs further study, as Canovan concludes? Or is it an outdated concept and morally wrong because a political elite is sometimes morally superior to the general public, as can be interpreted from Kazin's text? If the definition of populism is narrowed down to "policy based on the will of the majority," this might not be the case.

For example, the United States is one of the few developed Western countries without any variation of government-regulated universal healthcare. Both in the House and the Senate, there is strong resistance against any such measure, originating from both sides of the political spectrum. However, 63% of all U.S. adults are in favor of centrally provided healthcare coverage.[267] Alternatively, 66% of Americans are in favor of legalizing marijuana, while it is still illegal under the federal Controlled Substances Act of 1970.[268] 58% support free college, while in American politics, this policy seems very far away. And lastly, 68% support a two percent wealth tax on individuals worth over 50 billion USD. Conclusion? Politics is often far behind the wills and wants of the public. Without any moralistic judgment on the benefits of any of the aforementioned policies, it is evident that there is a clear difference between the two definitions of populism; it can be weaponized by a politician who uses it as a rhetorical device to divide a country into *us* and *them*, othering the political elite. Equally, when populism is defined simply as policies dictated by the will of the majority, populism shows us that there is a strong divide between what elected officials want, and what the general population wants, as exemplified by the United States.

The future of populism is heavily influenced by globalization trends; a European study concluded that

populism will keep expanding in Europe if concerns held toward globalization by adherents of populism are not addressed.[269] Political scientist Frane Adams argues that increased globalization and little accountability for elected officials brings populism with it; the desire for a "strong-man" with a focus on identity politics becomes appealing when a citizen does not recognize their own country anymore. Dr. Conrad King agrees with Adam's estimation that populism is here to stay but for another reason. King argues that populism is inherent to representative democracies, and considering representative democracies are still on the rise globally speaking, populism will expand with it.[270] However, populism is local by nature. For example, a populist movement in Asia is unlikely to jump over to America because the relevant topics are widely different per country. In that sense, populism is a contained ideology, as opposed to Marxism, for example, which is universal and, therefore, easily moved across national borders. In conclusion, the future of populism is a sober one; it is here to stay unless we tackle the underlying issues, but because of its local nature, it won't spread like wildfire. +

1.3 xenophobia — when strangers are to be feared

"The world is full of people who think different is synonymous with wrong."[271] The word xenophobia is derived from the two Greek words, *xenos* and *phobos*; stranger and fear. The fear of the alien, and the hate for strangers. The concept is heavily related to racism, othering, and political discourse. How prevalent is xenophobia today? What are some of its main causes, and what can we do to remove this fear from the hearts of all in the future? +

When Hans Rosling, the author of *Factfulness*, held a poll among his readers for his book, he asked what people were most afraid of. As expected, snakes, spiders, heights, and claustrophobia always appear somewhere at the top of the list of items. Then comes a long list with no surprises: public speaking, needles, airplanes, mice, strangers, dogs, crowds, blood, darkness, drowning, and so on.[272] The fear of strangers is one of the more commonplace phobias. Rosling continues, "Yet here is the paradox: the image of a dangerous world has never been broadcast more effectively than it is now, while the world has never been less violent and more safe."[273]

+ Sam Slewe
Populism is not the only issue regarding this. We might even ask ourselves what will happen with democracies in the future. In Europe, fewer people are voting, raising the question of whether democracy is still a democracy if turnout rates are declining. As a result of fewer people voting, democratic inequality and prejudice in public policy may emerge. A higher voter turnout rate is required for a functioning democracy. So, this 'trend' also shows a new direction democracy is taking.

+ Chia-Erh Kuo
In my opinion, the section answers the four questions very well. And that triggered my curiosity about the negative consequences of xenophobia in people's attitudes towards immigrants and policy advocacy. I recommend reading some case studies about the issue: 'Regionalizing xenophobia? Citizen attitudes to immigration and refugee policy in Southern Africa' by Jonathan Crush Wade Pendleton, 'Xenophobia, asylum seekers, and immigration policies in Germany' by Heribert Adam, 'The political economy of xenophobia and distribution: The case of Denmark' by John Roemer and Karine Van der Straeten. Sources:

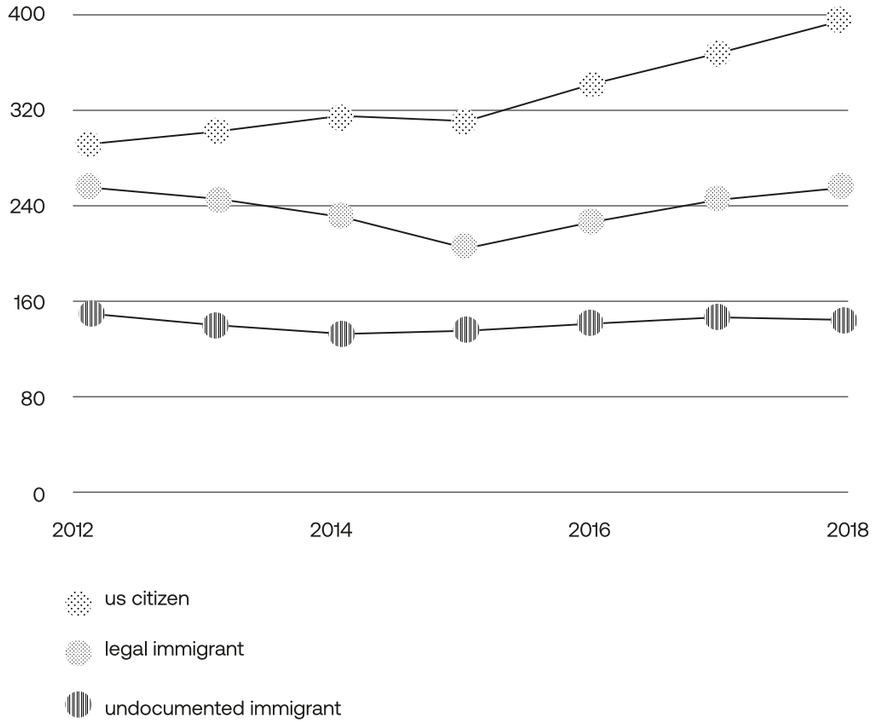
269. F. Adam, "The Future of Populism in a Comparative European and Global Context," in Comparative Sociology 2019/18, viewed on January 10, 2022, p. 701, https://brill.com/view/journals/coso/18/5-6/article-p687_5.xml?language=en.
270. C. King, "The Future of Populism (chapter 9.5), in Political Ideologies and Worldviews: An Introduction (Kwantlen Polytechnic University: Surrey), p. 158, https://kpu.pressbooks.pub/political-ideologies/.
271. D. Levithan, Two boys kissing, (Knopf Books: 2013), p. 24.
272. H. Rosling, Factfulness: Ten Reasons we're wrong about the world - and why things are better than you think (London: Screptre 2019), p. 105.
273. Ibid., p.107.
274. D. Kahneman, Thinking Fast and Slow (New York: Farrar, Straus and Giroux 2011), p. 122.
275. Ibid., p.123.
276. Ibid., p.122.
277. Rosling, Factfulness, p.122.

Rosling calls this the "fear instinct." This evolutionary bias has kept us alive for millions of years, and the media plays to our mammalian instincts to glue us to the news. If a stick moved, it was wise to jump in case of a snake attack. But a twenty-first-century woman watching a video of a natural disaster on their phone over breakfast is prone to assume that the world she lives in is still a snake-infested cesspit.

Leading psychologist and expert on judgment and decision-making processes Daniel Kahneman offers potential explanations for our inclination toward the fear of others. When we see migrants flooding borders on short, dramatized videos every week, what happens mentally is called an "availability cascade."[274] Here, relatively minor events lead to widespread panic and overcompensated government intervention. Kahneman calls media outlets that jump on the bandwagon "availability entrepreneurs." What happens is that these entrepreneurs notice people are outraged, and they cover the outrage instead of the news item itself, meaning the emotional reaction of the public becomes a new item in and of itself, perpetuating the negative spiral of sensational news. "Scientists and others who try to dampen the increasing fear and revulsion attract little attention, and most of it hostile; anyone who claims that the danger is overstated is suspected of association with a 'heinous cover-up.'"[275] Timur Kuran joked on the subject that "all heuristics are equal, but availability is more equal than the others."[276] The conclusion? Because the public is bombarded with news that inflames the fear of the unknown, and fear of the stranger, our brain has a list of ready examples of news that confirms the bias that foreigners are *bad* or *scary*.

Rosling makes the apt distinction between fear and danger.[277] Our fears have everything to do with our very human emotions, which are not prone to reason. We can be fearful of foreigners based on our own media consumption habits, but what is the concrete danger? If the crime rates in the United States among American citizens and immigrants (both documented and undocumented) are compared per 100,000 people, one can easily conclude that the American citizenry is more prone to crime than immigrants. But ask a group of 100 people to guess which of the two groups has a higher crime rate per capita, and a widely different answer is likely to emerge. If we make policy based on danger instead of fear, and if availability entrepreneurs stop

drug crime rate 2012–2018[278]



278. M. Light et al, "Comparing crime rates between undocumented immigrants, legal immigrants, and native-born US citizens in Texas," in Proceedings of the National Academy of Sciences 2020/117 (51), viewed on January 10, 2022, p. 32345, https://www.pnas.org/content/117/51/32340.
279. M. Sanchez-Mazas and L. Licata, "Xenophobia: social psychological aspects," in International encyclopedia of the Social & Behavioral Sciences 2015/2, viewed on January 1, 2022, p.804–805, https://www.semanticscholar.org/paper/Xenophobia%3A-Social-psychological-aspects-Cutanda-Licata/2be7233ac8997c32a833529a8c9eb28a9b48ca26.
280. G. Bernhard, "Why Xenophobia works," in Psychology Today, December 21, 2018, viewed on January 15, 2022, https://www.psychologytoday.com/us/blog/evolution-in-daily-life/201812/why-xenophobia-works.
281. C. Hedges, "What Every Person Should Know About War," in The New York Times, July 6, 2003, viewed on December 8, 2021, https://www.nytimes.com/2003/07/06/books/chapters/what-every-person-should-know-about-war.html.
282. D. Deudney, "Geopolitics," in Britannica, viewed on December 8, 2021, https://www.britannica.com/topic/geopolitics.
283. J. Rudy, "National Security versus Human Security," in GPPAC, January 21, 2018, viewed on December 8, 2021, https://gppac.net/national-security-versus-human-security.
284. Peter G. Peterson Foundation, "U.S. Defense Spending Compared to Other Countries," in Peter G. Peterson Foundation. July 9, 2021, viewed on December 8, 2021, https://www.pgpf.org/chart-archive/0053_defense-comparison.

+ Daphne Prieckaerts
A few years ago, photographer & world traveler Thijs Heslenfeld invited me to travel to the outskirts of Namibia. After not seeing a human being for two days, we stopped in the middle of the desert to put up our tent and make a campfire for dinner. Then, a furious big black man came towards us out of nowhere on his big bike. He scared the hell out of me. While my instinct told me 'run,' Thijs walked towards the man, with open arms and a big smile as if he had known this man since kindergarten, yelling, "what a great bike, my friend." Instead of running, we talked and drank coffee. The solution to xenophobia might actually be looking into the eyes of the other.

+ Adlan Hidayat
In my opinion, this conclusion leans more towards a pessimistic view. I think that due to the growing prominence of globalization and advancements in technology, society is actually more inclined to accept diversity. This has been evidenced by numerous efforts to support immigration, particularly during times of conflict. In the context of Ukraine and Russia, many have opened their homes to fleeing Ukrainians. After the Trump administration forced migrant children into custody, there was public outcry and efforts to improve migrant rights. Lastly, what the black lives matter movement taught us is that people all over the world believe in the value that everyone should be treated equally.

+ Emma Datema
What, for me, is striking is how over time, those who are understood to be strangers (and thus should be feared) change. In 2016, the Netherlands held a referendum about the Association Agreement between Ukraine and the European Union. It became a major political dispute, with politicians framing it as an issue of national identity and statehood. With a depressingly low turn-out (32.2%), a majority (61.1%) of voters were against closer political and economic relations with Ukraine. Many of these voters ignored arguments that Ukraine should be more closely integrated with Europe out of fear for Russia. Not even 6 years later, there appears to be much unanimity among Dutch society that Ukraine is very much part of Europe. (Rightfully so) Ukrainian refugees are very welcome, with Dutch citizens even willing to drive to the Polish-Ukrainian border to pick people up.

banking on the very human fear of others, we see that xenophobia has more in common with our mammalian fear of spiders than the actual danger strangers pose; it is nothing more than fear over rationality. +

The future of xenophobia is opaque because it largely depends on human countermeasures in the coming decades. A large behavioral science study conducted in 2015 stated that our social identity needs to "emphasize a superordinate level of identification that includes both the in-group and the out-group," in order to tackle xenophobia.[279] Put simply, our future hope of living in a less xenophobic world lies in expanding our hunter-gatherer band to include all human beings.[280] + +

2. geopolitics — on war & peace

During the previous 3400 years, there have been no recorded wars for only 268 of them. Humans have been at peace for only 8% of recorded history.[281] For international politics, war and peace are major questions: What motivates people to pick up arms? How does one sustain peace? One approach is the emphasis on geographical considerations. Geopolitics focuses on the interplay between politics and geographical concerns. The idea is that topography (e.g., who one's neighbors are) and natural environments (e.g., access to water) influence how political actors interact with each other. Nowadays, geopolitics has become a loose synonym for international politics since such geographical concerns are so fundamental to how countries interact.[282]

2.1 traditional security — borders & militarization

The provision of security is one of the main functions of the state. Yet, what does security truly entail? Traditionally, the focus has mostly been on what is understood as national security matters: protecting borders and the inside population from outside threats.[283] This means that the military has a big role in guaranteeing security, and military power is generally compared to understanding countries' security capabilities. The focus here is on military spending, the number of troops, and how advanced military equipment and technologies are. For years, the U.S. has been the main spender on its military[284] but possibly more interesting here is that globally since 1995, countries have increasingly spent more on

285. Stockholm International Peace Research Institute, “World military spending rises to almost $2 trillion in 2020,” in Stockholm International Peace Research Institute. April 26, 2021, viewed on December 8, 2021, https://www.sipri.org/media/press-release/2021/world-military-spending-rises-almost-2-trillion-2020.
286. M. Funaiole & B. Hart, “Understanding China’s 2021 Defense Budget,” in Center for Strategic & International Studies, March 5, 2021, viewed on December 8, 2021, https://www.csis.org/analysis/understanding-chinas-2021-defense-budget.
287. Stockholm International Peace Research Institute, “World military spending rises to almost $2 trillion in 2020,” in Stockholm International Peace Research Institute, April 26, 2021, viewed on December 8, 2021, https://www.sipri.org/media/press-release/2021/world-military-spending-rises-almost-2-trillion-2020.
288. F. Morgan and R. Cohen, “Military Trends and the Future of Warfare,” in RAND Corporation, May 11, 2020, viewed on December 29, 2021, https://www.rand.org/pubs/research_reports/RR2849z3.html.
289. R. Cohen, E. Han, and A. Rhoades, “Geopolitical Trends and the Future of Warfare,” in RAND Corporation, May 11, 2020, viewed on December 29, 2021, https://www.rand.org/pubs/research_reports/RR2849z2.html.
290. Stockholm International Peace Research Institute, “World military spending rises to almost $2 trillion in 2020,” in Stockholm International Peace Research Institute, April 26, 2021, viewed on December 8, 2021, https://www.sipri.org/media/press-release/2021/world-military-spending-rises-almost-2-trillion-2020.
291. E. Knickmeyer, “Study says nearly half of defense spending for 9/11 wars went to private contractors,” in PBS, September 13, 2021, viewed on December 8, 2021, https://www.pbs.org/newshour/politics/study-says-nearly-half-of-defense-spending-for-9-11-wars-went-to-private-contractors.

their militaries[285] (see graph ‘World Military Expenditure, by Region, 1988-2020’). The increase is the largest in the Asia and Oceania region, and possibly the greatest contributor to this increase is China. For more than a decade, its military budget has increased between 6% to 13% annually[286] and has been rising for twenty-six consecutive years.[287] Noticeably, conventional American troops are reducing in number. This means that the quantitative gap between the U.S. and countries such as China and Russia is decreasing.[288] This change in military-power perceptions is likely to cause a faster escalation in future conflicts since the U.S.’s hegemonic power appears to have ended and other actors are willing to take over part of the military vacuum.[289]

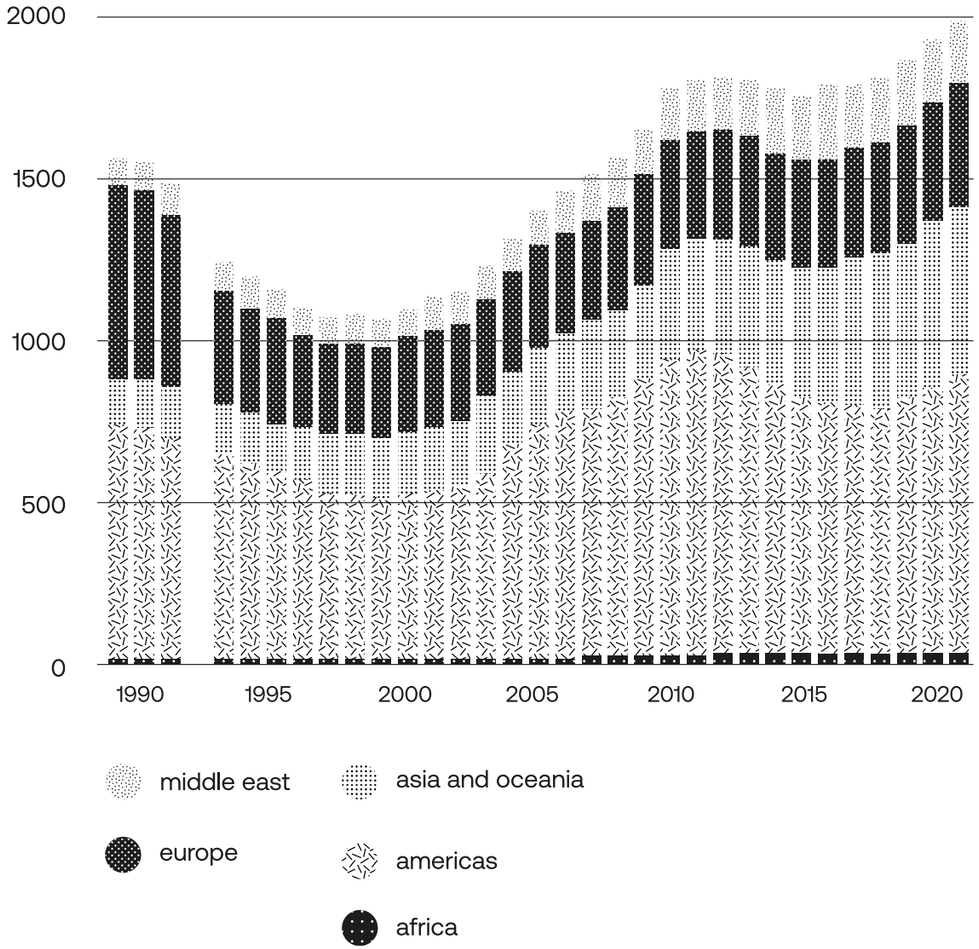
Furthermore, the focus on national militaries is also changing. Ever since the wars in Iraq and Afghanistan, the world has seen a great tendency toward the privatization of the military.[291] Privatization of the military has mostly happened for two reasons:

1. Privatization allowed for the reduction of annual military costs: governments now do not have a part of their troops on the payroll, but only pay when they require the troops.
2. Through increased media access, citizens could see their soldiers dying abroad, and this made it politically more costly to send troops away. By hiring private companies, governments do not have to provide the same justifications.[293]

This development does, however, impose additional questions about what security means. Since these companies are the actors on the ground, they have the upper hand in defining what counts as a threat and when intervention is required. In effect, military operations take much longer and also become more expensive.[294] Additionally, in their quest to be the most attractive security provider, private military companies continue to develop new processes and weapons. In this way, violence is innovative, and these companies contribute to developing new technologies, which can protect some people while also causing great harm to others.[295] Furthermore, private military security companies will have an increasingly important role in information warfare and data protection, especially since many government technologies tend to adopt such private technological security systems.[296] The increased use of

world military expenditure, by region, 1988–2020[290]

no total was calculated for 1991 because of the absence of data for the Soviet Union.



292. A. Horton & A. Gregg, "Use of military contractors shrouds true costs of war. Washington wants it that way, study says," in The Washington Post, June 30, 2020, viewed on December 8, 2021, https://www.washingtonpost.com/national-security/2020/06/30/military-contractor-study.
293. E. Knickmeyer, "Study says nearly half of defense spending for 9/11 wars went to private contractors," in PBS, September 13, 2021, viewed on December 8, 2021, https://www.pbs.org/newshour/politics/study-says-nearly-half-of-defense-spending-for-9-11-wars-went-to-private-contractors.
294. A. Horton and A. Gregg, "Use of military contractors shrouds true costs of war. Washington wants it that way, study says," in The Washington Post. June 30, 2020, viewed on December 8, 2021, https://www.washingtonpost.com/national-security/2020/06/30/military-contractor-study/.
295. W Pałka, "The Awakening of Private Military Companies," Warsaw Institute, August 2020, pp. 1–15.
296. Ibid.
297. M. Kaldor, "Peacemaking in an Era of New Wars," in Carnegie Europe, October 14, 2019, viewed on December 8, 2021, https://carnegieeurope.eu/2019/10/14/peacemaking-in-era-of-new-wars-pub-80033.
298. M. Albuquerque, "New Wars and New Practices in Contemporary Armed Conflicts," in E-International Relations, May 26, 2020, viewed on December 8, 2021, https://www.e-ir.info/2020/05/26/new-wars-and-new-practices-in-contemporary-armed-conflicts/.
299. A. Moseley, "Just War Theory," in Internet Encyclopedia of Philosophy, viewed on December 8, 2021, https://iep.utm.edu/justwar/.
300. J. Horgan, "We Need a New Just-War Theory, Which Aims to End War Forever," in Scientific American, April 24, 2013, viewed on December 8, 2021, https://blogs.scientificamerican.com/cross-check/we-need-a-new-just-war-theory-which-aims-to-end-war-forever/.

private military forces thus creates new challenges and raises questions about the future of warfare.

2.2 does warfare ever change? old wars vs. new wars

Although Francis Fukuyama's *The End of History and the Last Man* has been countered many times, at the end of the Cold War many international actors perceived that something had changed in the nature of conflicts. Mary Kaldor introduces in her book *New and Old Wars*, which was first published in 1999, the concept of *New Wars*. Although people disagree about how exactly to define it and to what extent it is true, Kaldor argues that the nature of conflicts has changed. Increasingly, wars are not fought between two countries but between a state and a non-state actor (like the War or Terror) or even two non-state actors. Moreover, conflicts are no longer relatively short wars but instead, long intractable conflicts. Generally, these conflicts are low in intensity but with sudden spikes in aggression. The war in Syria is a prime example of such conflict.[297]

As mentioned, not everyone agrees with Kaldor's distinction but most recognize a key contribution that she has made; the idea that the proliferation of the new, or irregular, wars is connected to the weakening position of the state as the legitimate source of norms. This has a direct impact on what are understood to be justified reasons to wage war, known as the *Just War Theory*.[298] Since conflicts can create such devastation and large numbers of casualties, the international community generally requires a justified reason to join a conflict and has agreed on several conventions to conduct war in a more morally acceptable way.[299] Since the nature of conflicts is changing (e.g., the role of non-state actors and long, but low-intensity conflicts), there are calls to re-evaluate such standards for a justified war or conflict.[300]

An example of one such standard for a just war is that there needs to be a good chance of coming out victorious. For this, one demand is that the party is fighting a demarcated enemy.[301] When the U.S. started the War on Terror, there was much criticism because fighting all terror in the world appears impossible since countries will always manage to find new actors to label terrorists. The difficulty of pulling international troops out of

Afghanistan in August 2021 appears to reaffirm this. After so many years of conflict, the party labeled a "terrorist organization" took over the country in a matter of days.[302] One can thus question how justified the international intervention was. However, since the nature of conflicts is changing, it becomes increasingly more difficult to wage war following the traditional perceptions included in *Just War Theory*.

Additionally, the emergence of new technologies raises questions about the nature of conflicts. The use of drones allows one party to intervene without risking any soldiers, completely changing casualty-risk considerations.[304] Moreover, 3D printers make weapons much more readily available and much more difficult to regulate in regard to who has access to weapons.[305] Thus, such new technologies will also influence the future of warfare and the way governments approach security challenges.

However, the emergence of the *New Wars* does not mean that *Old Wars* are no longer waged. A non-elderly citizen of North America, Europe, or some parts of Oceania is likely to never have experienced war within their territory. When their countries were at war, it was waged thousands of kilometers from their national borders. The conflicts that these countries partook in were multilateral interventions, not territorial wars between two individual countries; think of the war in Iraq, the mission in Mali, or the war in Afghanistan.[306] That is not a universally shared human experience. Although *New Wars* are often intrastate or against non-state actors, there are still *Old Wars* occurring in the world. Despite the fact, war accounts for only 1% of global deaths in the early 21st century instead of the 15% in ancient agricultural societies,[307] wars are still waged over the acquisition of land, resources, and strategic locations.[308] Think, for example, of the Armenia-Azerbaijan conflict,[309] the Russo-Ukrainian war,[310] or the war in Georgia.[311] An important aspect to note here is that wars over territory don't revolve around the land in every case. For example, the annexation of Crimea had the added reason for large amounts of oil and gas found in the Black Sea. By capturing the Crimean peninsula, Russia secured the territorial sea and Exclusive Economic Zone (EEZ) surrounding it, meaning they now have access to large amounts of fossil fuels.[312] Israeli historian Harari wrote in 2015 that it makes no sense to invade America to capture Silicon Valley, as they don't produce silicon. Instead, its value lies in knowledge, which cannot easily be captured.[313] Whilst information may become the most valued asset in the world; there is still conflict over scarce resources used for energy, production, and subsistence.

Instead, new forms of warfare (i.e. non-state actors playing a larger role in conflicts, cyber warfare, and modern warfare technologies) created a mixture of both Old Wars and New Wars: Hybrid War.[314] This form of warfare combines soft power with hard power to exhaust the enemy's resources and resolve.[315] An example of this can be found in China's treatment of Taiwan. China flies hundreds of jets over Taiwanese airspace (which did not lead to open confrontation), extracts resources from small islands around Taiwan, isolates Taiwan from its allies, as well as forces private companies to recognize Taiwan as part of China by threatening to lose access to mainland China.[316]

Another aspect of today's warfare (and future warfare) is the deployment of armed UAVs (Unmanned Aerial Vehicles). These armed drones used to be the domain of superpowers such as Russia, China, and the United States. But they are rapidly becoming more accessible, leading to smaller nations and even non-state actors having access to this deadly vehicle for war.[317] Every era has a dominating technology or technique in warfare, from the war chariots of ancient times to the English longbow archers of the Middle Ages and the tanks of the Second World War.[318] Low-cost drones can be produced in large quantities, and Anti-Air weaponry is not yet prepared to counter a mass drone attack.[319] Almost every nation that uses drones claims to have 'protocols' in place to prevent civilian casualties, but these are not verified.[320] An example of armed drones in action is the deployment of drones by the Turkish government in Iraq.[321] Whilst the Turks claim that warfare becomes more 'precise' and 'humane' through the use of armed UAVs, the citizens of Northern Iraq feel that they are constantly being held at gunpoint.[322] Lastly, drones change our legal understanding of self-defense. In a 'boots on the ground' situation, soldiers repel an identified attack, but with drones, self-defense becomes 'individualized', where the target poses a constant imminent threat.[323] This changed idea of self-defense means that proportionality as a principle changes with it. Instead of the complexity of soldiers versus soldiers, drones may reduce the discussion to the simple question: 'is this person an enemy'. There is

301. A. Moseley, "Just War Theory," in Internet Encyclopedia of Philosophy, viewed on December 8, 2021, https://iep.utm.edu/justwar/.
302. S. Coll & A. Entous, "The Secret History of the U.S. Diplomatic Failure in Afghanistan," in The New Yorker, December 10, 2021, viewed on December 10, 2021, https://www.newyorker.com/magazine/2021/12/20/the-secret-history-of-the-us-diplomatic-failure-in-afghanistan.
303. J. Horgan, "We Need a New Just-War Theory, Which Aims to End War Forever," in Scientific American. April 24, 2013, viewed on December 8, 2021, https://blogs.scientificamerican.com/cross-check/we-need-a-new-just-war-theory-which-aims-to-end-war-forever/.
304. T. Glazebrook, "Are drone strikes ever ethical?" in The New Statesman, November 3, 2019 (updated September 9, 2021), viewed on December 10, 2021, https://www.newstatesman.com/world/2019/11/are-drone-strikes-ever-ethical.
305. K. Hamilton, "I 3D-Printed a Glock to See How Far Homemade Guns Have Come," in Vice News. August 25, 2021, viewed on December 20, 2021, https://www.vice.com/en/article/bvzak4/ghost-gun-glock-3d-printing.
306. M. Madej, 'introduction', Western Military Interventions After The Cold War Evaluating the Wars of the West, M. Madej (Ed), Routledge, London, 2019, p. 3.
307. Y. Harari, Homo Deus, Signal Books, Canada, 2015, p. 21.
308. P. Poast, 'This land is no longer your land: a primer on territorial disputes', in War on the rocks, 3 December 2021, viewed on 8 March 2022, https://warontherocks.com/2021/12/this-land-is-no-longer-your-land-a-primer-on-territorial-disputes/.
309. T. de Waal, 'Unfinished Business in the Armenia-Azerbaijan Conflict', in War on the rocks, 11 February 2021, viewed on 8 March 2022, https://carnegieeurope.eu/2021/02/11/unfinished-business-in-armenia-azerbaijan-conflict-pub-83844.
310. New York Times, 'Maps: Tracking the Russian invasion of Ukraine', 7 March 2022, viewed on 8 March 2022, https://www.nytimes.com/interactive/2022/world/europe/ukraine-maps.html.
311. M. Kofman, 'The august war, ten years on: a retrospective on the russo-georgian war', in War on the rocks, 17 August 2017, viewed on 8 March 2022, https://warontherocks.com/2018/08/the-august-war-ten-years-on-a-retrospective-on-the-russo-georgian-war/.
312. A. Cohen, 'As Russia Closes In On Crimea's Energy Resources, What Is Next For Ukraine?', in Forbes, 28 February 2019, viewed on 8 March 2022, https://www.forbes.com/sites/arielcohen/2019/02/28/as-russia-closes-in-on-crimeas-energy-resources-what-is-next-for-ukraine/?sh=2580207629cd.
313. Y. Harari, Homo Deus, Signal Books, Canada, 2015, p. 21-22.
314. A. Toupchinejad, 'China's Hybrid War On Taiwan: Fighter Jets To Fruit Politics', in NATO Association, 13 October 2021, viewed on 8 March 2022, https://natoassociation.ca/chinas-hybrid-war-on-taiwan-fighter-jets-to-fruit-politics/.
315. A. Toupchinejad, 'China's Hybrid War On Taiwan: Fighter Jets To Fruit Politics', in NATO Association, 13 October 2021, viewed on 8 March 2022, https://natoassociation.ca/chinas-hybrid-war-on-taiwan-fighter-jets-to-fruit-politics/.
316. Ibid.
317. J. Marcus, 'Combat drones: We are in a new era of warfare - here's why', in BBC, 4 February 2022, viewed on 8 March 2022, https://www.bbc.com/news/world-60047328.
318. Ibid.
319. Ibid.
320. L. Hofman, 'Drones have changed warfare. This is what life is like as a constant human target', in The Correspondent, 18 November 2020, viewed on 8 March 2022, https://thecorrespondent.com/805/drones-have-changed-warfare-this-is-what-life-is-like-as-a-constant-human-target/106499031870-6e6fac5e.
321. Ibid.
322. Ibid.

a difference between Old Wars and New Wars, but the existence of hybrid warfare blurs the lines between the two, and new methods of warfare do not negate the fact that wars are still initiated over 'old' motives such as land, sea, and resources.

2.3 cyberwarfare — when actors resort to different methods

A German team of scientists led by Ralph Langner made a staggering discovery in 2010. Langner's team uncovered a cyber-attack that had a global reach but was highly targeted.[324] The worm, that came to be known as Stuxnet, was meant to disrupt the Natanz nuclear facility in Iran.[325] Stuxnet caused the enrichment centrifuges to break down. Stuxnet profoundly changed the way cybersecurity fits into a scientific understanding of warfare. Traditionally, proportionality in warfare, as proposed by 17th-century legal theorist Hugo Grotius, meant that an aggressive action from the belligerent justified an equal response of the defender: an eye for an eye instead of scorched earth in response to a minor border incident.[326] However, how does an attack that plays out in the digital sphere intended to cause physical harm fit into this narrative of proportionality? For example, years prior to the Stuxnet case, in 1981, Israeli forces dropped sixteen bombs on an Iraqi nuclear research facility to halt their progress.[327] 'Operation Opera,' as it came to be known, killed eleven soldiers and civilians. Stuxnet did not kill anyone. Operation Opera did. Both had the intended effect of harming a country's nuclear capability. Which one of the two was proportional to the threat they posed? There is no clear answer to this question, as is often the case with ethics. Cyberwarfare will raise many more such questions.

The future of cybersecurity is one of rapid advancement. To illustrate, the U.S. Department of Energy deployed the supercomputer 'Roadrunner' in 2008.[328] The supercomputer cost 120 million USD to build. The computer covered 560 square meters, had 296 servers, and contained 122,400 processor cores.[329] Roadrunner was already redundant by 2014 because its processing power was no longer competitive.[330] The speed of the development of computing power is often described using Moore's law.[331] Gordon Moore predicted in 1965 that the number of transistors per silicon chip would double every year.

323. R. Mignot-Mahdavi, Drone Programs, The Individualization of war and the ad bellum principle of proportionality, in Lieber Series Vol. 4, Oxford University Press, 2020, p. 29.
324. P. Singer, 'Stuxnet And Its Hidden Lessons On the Ethics Of Cyberweapons', in CaseWestern Reserve Journal of International Law 47, 2015/1, viewed on 16 March 2022, p. 79. https://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1009&context=jil.
325. Ibid.
326. Ibid., p. 84.
327. C. Kahl, 'An Israeli Attack Against Iran Would Backfire—Just Like Israel's 1981 Strike on Iraq', in Washington Post, 2 March 2012, viewed on 16 March 2022. https://www.washingtonpost.com/opinions/an-israeli-attack-against-iran-would-backfire--just-like-israels-1981-strike-on-iraq/2012/02/28/gIQATOMFnR_story.html
328. P. Singer and A. Friedman, Cybersecurity and Cyberwar: What Everyone Needs to Know' (New York: Oxford University Press 2014) p.247.
329. Ibid.
330. Ibid.
331. Britannica, T. Editors of Encyclopaedia, 'Moore's law', in Encyclopedia Britannica, 26 December 2019, viewed on 16 March 2022. https://www.britannica.com/technology/Moores-law.
332. Ibid.
333. D. Rotman, 'We're not prepared for the end of Moore's Law', in MIT Technology Review, 24 February 2020, viewed on 16 March 2022. https://www.technologyreview.com/2020/02/24/905789/were-not-prepared-for-the-end-of-moores-law/.
334. Ibid.
335. E. van Wie Davis, Shadow Warfare: Cyberwar Policy in the United States, Russia, and China, in Security and Professional Intelligence Education Series (SPIES) (London: Rowman & Littlefield 2021) p. 106.
336. Ibid., p. 107.
337. Ibid., p. 108.
338. Z. Abbany, 'Ukraine: Cyberwar creates chaos, 'it won't win the war'', in DW, 3 March 2022, viewed on 16 March 2022. https://www.dw.com/en/ukraine-cyberwar-creates-chaos-it-wont-win-the-war/a-60999197.
339. Ibid.
340. S. Dasgupta, 'The Future of Cyberwarfare', in Security Boulevard, 11 March 2021, viewed on 16 March 2022. https://securityboulevard.com/2021/03/hack/.
341. Ibid.
342. Ibid.
343. Ibid.

He was close: over the next decade, the number of transistors doubled approximately every 18 months.[332] Half a century later, almost all the electronic commodities we care about are a reflection of Moore's prediction: smartphones, cheap laptops, and GPS, but also artificial intelligence and genetic medicine acquired through machine learning.[333] However, the rate of Moore's law is declining, as chip development reached a threshold where the research effort of developing the next generation of computer chips has risen by a factor of 18 since 1971.[234] However, the leaps in the broader technology sector still warrant plenty of *unknown unknowns*.

This growing global computing capability is not only used for good. Cybercrime, hacktivism, cyberespionage, weaponized cyberattacks, and cyber disinformation campaigns are the new aggressive arsenal of global superpowers such as China, Russia, and the United States.[335] Over the past three decades, cyberwar capabilities have been deployed to target power grids, dams, centrifuges, missile launchers, and electronic election systems.[336] Cyberwarfare is nigh invisible, but it is also continuous, as its strategic goals are different from conventional warfare. The goal of cyberwarfare is overall power projection, which is not a goal with a set end in sight.[337] Cyberwarfare can also accompany 'boots on the ground' warfare practices. For example, Ukraine had to combat 150 cyberattacks in the first two weeks of the Russo-Ukrainian War.[338] These attacks include espionage, disinformation, and 'wiper attacks' meant to delete data on Ukrainian-run networks.[339] Cyberwarfare practices are used between nations in peacetime as well. For instance, in 2020, Iran faced a DDoS (Distributed Denial-of-Service) attack on its internet infrastructure. Chinese hackers attempted to steal classified documents from the Malaysian government-backed projects. The Russian government has intruded on the U.S. cyber infrastructure since 2011.[340] The total cost of cybercrime on economies is estimated to reach trillions of dollars in the near future.[341] The number one priority for combatting cybercrime and cyberwarfare is the creation of international guidelines and regulations for malicious cyber practices.[342] Cyberwarfare will remain too alluring for governments to deploy until such international norms are in place, as the grayness of its current legality means the aggressors easily get away with their malpractices.[343]

2.4 the politicization of strategic resources

Politics has to do with how scarce resources are divided. In the international arena, the scarcity of resources is often the cause of tensions. Many wars have been fought, for instance, over the access to or prices of oil. Climate change, however, has made some scarce resources even scarcer and made other countries find renewable energy sources, which upset other countries.[344] Although there are many other scarce but strategic resources, this section will focus on the emerging sand scarcity and the strategic importance of water. +

The demand for sand has skyrocketed in recent years as a result of the human desire to build ever more buildings and infrastructure. Since 2000, the amount of construction sand used every year has more than tripled and is still rising fast.[345] In most countries, the demand for sand exceeds domestic production. In the U.S., the price of sand increased at least 24% between 2011 and 2016, and the global value of sand increased sixfold in the last twenty-five years.[346] The issue is that desert sand cannot be used for construction, and thus sand needs to be dug out from oceans, seas, and rivers. This means that, currently, West Asian and North African countries are importing sand from as far as Australia and Canada.[347] Sand mining from rivers and seas also brings about additional risks, since this speeds up erosion, threatens biodiversity, and makes communities more vulnerable to climate change.[348]

All these worries have also led to policy changes. Singapore, which, since its independence in 1965, has increased its landmass by at least 20%, considers reclamation as the solution for accommodating its growing population.[349] Therefore, it has been stocking up on sand.[350] Since countries like Cambodia, Malaysia, and Indonesia have introduced sand export bans (Indonesia specifically bans sand exports to Singapore), it is increasingly more difficult and pricier to buy sand. Cambodia introduced export bans on sand after pressure from environmental groups because sand mining was harming coastal ecosystems and biodiversity.[351]

Additionally, the shortages and high prices of sand also have created a new type of crime: the sand mafias. From Mexico to South Africa to India, police reports include murders and disappearances concerning the

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If you like to explore the dynamics between strategic resources and political outcomes, I highly suggest reading 'Carbon Democracy: Political Power in the Age of Oil' by Timothy Mitchell. Throughout the book, Mitchell unravels the link between fossil fuels with the withering of democracy. Conventionally, many assume that the limited forms of democracy in the Middle East are restricted because of cultural and religious practices. In reality, Mitchell argues that the physical properties of oil limit the structure of the political response. For example, Mitchell talks about how the transportations networks of oil eliminate the opportunities for unions and labor rights. Fewer people are required to work, fewer people to supervise, and fewer central hubs. This was all planned to limit communities of workers and to the influences of labor unions, which were prominent with the extraction of coal. As oil companies gained influence politically, a history of pushback was translated institutionally. Source:

344. M. Keating, "How do resources create conflict?" in World Economic Forum, August 11, 2015, viewed on December 8, 2021, https://www.weforum.org/agenda/2015/08/how-do-resources-create-conflict/.
345. V. Beiser, "Why the world is running out of sand," in BBC Future, November 18, 2019, viewed on December 8, 2021, https://www.bbc.com/future/article/20191108-why-the-world-is-running-out-of-sand.
346. A. Torres, J. Liu, J. Brandt, & K. Lear, "The World is Facing a Global Sand Crisis," in The Conversation, September 8, 2017, viewed on December 8, 2021, https://theconversation.com/the-world-is-facing-a-global-sand-crisis-83557.
347. A. Niranjan, "Sand crisis: Mafias thrive as shortages loom," in DW, March 15, 2021, viewed on December 8, 2021, https://www.dw.com/en/sand-crisis-shortage-supply-mafia/a-56714226.
348. A. Torres, J. Liu, J. Brandt, & K. Lear, "The World is Facing a Global Sand Crisis," in The Conversation, September 8, 2017, viewed on December 8, 2021, https://theconversation.com/the-world-is-facing-a-global-sand-crisis-83557.
349. BBC News, "Cambodia bans sand exports permanently," in BBC News, July 13, 2017, viewed on December 8, 2021, https://www.bbc.com/news/business-40590695.
350. D. Moss, "What if Singapore runs out of sand?," in New Straits Times, November 15, 2020, viewed on December 8, 2021, https://www.nst.com.my/opinion/columnists/2020/11/641338/what-if-singapore-runs-out-sand.
351. BBC News, "Cambodia bans sand exports permanently," in BBC News, July 13, 2017, viewed on December 8, 2021, https://www.bbc.com/news/business-40590695.
352. A. Niranjan, "Sand crisis: Mafias thrive as shortages loom," in DW, March 15, 2021, viewed on December 8, 2021, https://www.dw.com/en/sand-crisis-shortage-supply-mafia/a-56714226.
353. P. Mahadevan, "Sand Mafias in India — Disorganized crime in a growing economy," Global Initiative Against Transnational Organised Crime, July 2019, pp.1–22.
354. H. Zhang and G. Donnellon-May, "China's Hydropower Plan on the Brahmaputra," in The Diplomat, September 1, 2021, viewed on December 10, 2021, https://thediplomat.com/2021/09/chinas-hydropower-plan-on-the-brahmaputra/.
355. E. Soloman, "Why water is a growing faultline between Turkey and Iraq," in Financial Times, July 4, 2018, viewed on December 10, 2021, https://www.ft.com/content/82ca2e3c-6369-11e8-90c2-9563a0613e56.

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There is a theory around this configuration: the resource curse. It would be interesting to see if sand-endowed countries will suffer from its benefit.

illegal mining of sand. Sand mafias have emerged in many places with job scarcity, feeding into the economic incentive, which results in local civilians digging the rivers, which sustain their communities, dry.[352] Poor working conditions and environmental degradation are what these communities are left with, while the sand mafias benefit from the increasing sand prices. Since sand is not even perceived by most as a valuable resource, and there is little awareness of the shortages and underworld associated with it, there are no international systems to ensure a more sustainable and morally correct sand-mining process.[353] The scarcity will keep increasing, which will not only drive prices up but also add to the criminality. +

Another valuable resource causing increasingly more tension between nations is water. This has to do both with access to water for drinking and irrigation, and the generation of sustainable energy. An example of this is the plan that China has to build a dam on the Brahmaputra River. The foreseen Medog super-dam, which is to be built in Tibet, is reported to generate 300 billion kWh of electricity annually, which is enough to sustain all of Tibet and can thus even be exported to other Chinese provinces. For China, this is an important step toward reducing its carbon emissions and opting for more sustainable solutions. The problem is that this river flows further downstream through India. For India, the river is important as it accounts for almost 30% of its freshwater resources and for about 44% of India's total hydropower potential. Moreover, if during the wet season, China decides to allow more water to flow through, India's already wet season will experience even more flooding. Similarly, in the dry season, China can stock more water and India will experience further water shortages.[354] Since these countries are already suspicious of each other, the dam causes further strain on their already weak relationship.

The attempts by China to generate more sustainable energy are seen as an immediate threat to access to water for drinking, irrigation, and energy generation for India. And this is not the only example that exists. The dams that generate energy in Turkey have resulted in Turkey controlling almost completely how much access to drinking water and irrigation the Iraqi population has.[355] Similarly, Ethiopia's Grand Ethiopian Renaissance Dam in the Nile is the cause of a decade-long diplomatic

dispute between Ethiopia, Egypt, and Sudan. Egypt has threatened Ethiopia multiple times that if the latter decides to stock more water in its hydropower dam, Egypt will respond with military action to break the dam apart.[356] Such examples of hydropower dams and sand shortages show how the very important efforts to counter climate change can add additional tension between neighboring countries.

2.5 human security

Such climate change-related tensions and shortages in necessary resources bring us back to the question of what security is truly about. Traditionally, security is about protecting borders and the population within. Currently, there are enough bullets in the world to shoot the global population twice, and people still do not feel secure.[357] Increased military spending is not without additional costs: not only does it bring more weapons to the world, but the additional money spent on defense is not used for public goods such as education or infrastructure, and thus may harm economic growth in the long run.[358] The Covid-19 pandemic, technological advancements (which also create new risks), rising house prices, climate change threats, and natural disasters are possibly just as, if not more, pressing for people's perception of security. Although with some of these threats, like natural disasters, the army does step in, with most other threats, increasing military spending or setting up new military alliances will not be able to prevent people from being affected by, for instance, a pandemic. For that, we need doctors and nurses, effective medical infrastructure, and international cooperation to prevent new variants from emerging.

For this reason, a new perspective on security has emerged: human security. As the human rights organization GPPAC describes it, human security is based on the idea that people should live free from fear (e.g., wars, persecution, and physical harassment), want (e.g., access to education, jobs, and natural resources), and indignity (e.g., access to justice, and equal rights).[359] As shown with the example of strategic resources and how climate change puts even more strain on important resources like access to drinking water or how sand mafias have introduced great violence into the sand mining industry, it becomes clear these security matters cannot be seen independently from each other.

356. Al Jazeera, "Ethiopia's massive Nile dam explained," in Al Jazeera, July 8, 2021, viewed on December 8, 2021, https://www.aljazeera.com/news/2021/7/8/explainer-ethiopias-massive-nile-dam.
357. J. Rudy, "National Security versus Human Security," in GPPAC, January 21, 2018, viewed on December 8, 2021, https://gppac.net/national-security-versus-human-security.
358. B. Rooney, G. Johnson, and M. Priebe, "How Does Defense Spending Affect Economic Growth?" in RAND Corporation, 2021, viewed on December 8, 2021, https://www.rand.org/pubs/research_reports/RRA739-2.html.
359. GPPAC, "Human Security," in GPPAC, viewed on December 8, 2021, https://gppac.net/what-we-do/human-security.
360. E. Remacle, "Approaches to Human Security: Japan, Canada, and Europe in Comparative Perspective," The Journal of Social Science, vol. 66, 2008, pp.5–34.
361. A. Steiner, "25th Anniversary of the Human Security concept," in United Nations Development Programme, February 28, 2019, viewed on December 20, 2021, https://www.undp.org/speeches/25th-anniversary-human-security-concept.
362. X. Yan, "From a Unipolar to a Bipolar Superpower System: The Future of the Global Power Dynamic," in Carnegie Endowment for International Peace, December 30, 2011, viewed on December 8, 2021, https://carnegieendowment.org/2011/12/30/from-unipolar-to-bipolar-superpower-system-future-of-global-power-dynamic-pub-47688.
363. W. Tao, "International Order Won't Be Bipolar," in China-US Focus, January 21, 2020, viewed on December 8, 2021, https://www.chinausfocus.com/foreign-policy/international-order-wont-be-bipolar.
364. F. Arif, "Transition of Balance of Power from Unipolar to Multipolar World Order," in Modern Diplomacy, September 19, 2020, viewed on December 8, 2021, https://moderndiplomacy.eu/2020/09/19/transition-of-balance-of-power-from-unipolar-to-multipolar-world-order/.

Governments and international organizations, therefore, have introduced the idea of human security as a holistic security approach. Countries like Japan and Canada have adopted human security in their security frameworks. For both of these countries, it means that rather than simply focusing on security from a military and conflict perspective, security includes matters such as human rights, health, education, housing, gender equality, and much more.[360] Moreover, the UN has also adopted human security in its framework. The 2030 Agenda and the Sustainable Development Goals (SDGs) are all built upon this idea that security has to do with much more than just military protection. It stimulates countries that have not yet done so to include matters like poverty, health, and education into their security considerations.[361] The efforts made by actors such as the UN and GPPAC contribute to having this concept of security understood much more broadly.

2.6 global powers & the power shift

To understand the dynamics in the international arena, scholars generally try to map out which countries are the main actors and in what kind of arena they interact with each other. This can be a bipolar world, like the Cold War, when the U.S. and the Soviet Union were the two main powers who influenced how most of the other countries interacted with one another. Some argue that after the Cold War, the U.S. became the hegemon and was able to dominate most of international politics.[362] Nowadays, many more countries appear to be present and willing to let their voices be heard in the international arena. For some, the reemergence of China means a similar Cold War dynamic between two major powers, but this time between the U.S. and China. Others understand the presence of many regional and mid-sized powers as a much more dynamic multipolar system.[363]

It is important to stress here that the literature and research are very much inconclusive about which of these systems (unipolarity, bipolarity, multipolarity) exists, either currently or in the past. Moreover, there is no agreement on whether one of them would be preferable due to, for instance, allowing for more peace in the world.[364] What such concepts do allow, however, is to try and understand who exerts influence in the world. That is very difficult to predict. Thirty years ago, no one

365. Ibid.
366. Union of International Associations, “How many international organizations are there?” in Union of International Associations, viewed on January 17, 2022, https://uia.org/faq/intorgs1.
367. United Nations, “About Us,” in United Nations, viewed on December 27, 2021, https://www.un.org/en/about-us.
368. United Nations, “UN System,” in United Nations, viewed on December 27, 2021, https://www.un.org/en/about-us/un-system.

+ Adlan Hidayat
If you would like to explore challenges to the institutional framework for development, I recommend reading ‘The Problematization of Poverty: The Tale of Three Worlds and Development’ by Arturo Escobar. Escobar argues that development professionals (from the UN, World Bank, etc.) sought to devise mechanisms and procedures to make societies fit a pre-existing model. He found that when intergovernmental institutions aimed to help the ‘developing world’, they didn’t aim to understand the particular circumstances, which produced worse outcomes. Source:

mentioned China. People focused on Japan as the major Asian power in the world. Yet, since countries do not interact with each other in a vacuum or isolated space but are bound by economic conditions, alliances, and domestic politics, changes may occur where one does not expect them. Currently, the U.S. and China appear to be the big players. The EU and countries like Russia, Turkey, Saudi Arabia, Iran, South Africa, Nigeria, Mexico, and Brazil exert regional influence.[365] Yet many questions remain: Which are the actors that influence global and regional politics the most? Since most people did not predict the reemergence of China as a global actor, could there be another country that grows as rapidly?

3. international cooperation — enemies and allies

Nowadays, there are over 68,000 international organizations.[366] All of these focus on different international challenges. In our continuously changing world, we face challenges that cannot just be solved by individuals, communities, or countries by themselves. Issues like climate change and global development, as well as the Covid-19 pandemic, demand international cooperation in order to find solutions. This section addresses some of these platforms, which allow countries but also non-state actors to cooperate and will influence our global future. +

3.1 politics at the highest level — the united nations

In terms of international engagement and representation, the UN is and will most likely remain unparalleled for the foreseeable future. The UN was founded in 1945, after the horrors of World War II, and has grown to 193 member states.[367] The UN consists of many different agencies, programs, and funds that all address different challenges that the world faces.[368] Its long history as an international organization, and the large number of members and agencies does not, however, mean that solving these global issues always goes smoothly. Key topics the UN focuses on are security matters and climate issues. These two topics shape the current and future functioning of the UN.

The United Nations Security Council (UNSC) is the UN organ that deals with security matters such as peace and conflict intervention. It has fifteen members, of which there are five permanent members (known as the P5 members, consisting of the U.S., U.K., France, Russia, and China) which all have veto power, and ten rotating members, which do not have veto power. The P5 privileges stem back to the UN's foundation as these were the victors of World War II. However, to many, this power division does not represent the actual distribution of international power and it hinders the effective functioning of the UN. There is no permanent seat and veto power for any African, Latin American, Oceanian, East Asian, or North African countries, and it is argued that Europe/the West are overrepresented. Moreover, since P5 countries have very different international interests, it means the members have a tendency to use their veto power to make it impossible for the UNSC to intervene in conflict situations.[369]

Since these problems negatively impact how representative the UNSC is and its international prestige and integrity, there have been many calls for reforming the UNSC. These demands are in themselves nothing new; already in the 1990s, there were debates on changing the UNSC structure. Still, this debate is important for future international cooperation and global power structures, since the international prestige of this council gives it the authority to evaluate what justified military interventions are and when, for instance, sanctions are to be implemented. This means that it can have an incredible impact on which wars are intervened in and which countries face economic restrictions. An example of this is that Russia has already vetoed fourteen resolutions by the UNSC on the war in Syria, including ones that are aimed at minimizing the humanitarian consequences.[370] If debates continue to lead nowhere, the UNSC will remain a relatively inefficient organ, and the credibility of its decisions will be reduced.

Possible suggestions for reforms include changing its Western focus by introducing a single seat for the EU, increasing the number of seats, or introducing a new category of members: semi-permanent members.[371] Given that reforms have already been stuck for three decades, it will be interesting to see how political and security matters will influence the future of the UNSC's functioning. Perhaps the UN will restructure the P5 privileges or introduce additional seats, as a way to evolve to adapt to the new demands of the rest of the members.

Furthermore, the UN has also been an active player in combating climate change. The actions taken by individuals and countries would be too inconsistent and, thus, the UN has taken it upon itself to create systems, agencies, and platforms in which actors from all over the world can come together to prevent climate change.[372]

An important aspect of this is the SDGs, adopted by all UN Member States in 2015, which are aimed at future-proofing global development up to 2030. The SDGs consist of seventeen goals, which are not exclusively focused on sustainability with regard to climate change but a broader quality of life.[373] One difficulty that emerges with such a global and broad approach to sustainability is the question of how such efforts and progress can be measured. The UN has provided 232 SDG indicators in order to map the progress made with the realization of the SDGs but these are not without criticism. The indicators overlap and, at times, also contradict each other. The focus is heavily on economic indicators, which often do not give any sort of indication of sustainable practices. Moreover, it is unclear whether the indicators are all weighed equally or whether some of the indicators are more important. Lastly, and most importantly, in 68% of the SDG indicators, data is missing, making it impossible to evaluate what progress has been made globally in the realization of the SDGs.[374] The SDGs are obviously incredibly important in how actors come together globally in tackling climate change, and the indicators are required to map global progress. It is, however, good to be aware of the current limits and thus future challenges with which the SDG system presents us.

Additionally, the UN has set up multiple agencies in order to stimulate climate change-prevention cooperation. The annual Conference of the Parties (COP) meetings are an example of this, in which all international actors involved come together to review the implementation of COP agreements and negotiate on additional measures.[375] There is, however, also great awareness that sustainable development is not just realized by building on the UN's member states. Increasingly, there are attempts to directly involve different types of non-state actors. An example of such an initiative, which focuses on the inclusion of non-state actors, is the UN

369. CFR Staff, "The UN Security Council," in Council of Foreign Relations, August 12, 2021, viewed on December 27, 2021, https://www.cfr.org/backgrounder/un-security-council.
370. R. Barber, "Syria: What the UN can do, and must do," in The Interpreter, March 3, 2020, viewed on January 8, 2022, https://www.lowyinstitute.org/the-interpreter/syria-what-un-can-do-and-must-do.
371. J. Thibault, "The UN Security Council isn't working. Will it ever be completely reformed?" in The Conversation, June 21, 2020, viewed on December 27, 2021, https://theconversation.com/the-un-security-council-isnt-working-will-it-ever-be-completely-reformed-141109.
372. United Nations, "UN System," in United Nations, viewed on December 27, 2021, https://www.un.org/en/about-us/un-system.
373. United Nations, "The 17 Goals," in United Nations, viewed on December 27, 2021, https://sdgs.un.org/goals.
374. L. Saccani & I. van Lammeren, "How reliable and valid are the SDG Progress Reports?" in Radboud Centrum Sociale Wetenschappen, viewed on December 27, 2021, https://rcsw.nl/beroepsopleidingen/amid/blog/how-reliable-and-valid-are-the-sdg-progress-reports?language=nl.
375. United Nations Framework Convention on Climate Change, "Conference of the Parties (COP)," in United Nations Climate Change, viewed on December 27, 2021, https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop.

Global Compact. This initiative is the world's largest on corporate sustainability and includes more than 15,000 companies globally, which have committed themselves and their business strategies to universal principles on, among other things, sustainability and human rights.[376] All these efforts make the UN currently, as well as in the foreseeable future, a key actor in aligning the interests and efforts of international actors to reduce the impact of climate change.

3.2 when institutions die — the case of the world trade organization

It has been argued that the World Trade Organization (WTO), which is in charge of governing international trade, does not function anymore. There are two issues the WTO faces: its negotiations have stalled for years, and the dispute settlement mechanism does not function properly anymore.[377] With regard to negotiations and deciding on new trade policies, the WTO has been stuck for years in the negotiation process known as the Doha round. The issue is that the number of member states has grown a lot since its creation. Nowadays, the WTO has such a large number of member states that decision-making processes have become complex and difficult to realize.[378] Additionally, the dispute settlement organ, known as the Appellate Body, has ceased to function. Under the Trump government, which criticized the WTO for being unable to enforce on China equal competition laws (like property rights), the U.S. blocked the appointment of new judges. This means that, currently, the Appellate Body does not have enough judges to function.[379] Although President Biden announced that he would take a different stance than Trump and the U.S. would be back as an actor in international organizations, he has not made any significant process to revive the U.S.' commitment to the WTO.[380] International organizations such as the WTO have to find a future solution between balancing representing all their member states' interests, as well as retaining their effective functioning, in order to deal with future trade issues and develop new trade policies.

3.3 emerging powers — the BRICS

As a result of the lack of developments with global international organizations such as the UNSC and the WTO, cooperation has emerged at different international

376. United Nations Global Compact, "Our Mission," in United Nations Global Compact, viewed on December 27, 2021, https://www.unglobalcompact.org/what-is-gc/mission.
377. J. McBride & A. Siripurapu, "What's Next for the WTO?" in Council on Foreign Affairs, December 13, 2021, viewed on December 27, 2021, https://www.cfr.org/backgrounder/whats-next-wto.
378. B. Pakpahan, "Deadlock in the WTO: What is next?" in World Trade Organization, viewed on December 27, 2021, https://www.wto.org/english/forums_e/public_forum12_e/art_pf12_e/art19.htm.
379. B. Baschuk, "U.S. Says WTO's Appellate Body Is Invalid, Balks at Compliance," in Bloomberg, April 22, 2020, viewed on December 27, 2021, https://www.bloomberg.com/news/articles/2020-04-22/u-s-says-wto-s-appellate-body-is-invalid-balks-at-compliance.
380. S. Aarup, "'All talk and no walk': America ain't back at the WTO," in Politico, November 23, 2021, viewed on December 27, 2021, https://www.politico.eu/article/united-states-world-trade-organization-joe-biden/.
381. United Nations Industrial Development Organization, "Cooperation with BRICS," in United Nations Industrial Development Organization, viewed on December 27, 2021, https://www.unido.org/our-focus/cross-cutting-services/partnerships-prosperity/cooperation-brics.
382. BRICS India 2021, "Evolution of BRICS," in BRICS India 2021, viewed on December 27, 2021, https://brics2021.gov.in/about-brics.
383. United Nations Industrial Development Organization, "Cooperation with BRICS," in United Nations Industrial Development Organization, viewed on December 27, 2021, https://www.unido.org/our-focus/cross-cutting-services/partnerships-prosperity/cooperation-brics.
384. N. Kapoor, "BRICS and its future: The challenges of multilateralism," in Observer Research Foundation, May 13, 2020, viewed on January 17, 2022, https://www.orfonline.org/expert-speak/brics-future-challenges-multilateralism-66053/.
385. D Sacks, "Countries in China's Belt and Road Initiative: Who's In And Who's Out," in Council on Foreign Relations, March 24, 2021, viewed on December 27, 2021, https://www.cfr.org/blog/countries-chinas-belt-and-road-initiative-whos-and-whos-out.
386. D. Sacks, "Countries in China's Belt and Road Initiative: Who's In And Who's Out," in Council on Foreign Relations, March 24, 2021, viewed on December 27, 2021, https://www.cfr.org/blog/countries-chinas-belt-and-road-initiative-whos-and-whos-out.
387. S. Lau, P. Tamma, & J. Posaner, "EU makes late bid to rival China on the Silk Road," in Politico. November 30, 2021, viewed on December 27, 2021, https://www.politico.eu/article/eu-makes-late-bid-to-rival-china-on-the-silk-road/.

+ Chia-Erh Kuo
The impact of the China-led initiative is expected to continuously reshape the geopolitical scenarios, given that Beijing has been facing backlash from member countries for years. If you are interested in exploring more about the topic, I recommend reading a recent article about what Russia's invasion of Ukraine could mean for China's BRI.Sources:

levels. One such example is the cooperation between the BRICS (Brazil, Russia, India, China, and South Africa). The influence of these countries in the global arena is rapidly growing, and they have become a benchmark for industrialized economies.[381] These five countries together represent 41% of the world population, 24% of global GDP, and 16% of world trade. BRICS countries have been cooperating since 2009, and their policies focus on furthering political, economic, and cultural ties between the countries.[382] One example of this cooperation is the BRICS Development Bank, which contributes to development assistance.[383] Still, the success of the BRICS needs to be examined. There are many internal contradictions between the member states, and strengthening their international positions will help them to maintain domestic stability and growth. It is unclear whether this can be maintained for all the members in the future. Nonetheless, BRICS cooperation can be seen as an example of how actors, in this case, countries, who feel underrepresented in traditional international organizations, come together to further effective international cooperation among themselves.[384]

3.4 new initiatives & the importance of infrastructure — the belt and road initiative (BRI)

Another more recent international cooperation project is the BRI, formerly known as the One Belt, One Road Initiative. This multi-trillion project focuses on developing infrastructure all around the world in order to enhance economic growth and further connectivity. This initiative was proposed by China in 2013, and ever since, China has been at the forefront of projects such as railroads and ports.[385] The graph titled 'BRI Plans in 2021' shows a map of what the plans currently look like, though it needs to be stressed that the plans are continuously updated.[386] +

The projects are mostly funded by China and do not come without additional questions about what the political, economic, and security implications will be. In November 2021, the European Commission announced plans for Europe's Global Gateway; a €300 billion plan to finance EU infrastructure abroad. This is proposed as a way to counter China's growing dominance in developing countries, stimulate competition, and boost transparency and higher environmental standards.[387]

bri plans in 2021[386]

china's trade position per country**

- china is trade partner #1
- china is trade partner #2
- china is trade partner #3
- china is not a top 3 trade partner
- no data

- mainland chinese majority stake
- mainland chinese minority stake
- other type of mainland chinese involvement
- involvement by hong kong-based company

important bri hubs

- port
- railway
- multimodel

corridors

- major bri overland corridors
- major bri maritime corridors

* this is china's sole military base outside of china
** based on imf direction of trade statistics 2018: exports (fob) + imports (cif) with china per country, relative to other countries

Although infrastructure projects like railroads might not appear particularly political, infrastructure directly affects strategic and economic interests, and thus political relations. The massive amounts that countries are willing to pay for infrastructure in other countries show that this will be a major topic in future international cooperation. + + + +

3.5 covid-19 and international cooperation

Lastly, though not an example of an international cooperation platform, the Covid-19 pandemic has also raised questions about how the international community cooperates. Over the past two years, a new term has emerged in international politics: vaccine diplomacy. This is mostly focused on the idea that there are many diplomatic relations involved in the creation, recognition, and distribution of the Covid-19 vaccine. Covid-19 has become a matter of soft power; instead of influencing countries through financial aid or economic relations, health cooperation is at the forefront of countries' foreign policies. An example of this is China's involvement in delivering Chinese vaccines to developing countries. These developing countries had not been able to access vaccines to the same extent as many Western countries. As of December 2021, only 7% of the African population is fully vaccinated. Western concerns over the effectiveness of Chinese vaccines do not matter as much: having a vaccine with some protection is better than having no vaccine and protection at all. China has pledged to donate 600 million vaccines and supply 400 million locally produced vaccines to Africa. This is additional to the already 200 million doses that China has already supplied to Africa. To Chris Alden, director of the think tank LSE Ideas, it appears that China is in search of moral high ground in order to create a more favorable international image.[388]

Additionally, although some countries have shown themselves to be hesitant about sharing their vaccine supplies, the emergence of new Covid-19 variants has proven the WHO's warning that "No one is safe from Covid-19 until everyone is safe."[389] This means that a global solution is needed, and that individual hoarding of vaccines will not allow countries to move on from the pandemic.[390] Nonetheless, similar to climate change politics, countries' short-term and individual political, economic, and strategic interests appear to take precedence. How can

+ Chia-Erh Kuo
Japan has a similar strategy, intending to balance its interest in regional infrastructure development with suspicions about China. As a result, Tokyo has committed to spending $110 billion on infrastructure projects throughout Asia. In addition, Japan has also agreed with India to develop the Asia-Africa Growth Corridor (AAGC), a project to develop and connect ports from Myanmar to East Africa. Sources:

+ Elias Sohnle Moreno
China is tremendously growing its influence in Sub-Saharan Africa. Sub-Saharan Africa manifests the strongest population growth over the next 50 years, making it the ideal candidate for becoming the new factory of the world. China sees this as a massive opportunity as Chinese labor is becoming more costly and the standard of living increases. China is heavily investing via traditional methods (purchasing land, training workforce, etc.) and loaning almost impossible to repay funds to African public authorities to take advantage of this opportunity. That will often entail strong collateral, creating a potential future dependency on China.

+ Emma Datema
Reaction to the previous comment: Maybe be a bit careful with how strong you make the claims, there is also a lot of criticism that the impossibility to repay the loans is a very western way of analyzing the relationship between China and African countries, and many African countries actually loan much more from western countries/institutions and also private funds

+ Diede Kok
It isn't easy to describe just how historical international cooperation along the Silk Roads truly is. There are historical records dating from 2000 years ago noting the travelers that entered China, what they brought, when they arrived, and when they left; an administration system that is reminiscent of passport control. The Chinese reports refer to the Mediterranean as well as Roman cultures, whose inhabitants were said to be tall and wealthy. The BRI is a continuation of millennia of human history. Source: The Silk Roads, Peter Frankopan, p. 15-17.

388. V. Ni and H. Davidson, "'More cautious' China shifts Africa approach from debt to vaccine diplomacy," in The Guardian, December 8, 2021, viewed on December 27, 2021, https://www.theguardian.com/world/2021/dec/08/more-cautious-china-shifts-africa-approach-from-debt-to-vaccine-diplomacy.
389. World Health Organization, "No one is safe from COVID-19 until everyone is safe," in World Health Organization, July 20, 2021, viewed on December 27, 2021, https://www.who.int/news-room/photo-story/photo-story-detail/No-one-is-safe-from-COVID19-until-everyone-is-safe.
390. OECD, "Global challenges require global solutions," in OECD, viewed on December 27, 2021, https://www.oecd.org/sti/science-technology-innovation-outlook/crisis-and-opportunity/globalchallengesrequire-globalsolutions.htm.

the world move on from the Covid-19 pandemic when such an approach dominates? If, in the future, another pandemic occurs, what will the international community have learned from Covid-19? +

4. political developments around the world — individual regions

What could spark political change? This section looks at current political trends across the globe. It will focus on how several factors — such as the effects of the pandemic on the civic sphere and the political involvement of younger generations — could become driving forces behind political upheaval and reforms in different regions.

4.1 asia-pacific — china, democratic backsliding, & online activism

One trend that has shaped the political status quo in the Asia-Pacific region is China's growing influence on the political sphere. Coupled with its deepening autocratization, Beijing has tried to challenge the legitimacy of the democratic model by offering an alternative to the U.S.-led democracy camp. Within this context, China is facing intensified competition with other regional powers to establish supremacy and control over borders and trade routes. Unsolved international disputes — including tensions in the South China Sea,[391] Mekong Delta,[392] the Taiwan Strait,[393] and the Sino-Indian border[394] — have posed a significant challenge to the peace and stability of the region in the future.

The scale and degree of democratic backsliding is another worrying trend. The current pandemic has magnified preexisting democratic strengths and weaknesses within the region. Hybrid and authoritarian regimes, such as Cambodia, have tightened their grips on society in response to the pandemic, while democracies such as India and the Philippines have also experienced democratic decay.[395]

In addition, the destructive consequences of the pandemic could last for years; a study finds that political unrest tends to reach a peak two years after an epidemic starts.[396] Although autocrats are holding on in some countries, their inability to handle the virus has damaged

+ Pieter Hemels
It's interesting to see that more and more is being done regarding the accessibility of medicines in low- and middle-income countries. The South African government fought multinational drug companies over access to HIV/AIDS medicines in what was dubbed "Big Pharma vs Nelson Mandela" and won. Since then, the accessibility of medicine has increased significantly. Initiatives like Access to Medicine Index, founded by Wim Leereveld, tremendously impacted big pharma behavior. Organizations like I+ Solutions literally increase the accessibility of medicine by shipping medicines to a billion patients in these areas, financed by UN Global Fund, USAID and others. More and more, these organizations focus on independence for these countries regarding access to medicine. Sources:

391. The Council on Foreign Relation, "Territorial Disputes in the South China Sea," in the Council on Foreign Relations, viewed on December 7, 2021, https://www.cfr.org/global-conflict-tracker/conflict/territorial-disputes-south-china-sea
392. D. Hutt, "How Mekong River is turning into a new flashpoint in Indo-Pacific," in Deutsche Welle, December 8, 2021, viewed on December 9, 2021, https://www.dw.com/en/how-mekong-river-is-turning-into-a-new-flashpoint-in-indo-pacific/a-58842727
393. L. Maizland, "Why China-Taiwan Relations Are So Tense," in Council on Foreign Relations. May 10, 2021, viewed on December 7, 2021, https://www.cfr.org/backgrounder/china-taiwan-relations-tension-us-policy
394. A. Tellis, "Hustling in the Himalayas: The Sino-Indian Border Confrontation," in Carnegie Endowment for International Peace, June 4, 2020, viewed on December 7, 2021, https://carnegieendowment.org/2020/06/04/hustling-in-himalayas-sino-indian-border-confrontation-pub-81979
395. The International Institute for Democracy and Electoral Assistance, "The State of Democracy in Asia and the Pacific in 2021," in the International Institute for Democracy and Electoral Assistance, viewed on December 7, 2021, https://www.idea.int/gsod/sites/default/files/2021-11/state-of-democracy-in-asia-and-the-pacific-2021.pdf
396. R. Guest, "The aftermath of the pandemic will make politics more turbulent," in the Economist, November 8, 2021, viewed on December 7, 2021, https://www.economist.com/the-world-ahead/2021/11/08/the-aftermath-of-the-pandemic-will-make-politics-more-turbulent
397. J. Kurlantzick, "Is COVID-19 Shaking Up Politics in Southeast Asia?" in Council on Foreign Relations, October 6, 2021, viewed on December 7, 2021, https://www.cfr.org/article/covid-19-shaking-politics-southeast-asia
398. A. Sinpeng, "Digital media, political authoritarianism, and Internet controls in Southeast Asia," November 25, 2019, viewed on December 7, 2021, doi:10.1177/0163443719884052
399. K. Lee, "The #MilkTeaAlliance in Southeast Asia: Digital Revolution and Repression in Myanmar and Thailand," in Center for Strategic and International Studies, April 1, 2021, viewed on December 7, 2021, https://www.csis.org/blogs/new-perspectives-asia/milkteaalliance-southeast-asia-digital-revolution-and-repression-myanmar
400. L. Boxell & M. Gentzkow & Jesse M. Shapiro, "Cross-Country Trends in Affective Polarization," NBER Working Papers 26669, in National Bureau of Economic Research, Inc. January 2020, viewed on December 6, 2021, https://www.nber.org/papers/w26669
401. G. Lopez, "How political polarization broke America's vaccine campaign," in Vox, July 6, 2021, viewed on December 6, 2021, https://www.vox.com/2021/7/6/22554198/political-polarization-vaccine-covid-19-coronavirus
402. F. Fukuyama, "Francis Fukuyama on the end of American hegemony," in the Economist, August 18, 2021, viewed on December 6, 2021, https://www.economist.com/by-invitation/2021/08/18/francis-fukuyama-on-the-end-of-american-hegemony

the legitimacy of those centrally controlled governments. People's anger was already rising in Southeast Asia over worsening inequality, with large, anti-government protests taking place in Thailand and Myanmar.[397]

Notably, activism in the digital age could bring opportunities for dissidents and political opposition groups. In response to a shrinking democratic space, young activists across Asia have demonstrated resilience and cross-country potential for alternative forms of activism.[398] A recent striking example is the formation of the Milk Tea Alliance, which is an online movement consisting of pro-democracy youth from Hong Kong, Taiwan, Thailand, and Myanmar.[399] The new generation of protesters has successfully raised awareness at the international level by leveraging social media and co-opting popular symbols. Although digital tools have also been used by autocratic governments to restrict civil freedoms, the rise of digital activism is a phenomenon that cannot be ignored.

4.2 americas — the fragility of trust

The growing political divide has become a critical issue in American politics. A high degree of polarization leads to difficulties in generating a broad consensus to undertake political reforms among different groups. Political polarization in the U.S. has grown rapidly over the past forty years, possibly due to increased racial division, the rise of partisan media, and changes in the composition of political parties.[400] The ongoing pandemic could intensify this troubling trend because social distancing, mask-wearing, and vaccinations are often not considered public-health measures but political markers.[401]

Apart from domestic affairs, polarization could also have a direct, far-reaching effect on Washington's foreign policy. Over the past decades, there has been a cross-party consensus in the U.S. in favor of maintaining a leadership position in world politics. The mighty role of the greenback has also secured the U.S.'s role in the global economy. However, this long-lasting hegemonic position could change due to the weak consensus about American national interest and how to position the country in a multipolar world.[402]

Meanwhile, Latin America is tackling the political uncertainties brought on by a lack of trust in the institutions of

government and democracy. Compared to other regions of the world, Latin American societies show lower levels of political trust, which could lead to economic problems and difficulties in countering pandemics.[403]

To be sure, the severity of the ongoing pandemic has exacerbated inequalities and magnified democratic and human rights challenges. Within the region, the consolidation of democratic governance has dimmed in some countries including Nicaragua and Venezuela. Amid economic breakdowns, traditional political parties' prestige in delivering on democracy has declined throughout the region, which opens possibilities for populism and the rise of "outsider" politics.[404] As revealed by the case of Colombia, long-standing grievances are likely to spread across Latin America and trigger political change.

4.3 west asia and north africa — demographic, economic, & geopolitical shifts

In the West Asian and North African region, states are facing challenges brought on by structural changes in three main aspects: demographics, economics, and geopolitics. The political response to these underlying shifts will likely shape the nature of political life in West Asia and North Africa (WANA). +

First, the rapidly growing younger generation could provide new challenges for authorities. By 2050, the populations of half the countries in WANA are estimated to increase by at least 50% from their 2015 levels.[405] The demographic change could instigate a set of questions around identity and the role of religion in the future, opening up existing social cleavages within states.[406] Second, economic uncertainty is also expected to have an immense impact on the region's political outlook. Several authoritarian states across the Gulf have been using the distribution of oil as an effective means of regulating political life. In this context, rising economic pressures stemming from fluctuations in oil prices and the pandemic could curtail governments' regulatory capacity.[407] Third, the developments in geopolitics could change the landscape of regional security. Although the Gulf monarchies have long relied on the U.S. as a guarantor of security, the impact of increased Chinese or Russian involvement in the region is to be observed.[408]

+ Chadia Mouhdi
I really like how we use the term WANA (West Asia and North Africa) instead of "The Middle East." Increasingly, people prefer the term WANA to the Middle East.

The term 'Middle East' was coined over a century ago and is geographically ambiguous. The region is only east when considered from the perspective of Europe. The term WANA is less rooted in political geography but rather in human geography.

Although I am from a country that is often included when The Middle East is mentioned, I only recently learned about the term WANA and why it is preferred to the Middle East. For me, this really made me aware that the western perspective is ingrained in many different facets of life. It makes me wonder what other words and perceptions I take for granted currently. Going forward, I would like to learn more about such sensitivities and be more open minded. Source:

403. P. Saiani, E. Ivaldi, A. Ciacci & L.Stefano, "Broken Trust. Confidence Gaps and Distrust in Latin America." in Soc Indic Res, September 10, 2021, viewed on December 6, 2021, https://doi.org/10.1007/s11205-021-02796-3
404. National Democratic Institute, "Democratic Challenges and Opportunities in Latin America," in National Democratic Institute, March 24, 2021, viewed on December 6, 2021, https://www.ndi.org/publications/democratic-challenges-and-opportunities-latin-america
405. UNICEF, "MENA Generation 2030," in UNICEF. April 2019, viewed on December 6, 2021, https://data.unicef.org/resources/middle-east-north-africa-generation-2030/
406. S. Mabon, "The Middle East in 2050: Precarious Politics and the Future of the State," in the Sectarianism, Proxies and De-Sectarianization Project, June 1, 2021, viewed on December 6, 2021, https://www.sepad.org.uk/announcement/the-middle-east-in-2050-precarious-politics-and-the-future-of-the-state
407. Ibid.
408. L. Scazzieri, "Europe and the Transition to a Post-American Middle East," in the Centre for European Reform, November 5, 2021, viewed on December 6, 2021, https://www.cer.eu/insights/europe-and-transition-post-american-middle-east
409. T. Yousef, "The Middle East and North Africa over the next decade: Key challenges and policy options," in Brookings Institution, March 3, 2020, viewed on December 6, 2021, https://www.brookings.edu/opinions/the-middle-east-and-north-africa-over-the-next-decade-key-challenges-and-policy-options/
410. Transparency International, "People See Low Political Integrity Throughout the European Union," in Transparency International, September 28, 2021, viewed on December 6, 2021, https://www.transparency.org/en/news/low-political-integrity-throughout-the-european-union-gcb-eu-2021
411. S. Fleming & M. Peel, "EU identity crisis: Poland, Hungary and the fight over Brussels' values," in Financial Times, December 4, 2020 viewed on December 6, 2021, https://www.ft.com/content/bfa58276-1868-4011-9891-ccd363dc68dc
412. International Institute for Democracy and Electoral Assistance, "Europe Report," in International Institute for Democracy and Electoral Assistance, viewed on December 6, 2021, https://www.idea.int/gsod/europe-report
413. M. Kuo, "Global Gateway: The EU Alternative to China's BRI," September 8, 2021, viewed on December 6, 2021, https://thediplomat.com/2021/09/global-gateway-the-eu-alternative-to-chinas-bri/

Regarding the outlook of democracy in WANA, a series of pro-democracy protests and uprisings that spread across much of the Arab world in the early 2010s, called the Arab Spring, has to some extent shaken the long-standing social contract within the region. One group of countries, led by Tunisia and Jordan, is taking a more democratic approach in responding to the needs of citizens, while other countries in the Arab world remain in the grip of autocrats. Some argue that the latter group will likely become more susceptible to social unrest and even regime change.[409]

4.4 europe, russia, and eurasia — allies & alliances

Governments across Europe are wondering what the future of Europe might look like after Angela Merkel departs the political stage. The issue of political integrity and the change in Europe's role in international affairs could reshape the political landscape of the region.

Europeans have a perception of a systemic lack of political integrity, possibly due to economic disenfranchisement and inequality. Low political integrity, along with political polarization, could damage democracies and citizens' trust in their institutions.[410] From the perspective of the whole region, it is also becoming challenging to maintain the integrity of the EU. The recent dispute over the rule of law in some countries, such as Poland and Hungary, is undermining the union's moral legitimacy and the bedrock of common European values — democracy and fundamental rights.[411] In addition, some have argued that the pandemic widened the preexisting split between high-performing democracies in Western Europe and weaker counterparts in Central and Eastern Europe, which has posed a challenge to the unity of the bloc.[412]

As for international relations, the recently announced Global Gateway (GG) project is considered the latest in a string of EU policy actions to reposition Europe in the world. The massive investment plan, often seen as the alternative to China's BRI, reflects the EU's strategic interests and intention to strengthen its role in the Balkans, North Africa, and Sub-Saharan Africa. The impact of the GG project is to be closely observed in the coming years.[413]

The development of the Sino-Russian relationship is another issue that could fundamentally change the political landscape of the region. European leaders are increasingly cognizant of the possible effects of the rapprochement between Russia and China, given that the emergence of the Moscow-Beijing axis is expected to wield a growing influence on transatlantic interests and draw new dividing lines over Eurasia. Despite this, it remains unclear how Europe and the West would react to the Sino-Russian rapprochement.[414]

4.5 sub-saharan africa — new generations & democratization

In Sub-Saharan Africa, conflict hotspots are expected to rumble on in the coming few years. The Sahel region has been facing armed conflicts and humanitarian crises since the regime shift in Libya and the subsequent uprising in Northern Mali in 2012, while a civil war in Ethiopia is threatening the stability of the Horn of Africa.[415] Despite the unresolved conflicts in the region, two main factors are likely to transform Africa's political landscape.

First, the continent's younger generation represents a key potential for further democratic development and increased citizen mobilization. Statistics show that Africa has the youngest population in the world: around 40% of the population is aged fifteen years and under as of 2021, compared to a global average of 26%.[416] However, it is notable that a growing population of unemployed youth could also create a ground for recruitment by extremist groups.[417] Second, rapid urbanization in Sub-Saharan Africa is likely to have a wide impact on the region's politics since urban residents in Africa are significantly less supportive of incumbent governments and less satisfied with democracy than rural residents.[418] As the urban population continues to grow, urbanization could lead to the transformation of existing power structures and political sentiment.

Concerning the democratic development in the region, some have expressed concerns about the impact of China's model of developmental authoritarianism. Despite public support for democracy in the region remaining high, the Chinese model seems to be attractive to those who see democracy as a hindrance to development, as can be seen in the case of

414. A. Gabuev, "As Russia and China Draw Closer, Europe Watches With Foreboding," in Carnegie Moscow Center, March 19, 2021, viewed on December 6, 2021, https://carnegiemoscow.org/commentary/84135
415. Economist Intelligence, "Africa: what to watch in 2022," in Economist Intelligence, October 6, 2021, viewed on December 6, 2021, https://www.eiu.com/n/africa-what-to-watch-in-2022
416. Statista, "Population of Africa in 2020, by age group," in Statista, July 1, 2020, viewed on December 6, 2021, https://www.statista.com/statistics/1226211/population-of-africa-by-age-group/
417. International Institute for Democracy and Electoral Assistance, "Africa & The Middle East Report," in The International Institute for Democracy and Electoral Assistance, viewed on December 6, 2021, https://www.idea.int/gsod/africa-middle-east-report
418. R. Harding, "Urbanites across Africa are more likely to be unhappy with their government. Here's why," in The Conversation, May 24, 2020, viewed on December 6, 2021, https://theconversation.com/urbanites-across-africa-are-more-likely-to-be-unhappy-with-their-government-heres-why-139126
419. J. Campbell & N. Quinn, "What's Happening to Democracy in Africa?" in Council on Foreign Relations, May 26, 2021, viewed on December 6, 2021, https://www.cfr.org/article/whats-happening-democracy-africa
420. M. Canning et al., "Creating the government of the future," in Deloitte Insights. November 25, 2020, viewed on December 27, 2021, https://www2.deloitte.com/us/en/insights/industry/public-sector/government-of-the-future-evolution-change.html
421. KPMG staff, "Modernizing government: Global trends," in KPMG, April 2020, viewed on December 27, 2021, https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/04/modernizing-government-global-trends.pdf
422. N. Abillama et al., "Unlocking the Value of AI-Powered Government," in BCG, July 21, 2021, viewed on December 27, 2021, https://www.bcg.com/publications/2021/unlocking-value-ai-in-government

China's vaccination campaigns. In addition, the inability of many governments to respond to the security challenges, such as unsolved ethical and religious conflicts, might further undermine popular support for a democratic trajectory."[419]

5. technology and the government of the tuture

The advancement of technology is shaping the political sphere. The increased adoption of emerging technologies, such as big data and AI, is continuously molding the way governments respond to fundamental changes in society. However, these trends have also caused growing concerns about how technology, regulatory mindset, and state authority will evolve in the future.

New technologies could bring benefits to the public sector in many ways. One benefit is efficiency improvement. In virtue of AI and ML technologies, governments can become more responsive and agile by conducting predictive analytics to prevent unfavorable conditions. AI-based tools can help government agencies increase the efficiency of internal operations, such as identifying inefficiencies in procurement processes or creating customized education programs for different positions.[420] Notably, the virus outbreak might make governments across the world more cognizant of the role technology can play in the future of public services. A KPMG report finds that many governments will likely be undertaking the largest logistical challenges of the past fifty years. Given that the pandemic has exposed the fragility of supply chains in public sectors, governments are now rebuilding their systems to mobilize and rapidly distribute vaccines to their populations.[421]

Another advantage is the use of technology in policy design. Policymakers can identify emerging issues and acquire a more accurate understanding of their impact and costs with the help of new technologies; AI and data analytics can make sense of demographics, consumption, and other trends across different government sectors. Administrations can also evaluate a more comprehensive range of alternatives and find the best solution with their simulation, digital-twin, and optimization capabilities.[422] In other words, AI can help

governments tackle problems more comprehensively by increasing the scale and type of information available to decision-makers. The smart-city model, which features the optimal use of all the interconnected information, represents this joined-up approach to policymaking.[423]

For policymakers, improving citizen engagement when designing and delivering future public services is crucial. Over the past few years, some countries have started using technology to strengthen democracy and promote inclusive decision-making at the government level.[424] More than seventy nations have incorporated the notion of open government — that is, a culture of governance that promotes the principles of transparency, integrity, accountability, and stakeholder participation — in their action plans for the future.[425] The emergence of civic technology, such as open-data portals and participatory budgeting, also helps enable greater citizen participation in government affairs.[426]

However, the wide adoption of technology across sectors can be a double-edged sword for governments and citizens. A growing number of countries are enhancing their security capabilities with facial recognition systems, big data analytics, and smart-city platforms.

However, abuse of AI surveillance has led to concerns over possible violations of human rights.[427] In a survey conducted by the Pew Research Center, experts have expressed worries about the consequences; the use of technology will likely weaken democracy between now and 2030 due to reality distortion, the decline of journalism, and the impact of surveillance capitalism. Some believe that the misuse of digital tools could affect people's trust in institutions and their views about democracy.[428] A looming example of digital authoritarianism is the spread of the Chinese model, which states have claimed to be premised on the goal of information security. Over the past few years, Beijing has tightened its political control over citizens through technology, such as the growing use of facial recognition and the launch of a nationwide social credit system. Some autocratic regimes, such as Egypt and Iran, are moving toward digital authoritarianism by adopting the Chinese model of extensive censorship and automated surveillance systems.[429]

Another emerging issue is the manipulation of human behavior — often associated with the notion of social

423. BCG staff, "AI Brings Science to the Art of Policymaking," in BCG, April 5, 2021, viewed on January 4, 2021, https://www.bcg.com/publications/2021/how-artificial-intelligence-can-shape-policy-making
424. OECD staff, "Open Government," in OECD, viewed on December 27, 2021, https://www.oecd.org/gov/open-government/
425. Open Government Partnership (website), viewed on December 27, 2021, https://www.opengovpartnership.org/our-members/
426. The Civic Tech Field Guide (website), viewed on December 27, 2021, https://civictech.guide/
427. S. Feldstein, "The Global Expansion of AI Surveillance," in The Carnegie Endowment for International Peace, September 17, 2019, viewed on December 27, 2021, https://carnegieendowment.org/2019/09/17/global-expansion-of-ai-surveillance-pub-79847
428. J. Anderson & L. Rainie, "Many Tech Experts Say Digital Disruption Will Hurt Democracy," in Pew Research Center, February 21, 2020, viewed on December 27, 2021, https://www.pewresearch.org/internet/2020/02/21/many-tech-experts-say-digital-disruption-will-hurt-democracy/
429. A. Shahbaz, "The Rise of Digital Authoritarianism," in Freedom House, viewed on December 27, 2021, https://freedomhouse.org/report/freedom-net/2018/rise-digital-authoritarianism
430. Z. Tufekci, "Engineering the public: Big data, surveillance and computational politics," in First Monday, 19(7), 2014, https://doi.org/10.5210/fm.v19i7.4901
431. J. Anderson & L. Rainie, "Many Tech Experts Say Digital Disruption Will Hurt Democracy," in Pew Research Center, February 21, 2020, viewed on December 27, 2021, https://www.pewresearch.org/internet/2020/02/21/many-tech-experts-say-digital-disruption-will-hurt-democracy/
432. L. Phillips-Alvarez, "10 Facts About Social Activism," in Borgen Project, October 1, 2019, viewed on January 24, 2022, https://borgenproject.org/10-facts-about-social-activism/

+ *Martin Bernal Dávila*
Have you ever jumped onto a train, downloaded or streamed a film or a piece of music online without paying for it? Have you paid somebody cash in hand, knowing that tax would not be paid on that money? There is an area of freedom that allows people to do wrong things from time to time. Nevertheless, big companies or governments will use all of the future technologies at their disposal to enforce their rules in the future. All these questions and considerations are from Jamie Süsskind's book "Future Politics: Living Together in a World Transformed by Tech"

My questions are more about how democracies and dictatorships will apply these technologies and knowledge; what norms will be reinforced in countries like North Korea, Venezuela, Russia, or the US? How will the concepts of freedom and control be used in politics?"

engineering — in the political sphere. The emergence of computational politics, a new field considered the intersection between computer science and political science, might give a clue on what the future of government-citizen relations will look like. Technological advances can increase governments' capabilities of predicting and affecting people's perceptions and behaviors; however, the methods of computational politics can give rise to unfavorable consequences. For example, tailored, data-rich political campaigns bring the potential for significant harm to civil discourse. The core of big data-driven computational politics is in opposition to the idea of a civic space functioning as a public, shared commons.[430]

To sum up, a greater role for technology in the political sphere can bring mixed consequences. The use of new technology largely augments how policymakers make decisions and how citizens engage in politics, while the sprawling system of censorship and surveillance has aroused concerns worldwide. As John Pike, director and founder of GlobalSecurity.org, commented in the Pew Research Center survey, "Democracy in 2030 will face the best of times and the worst of times. All the optimistic predictions about social media and other online implementations strengthening citizen participation will be realized. All the pessimistic predictions about the ease with which the surveillance state can manipulate public opinion will also be realized."[431] +

6. political activism — changing society for the better

Social activists frequently target organizations, companies, and government agencies in their efforts to change societal norms and policies.[432] Activism is defined as actions to advocate, obstruct, direct, or influence social, political, economic, or environmental reform with the goal of bringing forward societal change for the better.

This topic discusses some controversial activism movements in our society today, the changes social activism has manifested over the years, and the ongoing challenges it faces.

The topic of political activism in this section provides a general introduction of the government's role in

implementing the changes people have been fighting for and why this still remains an obstacle today. Furthermore, there is a discussion about the impact of activism, and an exploration of the importance of the different roles of people involved in the process and the ones affected at the end-goal of the intended change.

6.1 climate change activism — the demand for immediate action

Collective progression prospers when leaders proactively understand, listen, and address issues that ultimately impact the greater good — including the planet, which keeps us alive. Our decision-makers greatly influence and implement the policies guiding our societies, and when unresolved matters are left, saving those empty words and promises might be *a little too late*.

Climate change has been the subject of the most controversial change-focused activism in the world today.[433] In September 2019, the globe witnessed the greatest single-day climate protest in history, and according to the organizers of the worldwide climate strike, nearly four million people took part in 6,000 activities in over 1,000 locations across 185 countries.[434] The demand for immediate action soared even higher as large-scale and long-term execution of sustainable strategies to mitigate the alarming rate of climate change had yet to be undertaken. Despite the factual evidence, protests, global organizations for reducing greenhouse gasses, and collective first-hand experiences of individuals encountering the destructive effects of global warming, it was still being ignored by many. Why?

The majority of our country's leaders possess apathy, and unlike the average member of Congress, the younger generation will have to live with the devastation of climate change.[435] The youth have led environmental protests today that struck the world and made this matter as controversial as ever. From the age of fifteen, Greta Thunberg has been a leading young environmental activist. She initiated a climate strike to urge authorities in the Swedish Parliament to take preventive action as our entire ecosystems perish.[436] Greta has been in the headlines for several reasons, including endless mockery. However, her voice has fueled the spark of a global movement organized by young students who regularly strike on Fridays under the banner "Fridays for Future."

433. D. Fisher & S. Nasrin, "Climate Activism and Its Effects," WIREs Climate Change, vol. 12, issue 1, viewed on October 18, 2020. https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.683
434. Amfori, "Trends: Climate activism and green politics on the rise" in Amfori, March 9, 2020, viewed on December 11, 2021, https://www.amfori.org/news/trends-climate-activism-and-green-politics-rise
435. S. Sauer, "Why aren't politicians doing more on climate change? Maybe because they're so old," in Vox. July 14, 2017, viewed on December 10, 2021, https://www.vox.com/first-person/2017/7/14/15959968/climate-change-teenager
436. Wikimedia Foundation, "Politics of climate change" in Wikipedia, December 2021, viewed on December 10, 2021, https://en.wikipedia.org/wiki/Politics_of_climate_change
437. O. Kestin, H. Lock & P. Gralki, "12 Important Moments in the History of Climate Action: In Photos," in Global Citizen, June 5, 2020, viewed on December 29, 2021. https://www.globalcitizen.org/en/content/important-moments-climate-history-in-photos/
438. NASA, "The Effects of Climate Change" in NASA, 2021, viewed on December 29, 2021, https://climate.nasa.gov/effects/
439. Client Earth, "Fossil fuels and climate change: The Facts," in ClientEarth, 2021, viewed on December 11, 2021, https://www.clientearth.org/latest/latest-updates/stories/fossil-fuels-and-climate-change-the-facts/
440. Wikimedia Foundation, "Politics of climate change," in Wikipedia, December 2021, viewed on December 10, 2021, https://en.wikipedia.org/wiki/Politics_of_climate_change

+ Camera Ford
This statement resonates with me because of the slight feeling of hopelessness. Saying that climate change's impact is irreversible feels huge and finite. I've said and thought the same phrase myself, so I understand exactly the feeling. And the projected effects of climate change will indeed be mostly irreversible in our lifetime. But beyond these sobering truths, it also makes me think of Kate O'Neill's book "A future so bright: how strategic optimism and meaningful innovation can restore our humanity and save the world" She says that strategic optimism is the most important element in fighting climate change, building better technology, and addressing society's other issues. The future won't be either a utopia or a dystopia, but it is determined entirely by our actions. So those actions should be guided by a belief that despite the future's risks, we can and will create a future that avoids the worst outcomes.

She was also nominated for a Nobel Peace Prize following her viral addresses to lawmakers across the world.[437]

The climate change movement has been behind personal and organizational initiatives over the years, and several other teens are prompting initiatives to produce environmentally friendly innovations. Elif Bilgin, a 16-year-old from Istanbul, saw the issues with today's petroleum-based plastic and spent two years producing a biodegradable alternative made from banana skins. Benjamin Stern, 17, of Melbourne, Florida, developed a new type of shampoo that maintains its shape and that does not need a plastic container. While the commencement of new strategies to reduce environmental damage is much more evident today, the effects of the human-caused climate crisis are still deemed irreversible.[438] +

The facts, solutions, and ongoing research have shown enough evidence to determine that climate change should be treated as an emergency. There has also been massive coverage of the youth's call for immediate action for a future they have yet to encounter. However, political parties governed by adults have yet to treat this issue as a crisis requiring a rapid solution from a system that seeks change.

Fossil fuels, which accounted for up to 89% of the world's CO2 emissions in 2018,[439] have been the primary source of energy for economic and technological advancement since the industrial revolution. The significance of fossil fuels and other carbon-intensive activities in multiple industries has caused resistance to climate-friendly policies.[440] But do these fast-growing advances equate to sustainable growth?

While climate change is a pressing issue, it is important to note that nations around the world do not have the same economic health and societal standpoint. Developing countries are the most impacted by climate change and the least able to afford its consequences. Multiple factors contribute to their vulnerability, limit their capacity to avoid and adapt to the effects of climate change, affecting their progress.

Climate change is a complex global issue, and factors in dealing with it range from the apathy of today's leaders and policymakers, the neglected voices, the ability of a country's economy to address major issues, to hopeful

generations, and the growing motivation to bring about a powerful change. Are we finally equipped to combat climate change?[441]

6.2 lgbt+ — the fight for gender & sexuality rights

All humans deserve equal rights, regardless of sexual orientation or gender identity, and be allowed to live without fear of violence, coercion, or prejudice. LGBT groups, an acronym for lesbian, gay, bisexual, transgender, or sometimes extended to LGBT+ in inclusion for intersex and queer groups,[442] bring forth revolutionary movements to advocate for societal justice, acceptance, and human rights.

While some parts of the world are now openly embracing different gender orientations, these individuals remain a notorious target for harassment, violence, and cyber backlash everywhere. During LGBT+ Pride weekend on 12 June 2016, an assailant opened fire at the renowned gay dance club Pulse in Orlando. This hate crime is considered the deadliest mass shooting in U.S. history, with at least forty-nine people killed and another 50 injured.[443] The expression of sympathy and immediate response from the police, the government, and people around the world represent the significant transformation in societal acceptance and support for the LGBT+ community in comparison to the oppression these groups have tolerated throughout decades.

LGBT+ communities in East Asia, however, are still struggling to fight against their distinctive challenges such as embedded conservative elites, apprehensive or hostile public opinion, demographic difficulties, or rising nationalist sentiments. Societal norms have challenged the marginalized communities in these regions, but activists have shown empowered resistance and resilience in battling these obstacles. The government's view on LGBT+ in China has been one of neutrality in administering their rights; however, these rights do not provide equal legal rights, address pervasive societal bias, provide equal access to healthcare services, or allow autonomous action beyond a narrow scope. In workshops about how to deal with challenges, issues mentioned include how East Asian LGBT+ networks lack financing and resources, and there's also a lack of regional cooperation and information sharing. Certain regions in Asia have centered on the traditional religious

441. Canada, G. A, "Climate change in developing countries," in GAC, June 23, 2020, viewed on December 9, 2021, https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/environmental_protection-protection_environnement/climate-climatiques.aspx?lang=eng
442. Cable News Network, "LGBTQ Rights Milestones Fast Facts," in CNN, October 31, 2021, viewed on December 9, 2021, https://edition.cnn.com/2015/06/19/us/lgbt-rights-milestones-fast-facts/index.html
443. B. Morris, "History of Lesbian, Gay, Bisexual and Transgender Social Movements," in American Psychological Association, 2009, viewed on December 9, 2021, https://www.apa.org/pi/lgbt/resources/history
444. N. Cheng, M. Henry & S. Kim, "The Resilience of East Asia's LGBTQ Community," in The Diplomat, September 24, 2021, viewed on December 29, 2021. https://thediplomat.com/2021/09/the-resilience-of-east-asias-lgbtq-community/
445. HRC, "Sexual assault and the LGBTQ community," in HRC, 2021, viewed on December 10, 2021, https://www.hrc.org/resources/sexual-assault-and-the-lgbt-community

beliefs and anti-Western animosity to delegitimize LGBT+ rights.[444]

LGBT+ movements originated as a response to centuries of doctrinal practices and governmental and medical oppression where homosexual conduct or activities, ranging from conventional gender roles to cross-dressing, were prohibited by law or custom. Such denunciation might have been expressed through appalling public trials, imprisonment, clinical warnings, and sermon rhetoric. For generations, these avenues of persecution cemented homophobia, but they also made vast societies aware of the reality of diversity. Though social equality for LGBT+ individuals is a shared aim throughout these groups, the gamut of full LGBT+ rights is still withheld.

Leaders and policymakers collectively promise to foster freedom and have sworn to protect their citizens with policies that manifest fairness and liberty; yet the majority of LGBT+ groups continue to be preyed upon by assailants and face injustice where violators are still not punishable by law. LGBT+ sexual-assault survivors are often unwilling to seek aid from the police, hospitals, shelters, or rape victim facilities — people and authorities who are intended to help them — because they are afraid of being condemned or abused by the institutions.

According to the National Coalition of Anti-Violence Programs (NCAVP), 85% of victim advocates have worked with LGBT+ survivors who have been denied care because of their sexual orientation or gender identity, and according to the 2015 Transgender Survey in the United States, one in every five respondents who was detained in a jail, prison, or juvenile detention unit in 2014 was sexually abused by facility workers. Furthermore, 17% of respondents who stayed at one or more homeless shelters were sexually harassed because they were transgender.[445]

Whereas human rights are prioritized and implemented across nations where any type of human right violation is punishable by law, the challenge of achieving full enforcement of LGBT+ rights is still suppressed. If roles were reversed and heterosexuality was considered illegal and subject to imprisonment and centuries of oppression, would world leaders still act the same toward implementing equal rights?

6.3 inclusivity — a voice for everyone

The process of raising awareness and magnifying voices that seek change starts with collective inclusivity. Fighting for change in the modern world, challenges current policies, practices, and regulations, and opens the door for advocacy to reform the exclusive, closed or damaged systems that still exist today. Although the idea of change embraces the promotion of equal rights, it is vital to proactively support the unheard, vulnerable, and oppressed[446] — it is less about becoming the voice for the voiceless, and more about making certain that every individual's own voice is heard from their own perspective.

Political inclusion refers to the entitlement of the marginalized to political involvement and representation on the same legal footing as host populations, resulting in a sense of belonging to a city's population.[447] The marginalized can include immigrants, persons with disabilities, and people of all backgrounds regardless of race, ethnicity, nationality, religious identity, immigration status, sex, gender identity, sexual orientation, age, ability, health (including mental health), and socioeconomic status. To be inclusive involves bearing responsibility, being accountable, and accepting the reality of the injustices that have led us to this position today; it is a commitment toward the long-term viability and unity of our communities. It is also a refusal of the notion that any of us deserve to be cast out of the discussion or stay vulnerable. It is a collaborative effort by everyone to end cycles of inequality that impact us all in various ways, either directly or indirectly.[448]

Embracing diversity is the first step to inclusion; it is a process of acknowledging the strength of a wide range of experiences by individuals and diverting these into a powerful change-motivated movement. Realizing there is strength in diversity, compels teams to collaborate in buzzing synchronicity with unrivaled productivity and a shared sense of purpose. This is what ultimately enables victorious reforms.[449] Organizations, individuals, and movements that refuse alliance because of prejudice weaken the whole definition of activism—the essence of togetherness and equality becomes removed.

It takes deliberate work and consideration to make an organization or group accessible to everyone. Some participants do not have easy or any access at all to technology or transportation; however, concrete steps can be taken to eliminate hindrances in the progression of inclusivity. Enabling multiple entry points so that everyone can contribute, emphasizes the importance of establishing a gateway of opportunities and of a mobilization that accepts different degrees of involvement. Making inclusivity happen is a conscious effort and a priority, and once it is achieved, the possibilities are endless.

446. N. Toye, "Inclusion in Activism," in SAME, 2021, viewed on December 8, 2021, https://www.same-network.org/inclusion-activism
447. United Nations, "Political inclusion: United nations educational, Scientific and Cultural Organization," in United Nations Educational, Scientific and Cultural Organization, 2021, viewed on December 10, 2021 http://www.unesco.org/new/en/social-and-human-sciences/themes/urban-development/migrants-inclusion-in-cities/good-practices/political-inclusion/
448. Indivisible, "How to be inclusive: An introduction," in Indivisible, July 23, 2020, viewed on December 2, 2021, https://indivisible.org/resource/how-be-inclusive-introduction
449. Ibid.

6.4 is the government to be trusted? political trust & legitimacy

Political trust is a key indicator of political legitimacy. It is broadly defined as a citizen's belief in the authenticity of government systems and the administration; it is the people's belief in the worthiness of these institutions and political systems of which they are a part.[450]

Trust is the backbone of an effective team and is vital for securing relationships.[451] The credibility of public institutions and functioning democratic systems are built on trust, and it is vital in maintaining political involvement and social cohesiveness. The lack of political trust, whether in governmental bodies or in the system as a whole, makes it much more difficult to establish and successfully implement solutions to our communities' most pressing problems, such as the enforcement of regulations, developing responses, and even vaccination distribution during the Covid-19 pandemic.

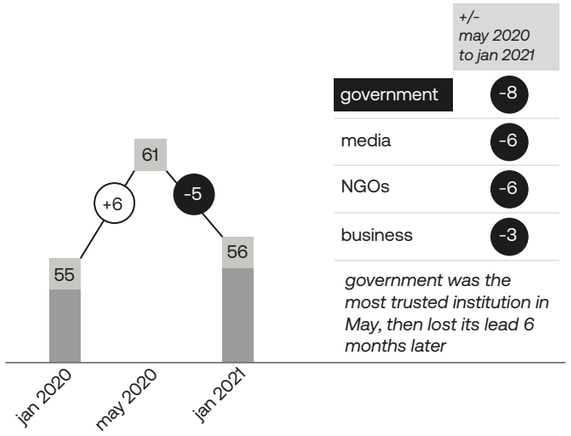
The effectiveness of a wide variety of public policies that rely on public behavior is highly dependent on public trust, and increased public trust leads to better regulatory compliance. In the long run, public trust is crucial for long-term societal changes, which shape our future, such as climate change, aging, automation, and much more. But why do a lot of citizens distrust the government?

The media plays an important role in disseminating information to the public, yet the spread of misinformation in the digital age causes great distortion toward the perception and understanding of topics ranging from current events, public health, and governmental elections. Citizens are aware of the problem of the rapid spread of fake news and believe that this greatly affects the people's output on decision-making and trust in the public bodies. In 2019, 68% of adults in the United States

450. S. Turper, & K. Aarts, "Political Trust and sophistication: Taking measurement seriously," in Social indicators research, 2017, viewed December 6, 2021, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5250644/
451. Crowe Associates, "The importance of trust in teams," in Crowe Associates, April 11, 2019, viewed on December 4, 2021, http://www.crowe-associates.co.uk/teams-and-groups/the-importance-of-trust-in-teams/

spring trust bubble bursts; biggest loss for government[454]

trust index, 11 countries included in the 2020 trust barometer spring update



	+/- may 2020 to jan 2021
government	-8
media	-6
NGOs	-6
business	-3

government was the most trusted institution in May, then lost its lead 6 months later

government	+/- Jan 2020 to May 2020	+/- May 2020 to Jan 2021
S.Korea	+16	-17
U.K.	+24	-15
China	+5	-13
Mexico	+12	-12
Canada	+20	-11
India	+6	-8
U.S.	+9	-6
Germany	+19	-5
Japan	-5	-1
Saudi Arabia	+5	-1
France	+13	+2

452. OECD, "Trust in government," in OECD iLibrary, December 10, 2013, viewed on December 5, 2021, https://www.oecd-ilibrary.org/governance/government-at-a-glance-2013/trust-in-government-policy-effectiveness-and-the-governance-agenda_gov_glance-2013-6-en
453. R. Cohen, "Breaking down public trust," in Ford School, June 10, 2021, viewed on December 6, 2021. https://fordschool.umich.edu/news/2021/rebuilding-trust-in-government-democracy
454. J. Aguilera, "An Epidemic of Misinformation. New Report Finds Trust in Social Institutions Diminished Further in 2020," in Time, January 13, 2021, viewed on December 7, 2021, https://time.com/5929252/edelman-trust-barometer-2021/
455. R. Watters, "Digital Activism: The Good, the Bad, the Future," in HAD, June 18, 2020, viewed on January 2, 2022, https://had-int.org/blog/digital-activism-the-good-the-bad-the-future/
456. M. Peters, "A Brief History of Online Activism," in Mashable, August 15, 2011, viewed on January 2, 2022, https://mashable.com/archive/online-activism

+ Elias Sohnle Moreno
Post-truth was named word of the year in 2016 by the Oxford Dictionary.

said that made-up news greatly impacted their public confidence in the government, whereas more than half believe it had a significant impact on Americans' trust in one another and government officials to get the work done.[453] During the early months of the Covid-19 pandemic in 2020, studies found that public trust for the government had declined. The U.S. and China, two of the largest economies in the world, saw a great reduction in public trust. China saw a drop of 18 percentage points in public confidence, while the U.S. saw an additional drop of 5 percentage points.[454] +

Shobita Parthasarathy, director of the Ford School's Science, Technology, and Public Policy program, believes that misinformation, disinformation, and conspiracy theories do not provoke public distrust in political institutions. Fake information results from existing public distrust. The OECD identified five key public governance factors for generating confidence in government institutions; it measures the degree of responsiveness of institutions and how well they execute long-term goals, including how well they establish and implement programs that are fair, reliable, and transparent.

Political legitimacy is earned when the public see reliable results. This makes more people choose to voluntarily engage in their government's control.[454]

6.5 the future of activism

From protests against climate change to the Black Lives Matter movement that struck the world, online or digital activism has revolutionized the way events, protests, and movements are conducted, allowing supporters to mobilize and raise public awareness for a wide range of issues with a single click.

Digital activism uses the Internet, social media, and other communication technologies as the key medium for mass mobilization in order to ignite change and challenge political action.[455] It began in the 1990s, along with the development of Web 2.0 and the boom of social media, and has evolved ever since, playing a vital role in bringing people together around a common aim of supporting a cause.[456] Differing from the *offline* method of live protest where traditional media has the power to impose limitations on what to share with the world, digital activism can

public governance factors for generating confidence in government institutions[452]

policy dimension	1 responsiveness	2 reliability
public institutions role leading to trust	provide or regulate public services	anticipate change, protect citizens

3 integrity	4 openness	5 fairness
use power and public resources ethically	listen, consult, engage & explain to citizens	improve living conditions for all

457. B. Williams, "The Future of Activism," in Fluxtrends, 2021, viewed on January 2, 2022, https://www.fluxtrends.com/the-future-of-activism/
458. C. Jones-David, "Julius Jones is innocent. Don't let him be executed by the state of Oklahoma.", viewed on March 20, 2022, https://www.change.org/p/julius-jones-is-innocent-don-t-let-him-be-executed-by-the-state-of-oklahoma
459. K. Andresen, "Overturn ban on gay scouts", viewed on March 20, 2022, https://www.change.org/p/overturn-ban-on-gay-scouts
460. R. Fisher, "The subtle ways that 'clicktivism' shapes the world," in BBC, September 16, 2020, viewed on January 3, 2022, https://www.bbc.com/future/article/20200915-the-subtle-ways-that-clicktivism-shapes-the-world

+ Elias Sohnle Moreno
This is a fascinating characteristic of 21st-century society. It has huge sociological implications and shows us how society dictates what is politically correct and what is not and how society enforces social norms in the digital age. It could be interesting to elaborate on the sociological implications for the future.

spread unfiltered information and prompt the spread of real-time global reactions like wildfire.

Cancel culture, a modern-day social justice movement in the form of a hashtag, can damage an individual or brand's reputation in seconds as the public's stance against behaviors that are deemed inappropriate or unacceptable is easily put under a spotlight to seek accountability and proper action.[457] Online petitions, such as those on Change.org, let anyone simply create and share an online petition in order to garner traction for their organization, an initiative, or a cause — and with the power of 6,592,403 online signatures by citizens all around the world, innocent 19-year old Julius Jones who was wrongly convicted of a murder he did not commit, successfully had his execution called off with only three hours to go.[458] +

Even after twelve years in the Boy Scouts, Ryan Andresen was told that he could not receive the highest rank in the organization because he had openly come out as being gay. His mother, Karen Andresen, created an online petition to protest against the organization's decision, and after garnering 479,000 signatures, a historic decision was made by the Boy Scouts of America's National Council to end the ban on gay youth.[459] Ryan may not have had the chance to earn this rank, but many young men and gay scouts would now be equally able to do so. For an organization that has been resistant to change, this momentous event signifies hope that any issue can be raised and addressed.

Although online activism has victories, some people coin this type of action as "slacktivism" or a lazy and ineffective way of creating protests. The idea of publishing a hashtag or a picture on social media might make a person feel as if they've made a difference when in reality, they have not. Slacktivists tend to show concern over an issue on social media, but do not take any further steps to use their voices outside of the screen or at all.[460] Virtue signaling is another opportunistic strategy for people or organizations to join a trending movement's bandwagon to score virtual points for speaking about a cause without doing any relevant action afterward. While some digital activist practices are relatively ambiguous, there is no question that the main essence of digital activism is to help spread the raw and non-mainstream knowledge that people deserve to know on a global scale.

461. B. Laker, “This Is What Leadership Will Be In 2030,” Forbes, August 5, 2020, viewed on January 10, 2022, https://www.forbes.com/sites/benjaminlaker/2020/08/05/this-is-what-leadership-will-be-in-2030
462. J. Morgan, The Future Leader: 9 Skills and Mindsets to Succeed in the Next Decade, Wiley Publishers, 2020.

+ Kim Tan
Such an informational read overall! I think it is also relevant to highlight the importance of business leaders who can execute influence without authority. How can future leaders remain influential in a changing environment without compromising collaboration, focus, reflection, self-assessment, etc.?

The world’s shift to technology and digital mobilization shows how online activism has evolved and the monumental triumphs it has achieved over the years. From saving an innocent life hours before their execution to challenging the inclusivity in the Boy Scout organization, there is no doubt that voices behind the screens are a powerful weapon for change. Online activism is not a replacement for offline activism but it is an addition, a new way of challenging multiple causes, and a compelling instrument in the future of activism.

7. leading the change — leaders of tomorrow

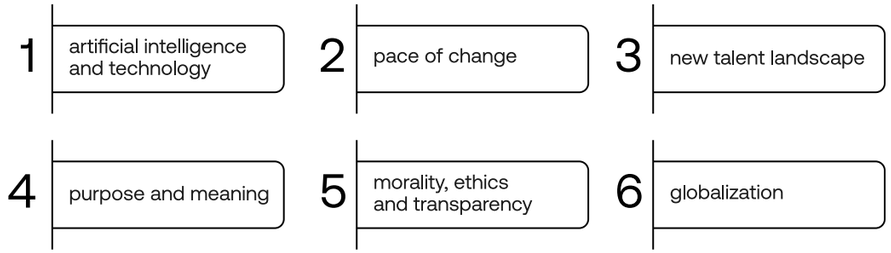
Malala Yousafzai, Narendra Modi, Elizabeth II, Jacinda Ardern, Angela Merkel, Greta Thunberg. These are all instances of leaders who lead or led in a variety of ways and with a variety of leadership styles. It is debatable if all of those leaders will continue to lead in the future or whether their followers will continue to follow them. So, what does the future hold for leaders? What kind of leader will be able to deal with all of the current world’s changes? Will today’s leaders be able to lead in the future? This section will go into greater detail on the future of leadership and what to expect, focusing on business leaders and political leaders. +

7.1 what the private sector can contribute — the future of business leaders

A business leader who is successful today in producing a lot of money for a certain organization may not be so successful in 25 years. While certain aspects of leadership will remain the same (for instance, articulating a vision and forming a strategy to get the best out of the company), the future leader will need a new set of skills and attitudes to succeed.[461] According to Jacob Morgan,[462] there are six tendencies impacting the future of leadership; technology, world changes, purpose and meaning, diversification of teams and inclusive cultures, morality, and openness.

Firstly, technology is having a huge and, more importantly, quick impact on the planet. Leaders must soothe these worries by searching for methods to use new technologies. For instance, without the huge development in the importance of technology, Mark Zuckerberg

six trends shaping the future of leadership[463]



463. J. Morgan, The Future Leader: 9 Skills and Mindsets to Succeed in the Next Decade, Wiley Publishers, 2020.
464. Ibid., p. 113
465. Ibid.
466. E. Herrington, "What is Purpose-Driven Leadership?", sidecar, March 5, 2021, viewed on January 14, 2022, https://www.sidecarglobal.com/organizational-culture/what-is-purpose-driven-leadership/
467. D. Seidman, "We need moral leadership in the future of work," World Economic Forum, August 27, 2019, viewed on January 12, 2022, https://www.weforum.org/agenda/2019/08/moral-leadership-future-of-work-lrn/
468. Jacob Morgan, The Future Leader: 9 Skills and Mindsets to Succeed in the Next Decade, Wiley Publishers, 2020.

+ *Chia-Erh Kuo*
In my opinion, the rise of the B Corp movement could be seen as a real-life example of purpose-driven leadership. The movement aims to help companies around the world balance profit with purpose, advancing a new model that ensures equity and sustainability. Sources:

would probably not be as successful as he is now, which shows how important the global trends are in shaping a leader and company. However, technology is not the only development that has a significant impact on future leaders; practically all developments described in this book have an impact on the world's future leaders. For example, more and more value is attached to sustainable practices, so people expect a leader to also take this into account while leading a world-leading company. To cope with the changing world, leaders must always be looking forward in order to successfully lead their subordinates.[464] Purpose and meaning are also becoming more important in today's world. Companies used to be able to readily recruit great personnel by offering high pay, but this is no longer the case for many companies. A current trend is that most employees want to work for a company that has meaning and purpose, and most of them are even ready to accept a wage reduction to achieve this.

Additionally, future leaders should aim to build diverse teams and foster inclusive cultures. More honest and modest leaders have emerged as a result of a contemporary movement for morals, ethics, and openness.[465] Purpose-driven leadership is actually on the rise nowadays. This type of leadership is when a leader puts their mission and beliefs above all else. From a business standpoint, purpose-driven business leaders take action on something broader than the company's goods and services.[466] +

In line with purpose-driven leadership, according to World Economic Forum research,[467] the demand for moral leaders is also greater than ever. Moral leaders use principles and ethics that they have developed over time and through experience to guide them. Companies with strong ethical underpinnings outperform their competitors in terms of profitability and customer and staff happiness. Another current trend is that subordinates expect greater openness and transparency. Leaders can no longer hide behind their titles; they must be transparent and honest with their organizations and the general public. As technology advances, the globe appears to become smaller and more connected. Globalization creates both serious geopolitical concerns and fantastic changes for collaboration and cultural exchange. Future leaders must embrace globalization and value diversity. They have to be able to interact across cultural obstacles.[468]

Purpose-driven leadership is becoming more popular these days, and it is projected to grow in popularity over the next few years. However, there are other types of leadership that are also gaining popularity, namely despotic leadership. This type of leadership is defined by the establishment of a centralized, easy-to-manage hierarchical organization. These leaders place a premium on total control over their subordinates and a high level of efficiency. It is defined as a style of leadership in which the leader advocates utmost harshness and absolute dominance over subordinates and expects them to obey without question.[469] The current rise of despotic leaders might be a result of uncertain times brought on by many global shifts. The Covid-19 crisis is an example of this; people are unsure about what will happen and feel a loss of personal control and power over the outcome. People prefer dominating leaders to other types of leaders in times of uncertainty because dominant leaders may help them regain personal control.[470]

Not only are business leaders important, but companies, on their own, also play an important role in world leadership. For instance, focusing on sustainability, Schneider Electric (European multinational energy and automation provider) is ranked as the most sustainable company in the world in 2021.[471] Their strategy revolves around creating a long-term business. To cut carbon emissions, they are focusing on digital and renewable disruptors. Schneider Electric can act as an example and as a leader for other businesses that want to improve their sustainability protocols.

Future developments will alter how businesses and organizations effectively impact the world. They must adapt to numerous changes that are currently occurring and are expected to happen in the future. The business leader of the future will develop new skills, work and empower diverse and multidisciplinary teams, and most of all, be purpose-driven. According to Steve Jobs,[472] success can make a business lazy and complacent. It's important to continue taking risks, pushing to try new things, and seeing the changes in the future. Only time will tell who became a leader and a follower.

7.2 future of political leaders — the need for inspiration & inclusivity

What will the future of political leadership look like? The world around all of us continues to change, with current political dynamics creating future problems and new challenges arising. Since the beginning of time, people have had to organize themselves in order to tackle such challenges and ensure the well-being of the people. This section addresses the dynamics and future of political leadership.

The difficulty in the analysis of politics and leadership, or social developments more broadly, is that societies do not progress in linear ways. When new ideas emerge, there will always be people who oppose them and push back in favor of the status quo. This is also where leadership comes in. It is those people who take a stance and inspire others to see a future. Yet, political leadership does not only imply top-down structures but also bottom-up dynamics. It was climate concerns, and the (initial) lack of existing political actors, that made Greta Thunberg skip school in order to protest at the Swedish parliament. Her actions sparked such global support that she has now become the face of environmental activism.[473] Moreover, it also shows that political impact does not necessarily come from those political leaders who are in office; it is people with a vision, regardless of age, gender, sexuality, race, or whatever else it is that people might be judged on, who take a stance and are willing to take action.[474]

The future of political leadership will be more inclusive. Much of humanity's history has been decided while a vast majority of the population was excluded, whether for gender, race, social status, sexuality, or something else. In September 2021, there were a total of twenty-six women who served as Heads of State and/or Government in a total of twenty-four countries. From those numbers and recent progress, the UN concluded that if gender equality continues to develop at this speed for the highest positions of power, it will take at least another 130 years for gender equality to be realized at such high political positions.[475] Still, representation matters; those minorities who are elected to office can influence future policies as well as show next generations that their voices do matter and that they can make a change.

Andrew Reynolds, Professor of Political Science, at the University of North Carolina at Chapel Hill, analyzed the impact of openly LGBT+ legislators in office and concluded that their presence is associated with the passage of enhanced gay rights policies. Similarly, their presence has a transformative effect on voting behavior and views

469. X. Zhou, S. F. Rasool, J. Yang & M. Z. Asghar, "Exploring the Relationship between Despotic Leadership and Job Satisfaction: The Role of Self Efficacy and Leader-Member Exchange," International Journal of Environmental Research and Public Health, May 17, 2021, p. 5307.
470. H. Kakkar & N. Sivanathan, "Why We Prefer Dominant Leaders in Uncertain Times," Harvard Business Review, August 11, 2017, viewed on January 14, 2022, https://hbr.org/2017/08/why-we-prefer-dominant-leaders-in-uncertain-times.
471. Scheider Electric, "Schneider Electric ranked world's most sustainable company by Corporate Knights," January 25, 20221, viewed on January 13, 2022, https://www.se.com/ww/en/about-us/newsroom/news/press-releases/schneider-electric-ranked-world%E2%80%99s-most-sustainable-company-by-corporate-knights-600a99142da98a304f239fbf
472. J. Johnson, "10 Steve Jobs Quotes Every Business Owner Needs to Hear", CO, January 10, 2020, viewed on March 20, 2022, https://www.uschamber.com/co/authors/jamie-johnson
473. D. Kraemer, "Greta Thunberg: Who is the climate campaigner and what are her aims?" in BBC News. November 5, 2021, viewed on January 17, 2022, https://www.bbc.com/news/world-europe-49918719.
474. PWC, "Leaders of the future in government Value-based, authentic & in-real time," PwC Middle East Public Sector Institute, 2010, pp. 1–17.
475. UN Women, "Facts and figures: Women's leadership and political participation," in UN Women, viewed on 16 January 2022, https://www.unwomen.org/en/what-we-do/leadership-and-political-participation/facts-and-figures.

by their straight colleagues, and same-sex marriage is more likely in countries with a higher representation of openly gay parliamentarians.[476] In the U.S., these trends are accompanied by, between 2019 and 2020, a 21% increase in LGBT+ political representation with at least 843 people who openly identify as LGBT+ serving in elected offices.[477] Even if in some countries, the political participation among youth is decreasing, young people are demanding change in political leadership and take on a bigger role in shaping the future of their political reality. The 2019 UN Youth Climate Summit allowed youth climate leaders from all over the world to share their demands and solutions, and pressure world leaders.[478] Since then, the UN COP meetings have been accompanied by the Youth4Climate meeting, which allows young delegates to come together and participate in shaping the global climate discussion.[479] All these examples show the importance of ensuring inclusive political leadership.

Still, there are also opposing trends. In recent years, there has been much electoral support for populist parties and leaders. With populism, politics is generally framed as a battle between the corrupt elite and the virtuous ordinary masses. In many countries, there are many people who do not feel heard or represented and thus opt for people who frame themselves as anti-elite. Crisis situations make the support for populism generally higher.[480] Since the world is currently, and also over the next few years, facing plenty of crises, whether it's the pandemic, migration, economic, or climate, such populist leaders are most likely here to stay. Additionally, for the fifteenth year in a row, Freedom House, which records how democratic countries are, has recorded a decline in the number of democracies.[481] Such decline in the level of democracy, within countries as well as globally, in combination with the arguments that people do not feel heard by the current political leadership, increases the importance of inclusive leadership.

Additionally, there are also changes in what is understood to be political leadership because, across different communities and cultures, political leadership takes different forms. An example of this can be found with the American Indian communities, where non-indigenous observers understood American Indian leadership as an inability to lead instead of a different ability to lead. Nowadays, there is more awareness of different political leadership traditions. This has led to the understanding

476. A. Reynolds. "Representation and Rights: The Impact of LGBT Legislators in Comparative Perspective." American Political Science Review, 2013, 107(2): pp. 259–274, doi:10.1017/S0003055413000051.
477. T. Fitzsimons, "LGBTQ political representation jumped 21 percent in past year, data shows," in NBC News, July 17, 2020, viewed on January 17, 2022, https://www.nbcnews.com/feature/nbc-out/lgbtq-political-representation-jumped-21-percent-past-year-data-shows-n1234045.
478. United Nations, "Youth in Action," in United Nations Climate Action, viewed on January 17, 2022, https://www.un.org/en/climatechange/youth-in-action.
479. UK COP26, "A chance for young people to propose ideas and concrete actions to address climate change," in UK COP26, viewed on January 17, 2022, https://ukcop26.org/pre-cop/youth4climate-2021/.
480. M. Roodujn, "Why is populism suddenly all the rage?" in The Guardian, November 20, 2018, viewed on January 17, 2022, https://www.theguardian.com/world/political-science/2018/nov/20/why-is-populism-suddenly-so-sexy-the-reasons-are-many.
481. Foreign Policy, "10 Ideas to Fix Democracy," in Foreign Policy, January 7, 2022, viewed on January 17, 2022, https://foreignpolicy.com/2022/01/07/10-ideas-fix-democracy/.

that American Indian models are more focused on how different types of leadership can serve the community, whereas Western models are more focused on rewards and the reputation of individuals.[482] Furthering such awareness will allow different political communities to learn from each other, overcome biases, and tackle future challenges more effectively.

Our world will continue to face challenges. In order to make sure that the 7 billion people, or the 9.9 billion people expected by 2050, will continue to thrive, political leaders need to step up. A PWC report on the future of political leadership argues that a critical success factor for future leaders is a "global" mindset; implying that they must find a balance between global and local matters. The challenges of the future require political leadership with a vision, strong personal commitment, and an ability to energize and inspire.[483] +

What will the future of leadership look like? In business leadership, there are two main trends: purpose-driven and despotic leadership. These appear similar to governmental dynamics where on the one hand, there appears to be a greater call for inclusive leadership, whereas, on the other hand, there is also a rise in populist and authoritarian leadership. Our world will continue to change. This will allow new leaders to emerge, but it also demands new skills and strong visions from leaders. Both the private and public sectors have great possibilities to change our world for the better, and their leadership is crucial in how well humanity is able to face future challenges.

+ Diede Kok
The global community's challenges seem daunting, but remember an important citation from Franklin D. Roosevelt, a man whose life was riddled with difficulty and strive. His mentality is one of optimism and recalls the essence of the scientific method.

"The country needs and, unless I mistake its temper, the country demands bold, persistent experimentation. It is common sense to take a method and try it: if it fails, admit it frankly and try another. But above all, try something"
— Leadership In Turbulent Times, Doris Kearnes Goodwin, p. 181

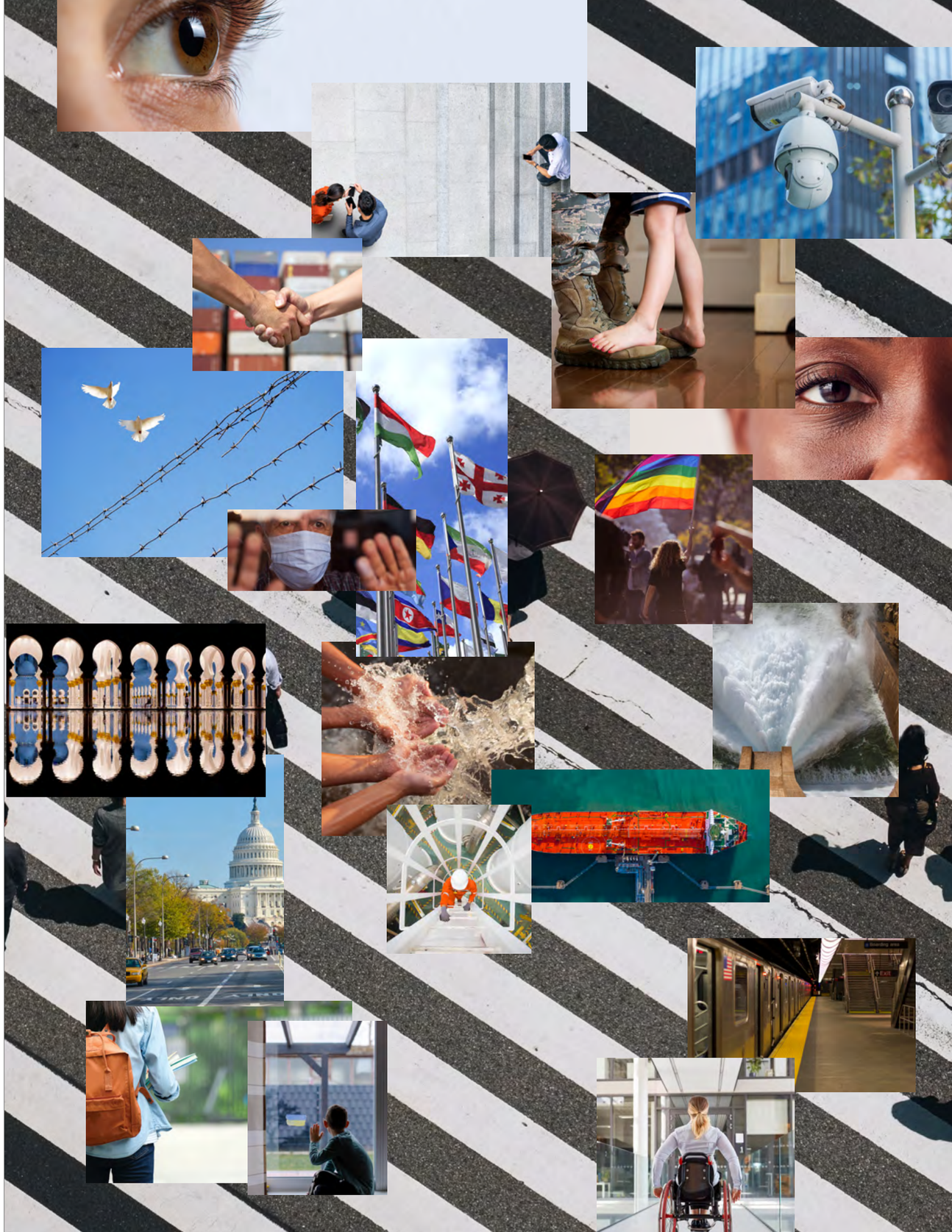
482. L. Warner & K. Grint, "American Indian Ways of Leading and Knowing", Leadership, 2006, 2(2): pp. 225–244, doi:10.1177/1742715006062936.
483. PWC, "Leaders of the future in government: Value-based, authentic & in-real time", PwC Middle East Public Sector Institute, 2010, pp. 1–17. https://www.pwc.com/m1/en/mepsi/leaders-of-the-future.pdf

8. political change — what's heading our way?

Although no one can predict precisely what politics will look like in the future, this chapter offers a glimpse at a crystal ball by outlining some of the possible trends with regard to political issues. The future of the world's political climate depends largely on what parts of our politics are embedded in our human nature and what parts are taught behavior; geopolitics will likely see traditional and new types of conflict and military, as well as a broader approach in defining what exactly security entails. New actors such as China are taking the lead in changing the way states cooperate with each other, given that many of the existing international organizations are having trouble with their effectiveness and representation.

As to political change at the domestic level, the long-lasting effects of the pandemic and the political involvement of younger generations could become driving forces behind political upheaval and reforms in different regions across the globe. On the government side, technology is continuously reshaping the way authorities respond to fundamental changes in our societies. In civil society, activist movements have expanded over time and undeniably sparked change in the evolving forms of protests.

3d printing, metaverse, gene editing, and data privacy will be scorching topics. how can we safeguard the ethical side of these changes for future society?



introduction
economics
socio-cultural
politics
ecology
technology
demographics
conclusion

food & water
energy
circular economy
conservation
ecological change

If no adjustments are made, earth extinction is what humanity may face in the future. With much of the world's soil becoming degraded and more people facing water shortages and hunger, the world is becoming a more dangerous place. This description just scratches the surface of the huge impact climate change will have on the Earth in the future. Some scientists envision Mars as a *backup* planet to which people could go when climate change is out of control.[484]

As a result of rising temperatures, many companies have made promises to limit the global temperature rise to below at most 2 degrees Celsius—but preferably 1.5 degrees Celsius, to, for instance, save a lot of countries that are harmed by climate change; consequences such as heatwaves, floods, and droughts will become more and more frequent.[485] The chances of creating or maintaining a livable planet are dwindling the hotter it gets. At an increase of 1.5 degrees Celsius, severe heatwaves will affect around 14% of the world's population every five years. At an increase of 2 degrees Celsius, 99% of the world's coral reefs begin to erode, thereby putting an end to warm-water corals. Almost one out of every ten vertebrate creatures and nearly one out of every five plants species will lose half of their habitats. Several ecosystems are on the verge of extinction.[486] Unfortunately, heat waves are not the only consequences of climate change. Is it then already too late to take action? No, with current technological advances and renewable energy, there is still hope.

This chapter dives deeper into the effects of climate change such as in relation to food and water, energy and natural resources, the circular economy, conservation, and the natural environment. The problems posed by climate change and the possibilities to overcome these problems to create a better world are examined in greater depth.

1. food & water — our most fundamental needs

1.1 food — how to feed the largest global population yet

Overall food demand is expected to rise by more than 50% by mid-century, with demand for animal-based meals rising by almost 70%. According to current projections, the world will not reach the second Sustainable Development Goal in the UN (zero hunger by 2030) in time without any drastic changes. Almost 9% of the world's population is hungry now, and this number is rising by 10 million people every year,[487] roughly equaling the population of Belgium.[488] If recent trends continue, the number of people affected by hunger will surpass 840 million by 2030.[489] +

484. The Oxford Scientist, "Staying on Earth or moving to Mars: The cosmic debate," in The Oxford Scientist, 2019, viewed on January 7, 2022, https://oxsci.org/staying-on-earth-or-moving-to-mars-the-cosmic-debate/
485. O. Milman, A. Witherspoon, R. Liu, & A. Chang, "The climate disaster is here," in The Guardian, October 14, 2021, viewed on December 12, 2021, https://www.theguardian.com/environment/ng-interactive/2021/oct/14/climate-change-happening-now-stats-graphs-maps-cop26
486. Ibid.
487. United Nations, "Food," in United Nations, 2021, viewed on December 12, 2021, https://www.un.org/en/global-issues/food.
488. The World Bank, "World Development Indicators," in The World Bank, 2020, viewed on December 16, 2021, https://datatopics.worldbank.org/world-development-indicators/
489. United Nations, "Food," in United Nations, 2021, viewed on December 12, 2021, https://www.un.org/en/global-issues/food
490. C. Chen, A. Chaudhary & A. Mathys, "Natural and environmental losses embedded in global food waste," in Resources, Conservation and Recycling, Volume 160, September 2020.
491. O. Mulhern, "Food Waste Statistics Updated," in Earth.org, November 15, 2021, viewed on December 12, 2021, https://earth.org/data_visualization/an-update-to-food-waste-statistics/
492. Ibid.
493. World Resource Institute, "Creating a Sustainable Food Future," in World Resources Report, July 19, 2019, https://agritrop.cirad.fr/593176/1/WRR_Food_Full_Report_0.pdf
494. Ibid.
495. Ibid.
496. M. De Clercq, A. Vats, & A. Biel, "Agriculture 4.0: The Future of Farming Technology," February 2018, viewed on December 12, 2021, https://skyfarms.io/wp-content/uploads/2020/08/84-OliverWyman-World-Government-Report-Agriculture-4.0.pdf
497. TNO, "Enabling the future of 3D-printed food," in TNO, viewed on December 28, 2021, https://www.tno.nl/en/focus-areas/industry/roadmaps/flexible-free-form-products/enabling-the-future-of-3d-printed-food/
498. BIS Research Global 3D Food Printing Market: Analysis and forecasts 2018–2023, viewed on December 5, 2021, BIS Res. Ind. Rep. 2018, https://bisresearch.com/industry-report/global-3D-food-printing-market-2023.html.

+ *Daphne Prieckaerts*
Although I agree with Maslov that food and water are fundamental to survival, so is energy. With energy, I don't mean electricity, but human energy. Energy regulates our feelings, will, interaction, and mental and physical health. Together with food and water, this energy enables us to live, breathe, and be happy or unhappy. As a teacher at the Barbara Brennan School of Healing, I train people to become aware of and change their energy from negative to positive, from toxic to loving and compassionate. Do you want to change the spirit of a person, a group, a company, a movement, a country? Change the energy. It's not hard; it's the biggest gift you can give to yourself and others.

One of the major contributors to global greenhouse emissions, freshwater withdrawals, and land use is food waste.[490] Farm-stage food waste amounts to 2.2 Gt CO2 a year, which is 4% of the global anthropogenic emissions. Additionally, a lot of the food produced worldwide will never reach the mouth of a person.[491] From production to consumption, one-third of the food produced is lost or wasted.[492] Food waste is most present in high-income countries; in fact, high-income countries waste six times more food by weight than low-income countries do.[493] Food security can only be reached in a society with limited resources and a growing population by making more sustainable use of resources and behavioral changes, such as reducing or ideally limiting food waste.[494] Hundreds of millions of people are still malnourished today due to the lack of nutritious food provided by local agricultural systems.[495]

What about printing food? This sounds impossible, but actually, a lot of research is being conducted to make this happen in the future. It is a method of forming items out of layers of materials.[496] Instead of going to the supermarket and buying food, people could print their own food at home and personalize it. It will probably be possible to print snacks that fit well with the needs and functions of an individual. 3D food printing can help to reduce food challenges like food waste, as people would only focus on printing the food they need and like.[497] Research by BIS predicted that the 3D food industry market will reach $525.6 million globally by 2023.[498] According to researchers, 3D food printing will not fully replace traditional food manufacturing but it will broaden the range of food products available.[499] As a result, it is feasible that food may be manufactured using only a printer in the future; however, it is unclear when this will occur.

Another transformation that is currently happening is alternative proteins. One of these alternatives is called

cultured meat. Even though meat consumption is down in industrialized countries, it is rising globally because consumers, particularly in developing countries, are hesitant to cut their meat intake. As these people become increasingly middle class, they seek more upscale goods, such as meat and other animal products. In today's world, industrial farming accounts for a major share of animal production. Although there has been a switch from large agriculture to factory farming, it is still mostly focused on efficiency instead of being concerned with other implications, such as environmental consequences and animal welfare. As a result, more efficient protein production methods are being developed to meet these concerns.[500] People will probably keep eating meat in the future; however, the meat has to be produced in a more sustainable way for the planet to survive. Too much land is being utilized to feed too many animals, and the world is running out of farmable land.[501] With the development of cultured meat, people can still eat meat, but in a more sustainable way without any animals being killed. The goal of cultured meat is to use only a few cells to reproduce the complicated structure of an animal's muscle. An animal that is alive is used to obtain a biopsy, and stem cells are used to multiply or change into various types of cells.[502] Additionally, some argue that cultured meat is safer than conventional meat as it is produced in a completely controlled environment with no other organisms present. Another advantage of cultured meat in terms of safety is that it is not generated from animals grown in confined spaces, which eliminates the chance of an epidemic and eliminates the need for costly vaccines against illnesses like influenza.[503] +

Since cultured meat can serve as the solution for meat consumption in the world, how about other products? Proteins are important for multiple reasons. One reason is they are important for the growth and development of young people. Looking at the future, some researchers argue that insects could be a sustainable solution. The use of insects as human food and as animal feed could be promising in assuring food security. A positive aspect of using insects as a source of protein is that they can be farmed anywhere in the world and not in a specific environment. Additionally, insects do not destroy the land, they can be grown on byproducts of the food industry, and they are full of nutrients. Nowadays, most investment is heading toward insects-as-feed for other animals, like pets. They can be farmed intensively without

+ Sten Uijtewaal
Meat culturing is very energy consuming. Therefore, to achieve sustainable meat production, the energy in the process should be sustainable as well.

A study by Lynch and Pierrehumbert points out that the effect of the decrease of methane emissions from eliminating normal meat production could be countered by increased CO2 emissions from meat culturing. Source:

499. S. Jayaprakash, J. Paasi, K. Pennanen, I. F. Ituarte, M. Lille, J. Partanen & N. Sozer, "Techno-Economic Prospects and Desirability of 3D Food Printing: Perspectives of Industrial Experts, Researchers and Consumers," Foods, Volume 9 (Issue 12), December 9, 2020
500. S. Chriki and J. Hocquette, "The Myth of Cultured Meat: A Review," in Discoverability, February 7, 2020
501. Ibid.
502. TNO, "Enabling the future of 3D-printed food," in TNO, viewed on December 28, 2021, https://www.tno.nl/en/focus-areas/industry/roadmaps/flexible-free-form-products/enabling-the-future-of-3d-printed-food/
503. Ibid.
504. R., "If we want to save the planet, the future of food is insects," in The Guardian, May 8, 2021, viewed on December 12, 2021, https://www.theguardian.com/food/2021/may/08/if-we-want-to-save-the-planet-the-future-of-food-is-insects
505. Ibid.
506. B. Kateman, "Is The Future Of Farming Indoors?", in Forbes, July 14, 2021, viewed on December 7, 2021, https://www.forbes.com/sites/briankateman/2020/07/14/is-the-future-of-farming-indoors
507. Square Roots, "Our mission: To responsibly bring our locally grown food to people in cities around the world, all year round," in Square Roots, viewed on December 28, 2021, https://squarerootsgrow.com/about_us/
508. Ibid.
509. Dutch Greenhouses, "The Dutch Approach to Greenhouses," in Dutch Greenhouses, 2021, viewed on December 9, 2021, https://www.dutchgreenhouses.com
510. B. Kateman, "Is the Future of Farming Indoors?" in Forbes, 14 July 2021, viewed on December 7, 2021, https://www.forbes.com/sites/briankateman/2020/07/14/is-the-future-of-farming-indoors

compromising their welfare. A prediction for the future is that the market for edible insects will reach $6.3 million by 2030, so they are on the rise.[504] For instance, crickets can generate the same amount of protein with less than 0.1% of the GHG emissions produced by cows. They also use far less water: a single gram of beef requires 112 liters of water. An insect protein, on the other hand, requires just 23 liters, which is even less than chickpeas.[505]

As alternative proteins are on the rise, transformations in the agricultural sector are also happening. Rising temperatures and more frequent droughts are challenging for traditional farming methods. Farming is actually becoming increasingly inefficient and unreliable as a result of these difficulties. One solution could be indoor farming. In an indoor farm, vegetables are grown inside, where growth conditions can be controlled. Over the past six years, indoor farming has increased in worth by almost 17 million dollars. Compared to traditional farms, yields are often significantly higher in indoor farms as crops are produced in three dimensions instead of two. Crops can also be grown all year round, regardless of weather conditions.[506]

One example of an indoor farming company is Square Roots.[507] One of their farms can produce the same amount of food as a traditional farm each year but within just 340 square feet. They make this possible by using AI to guarantee that the environment is perfect for each plant, including temperature and CO2 requirements.[508] Another example is a Dutch greenhouse manufacturer that specializes in the development of greenhouse projects.[509] Dutch greenhouses produce 35% of the country's vegetables, despite occupying less than 1% of its farmland. Indoor farming, thus, has the potential to sustainably (using less water and emitting fewer emissions) help plants adapt to different environmental circumstances. Another advantage of using indoor farming is that it does not require pesticides, which is healthier for the environment and humans since it avoids the potential of run-off contaminating water.[510]

Furthermore, not only are greenhouses on the rise, but vertical farming is also becoming more and more significant. In China, "the farmscraper" is already getting bigger. A large-scale vertical hydroponic farm capable of feeding up to 40,000 people per year is being designed by architects. Vertical farms are one idea for increasing food yields while using less space. They're advertised as

being eco-friendly, consuming less water, and requiring fewer pesticides. On the other hand, most vertical farms employ fully enclosed systems with heating and artificial LED lighting, which may consume a lot of power.[511]

To conclude, there are a growing number of solutions to deal with food scarcity. However, we are still a long way off. To protect the environment and help the ten million people who go hungry every year, the world must come up with realistic solutions and encourage change. +

1.2 water — scarcity vs. flood protection

Food cannot be produced without water, and, currently, agriculture uses 70% of all freshwater withdrawals globally. So, not only is food production under pressure, but so is the water supply. Global water consumption is predicted to rise by 50–80% over the next decades,[512] and in today's world, there are already many individuals affected by water shortages. Water scarcity and poor water quality have wide-ranging impacts on people's lives, causing hunger, diseases associated with poor hygiene, poverty, violence, and in some cases, even jeopardizing their education,[513] It is no surprise that most SDGs are related to water. Water security challenges, such as water shortages, drought and flood risks, and rising water temperatures that impair water quality and biodiversity, are among the issues to be addressed. However, the biggest issue is dealing with all of the challenges at the same time.[514] The predictions are that freshwater biodiversity will be reduced by 28% in 2050, and nothing will change. The primary drivers of freshwater biodiversity loss are growing populations and unsustainable economic development. For example, in the blockbuster film *Blade Runner 2049*, the main character only has two seconds to clean himself in the shower. Showering has become a luxury due to water rationing, which terrified many people. Some individuals are oblivious to the situation today and do not believe that their daily routines will be disrupted; yet, if nothing changes, there may be insufficient water to clean oneself in the future. +

Nowadays, high-quality freshwater ecosystems in tropical regions are already being harmed. The drop in quality will continue, particularly in Sub-Saharan Africa, Latin America, and Asia. The majority of the quality reduction has already occurred in Europe, the United States, and

+ Chia-Erh Kuo
The solutions are very impressive. I would like to add one angle here: politics and food security. In a highly globalized world, the problem of food insecurity no longer refers to the scarcity of food alone. Instead, food issues are often the byproducts of inequalities among countries, geopolitical change, and the trajectory of capitalism.

If you want to dive deeper into the link between international relations and food security, I recommend reading "Food Security and International Relations." The author explores the humanitarian and ethical importance of a solution to the problem of hunger, as well as the role of the state as a relevant factor in achieving food security from a Global South perspective. SourceL

+ Kim Tan
It can take up to 10,000 liters of water to produce one pair of jeans! Source:

511. Bloomberg News, "Can Indoor Farms Reach Skyscraper Height?" in Bloomberg, December 14, 2021, viewed on December 29, 2021, https://www.bloomberg.com/news/features/2021-12-13/farmscraper-design-takes-vertical-farms-to-new-heights
512. C. He, Z. Liu, J. Wu, X. Pan, Z. Fang, J. Li & B. A. Bryan, "Future global urban water scarcity and potential solutions," in Nature Communications, vol. 12, August 2021.
513. M. Cipullo, "Solutions to Water Scarcity," in SOLARIMPULSE, August 30, 2021, viewed on December 10, 2021, https://solarimpulse.com/news/solutions-to-water-scarcity
514. PBL Netherlands Environmental Assessment Agency, "Setting the scene," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/setting-the-scene/
515. PBL Netherlands Environmental Assessment Agency, "Ecological quality of aquatic ecosystems," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/ecological-quality-of-aquatic-ecosystems/
516. C. He, Z. Liu, J. Wu, X. Pan, Z. Fang, J. Li & B. A. Bryan, "Future global urban water scarcity and potential solutions," in Nature Communications, vol. 12, August 2021.
517. PBL Netherlands Environmental Assessment Agency, "Setting the scene," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/setting-the-scene/
518. H. Ritchie and M. Roser, "Clean Water and Sanitation," in OurWorldInData.org, 2021, viewed on December 12, 2021, https://ourworldindata.org/water-access.
519. PBL Netherlands Environmental Assessment Agency, "Water pollution and human health," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/water-pollution-and-human-health/
520. M. Cipullo, "Solutions to Water Scarcity," in SOLARIMPULSE, August 30, 2021, viewed on December 10, 2021, https://solarimpulse.com/news/solutions-to-water-scarcity
521. Ibid., p. 122, "Solutions to Water Scarcity," in SOLARIMPULSE, August 30, 2021, viewed on December 10, 2021, https://solarimpulse.com/news/solutions-to-water-scarcity
522. PBL Netherlands Environmental Assessment Agency, "Flooding," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/flooding/

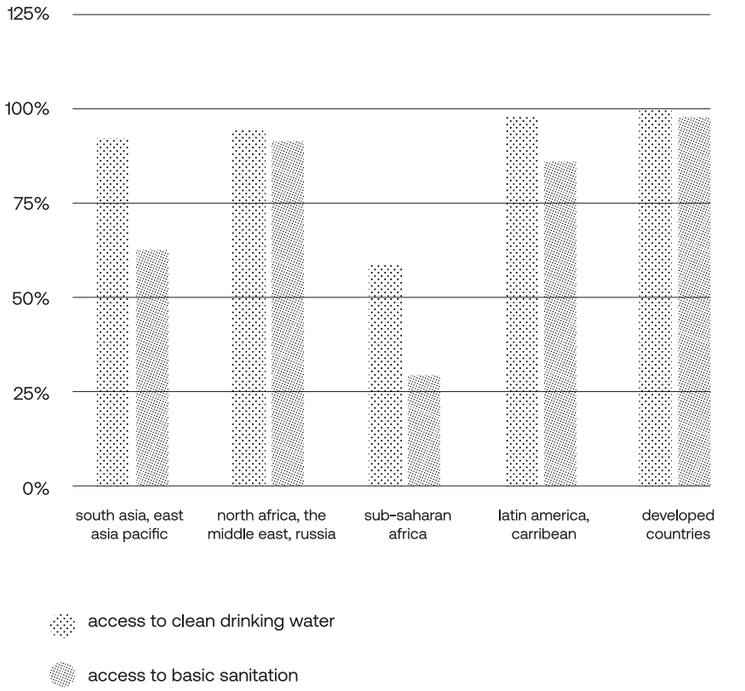
Japan or Oceania. The quality of freshwater ecosystems will be least harmed in less populated, northern areas.[515] In 2050, half of the world's urban population will be confronting water scarcity due to, among other things, the decline of freshwater supplies. India will be the worst hit in terms of urban population expansion in water-scarce areas. Water scarcity will affect a growing number of cities (between 193 to 284), including 10–20 megacities.[516] In addition to this, far more people die from unsafe water compared to natural disasters and conflicts.[517] In fact, 1.2 million people die from unsafe water each year, which makes it a leading risk factor for death, especially in low-income countries.[518] Most people without safe drinking water and basic sanitation are in Sub-Saharan Africa (see graph 'Safe drinking water and basic sanitation').

Suffering from water scarcity? To meet the SDGs, clean technology solutions are in development. They have the potential to significantly improve the access to clean and safe drinking water, while at the same time could also provide social and environmental advantages. *UDUMA* is a good example of such a technological solution. *UDUMA* is a rural African drinking water service that provides African villages with a long-term, sustainable, and creative drinking water supply. They replace pumps that are not working properly and provide residents with electronic cards to help them pay easier. This technique allows many people to drink clean water and avoid infections while producing less CO2.[520]

ORISA, which is a water filter for people who do not have access to clean water, is another example. It is a portable water filter that offers a steady supply of drinking water for NGOs and local organizations. To combat infections, the filter removes viruses and germs. It's also completely reusable and repairable.[521] Despite these advances, climate change will further press water scarcity, which will lead to stronger actions being needed to ensure that every person has access to clean water.

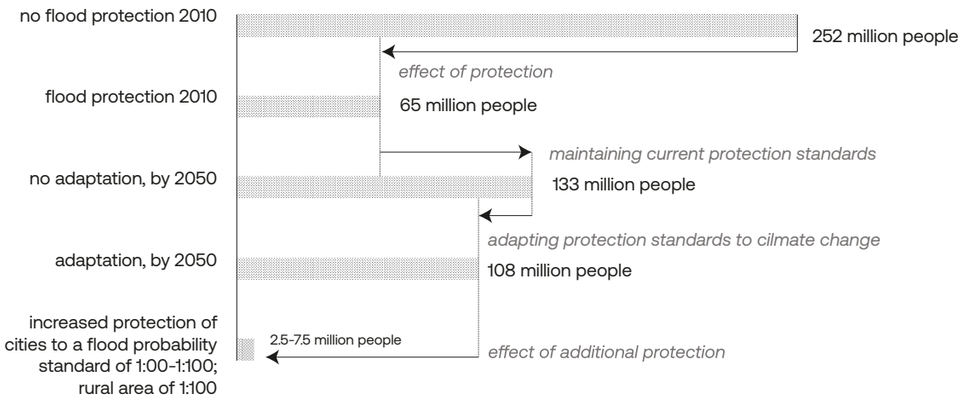
While water scarcity is one problem, some people are affected by too much water. There has been a significant rise in the likelihood of flooding due to population growth and economic development. One prediction states that approximately 1.6 billion people will be living in flood-prone areas by 2050.[522] The majority of people who are in danger of river floods live in developing nations, particularly in South Asia and the East Asia Pacific. The

safe drinking water and basic sanitation[519]



flood protection[525]

people that would be exposed to river flooding each year



523. PBL Netherlands Environmental Assessment Agency, "Flooding," in themasites, 2019, viewed on December 8, 2021, https://themasites.pbl.nl/future-water-challenges/flooding/
524. Ibid.
525. Ibid.
526. D. A. Ortiz, "The underground cathedral protecting Tokyo from floods," in BBC, November 29, 2018, viewed on December 12, 2021, https://www.bbc.com/future/article/20181129-the-underground-cathedral-protecting-tokyo-from-floods
527. J. Buckley, "The flood barriers that might save Venice," in CNN, updated on December 29, 2021, viewed on December 29, 2021, https://edition.cnn.com/travel/article/mose-venice-flood-barriers/index.html

risks of flooding are dispersed unevenly. Namely, while affluent nations would bear the brunt of the economic consequences, the bulk of those who will be affected live in underdeveloped countries. Additionally, the number of individuals at risk in developing countries will rise faster than in developed countries.[523] Based on current statistics, if there was no flood protection, around 252 million people would be vulnerable to floods each year. There are already ways to reduce flood danger, such as building dikes, as well as adopting spatial design and construction rules that address flood risk. A significant number of deaths have already been averted due to these measures. However, if protection levels are maintained at the present level, by 2050, the yearly number of individuals vulnerable to floods would have more than doubled. So, flood protection measures have to be adapted to climate change in order to save more lives.[524]

Tokyo is seeking flood protection solutions for the city's underground. The Metropolitan Area Outer Underground Discharge Channel (MAOUDC), a 6.3 km long system of tunnels and chambers that protect parts of Tokyo from flooding, including a floodwater cathedral, is hidden 22 meters underground. This system is the world's largest flood diversion facility, which took 13 years to complete. When one of the rivers in Tokyo overflows because of heavy rainfall, for instance, the water is diverted to one of five massive tanks underground that run the length of the channel. The tanks are huge and connected by a 6.3-km underground network of tubes. The current system is able to withstand 65 to 75 mm of rain per hour.[526] What if this is just the beginning of looking for answers underground to combat climate change, and does it imply that life should be moved underground in the future?

In addition to this, rising sea levels are affecting multiple places on Earth. One of these places is Venice. The MOSE (Modulo Sperimentale Elettromeccanico, Experimental Electromechanical Module) project has been in the works since 1984, taking forty years to complete, and it protects Venice from flooding. It's a complex system made up of rows of moveable gates that can temporarily separate the Venetian Lagoon from the Adriatic Sea at high tide. This technology can keep Venice safe from tidal waves of up to three meters.[527]

Even if technology can support climate change mitigation today, water security is not guaranteed. This is because

528. J.D. Sachs, The Age of Sustainable Development, Columbia University Press, New York, 2015.
529. Department of Economic and Social Affairs, “Energy,” in United Nations, viewed on December 5, 2021, https://sdgs.un.org/topics/energy
530. Deloitte, “Renewable Energy Industry outlook 2022,” in Deloitte, November 2021, viewed on December 18, 2021, https://www2.deloitte.com/nl/nl/pages/energy-resources-industrials/articles/renewable-energy-industry-outlook.html

technology needs constant innovation to respond to current and coming challenges. Therefore, the future of water will depend on how people, companies, governments, all actors implement new technologies.

2. the energy transition & natural resources

Today, sustainability has become a central concept. For the upcoming generation, the SDGs will guide the world’s economic diplomacy. Sustainability was discussed in an economic growth context for the first time at a UN Conference in 1972. Years later, in 2012, the globally applicable SDGs were established. The idea behind the SDGs is to motivate taking action, knowledge, and enthusiasm worldwide. Moreover, they create social mobilization and peer pressure, since all countries report on their progress toward their goals annually.

There are seventeen goals in total, and they vary from ending poverty to reducing inequalities globally.[528] *Goal Seven*, which aims to “ensure access to affordable, reliable, sustainable and modern energy for all” is related to the focal point that will be discussed later on in this text. Furthermore, this SDG is noted as highly important for the agenda of the Paris Agreement and the 2030 agenda for Sustainable Development. By achieving this goal, a whole lot of other opportunities will become possible for billions of people. Better education, new economic opportunities, better health services, and empowered women are just a few examples this SDG will make possible.[529]

In the following section, changes in solar power, wind energy, hydropower, and geothermal energy will be discussed; all of these are sources of renewable energy. The renewable energy industry did not change much in 2021. This was a bit surprising since it is normally characterized by technological developments that happen fast and at a high competitiveness rate. It is expected that in 2022, the renewable energy sector will grow again. One of the reasons for this is that there is accelerated concern for climate change action and demand for cleaner energy will increase in the future.[530]

2.1 solar power

When a new day begins, the sun supplies the Earth with a fresh and free supply of clean and renewable energy.[531] Using solar power reduces massively the production costs of electricity. Renewable energy sources have rapidly transformed the global electricity mix in the last decade. The production costs of solar and wind power are especially low. What makes the investment in solar power so attractive is that even though investment comes at a high cost, maintenance and operating costs are rather low. Over the long term, it also creates stable revenue.[532]

First, one of the changes that will be prominent in the future is the upcoming rise of floating solar photovoltaics (FSPV); in other words, floating solar panels. They have already gained attention in the United States, and developers are looking into the possible opportunities they might provide. For instance, developers are looking into creating a hybrid system in combination with hydropower.[533] Currently, it is becoming harder and harder to find space on land where solar panels can be placed so this new type of solar panel could be a perfect solution. The National Renewable Energy Laboratory (NREL) noted that applying them to the reservoirs in the United States could possibly generate 10% of the yearly needed electricity in the country.[534] Once this new type of solar panel is successfully implemented, it will result in new growth opportunities in the solar power industry in the future. +

Second, in the future, community solar projects will become more developed and more widely applied across the world. Currently, they are available in twenty-two states in the United States of America. The concept is as follows: for many people, the purchase of a (rooftop) solar panel is too expensive. Moreover, when someone lives in an apartment complex, they are able to enjoy the benefits of a solar panel since they have no space for it, even when they have the money to buy it. The community project provides the concept of shared solar power benefits. In this way, multiple people can enjoy the benefits of one solar panel.[535] +

Another similar project to be further developed in the future is the Solar for All initiative, originating in the District of Columbia. The goal of this initiative is to lower utility bills, and the benefits involved go beyond its positive impact on climate change. The initiative's ambition is to reach equity in clean energy.[536] As a result, in the future, there will be an increase in people participating in community solar projects.

Third, solar-powered cars, and other electric vehicles, are expected to hit the road in the future. Solar-powered vehicles will need to use their energy efficiently to meet users' needs. To make it actually possible for solar-powered vehicles to hit the road, engineers are creating different designs. Some vehicles will come with an option for a plug-in in order for drivers to reach their destination when solar power on its own is not sufficient. Currently, electric vehicles still need to be charged in addition to the energy it receives from the sun to be capable of lasting longer distances. However, the constantly evolving technology of today could help solar-powered vehicle owners become less reliant on charging stations, in comparison to electric vehicle owners.[537] Nonetheless, solar-powered cars are likely to be on the road soon.

2.2 historic with great potential — wind power

In the same way the price of solar electricity has dropped, the cost of wind power has plummeted. As a result of regulations established in Europe, offshore wind costs have decreased, resulting in significant success. Asia and North America will benefit from offshore wind success in the future and economies of scale will lower costs even further. Wind power will remain popular in the future as a result of these assumptions.[538]

Humanity has been using wind power for over 1300 years. It all started with windmills and technological developments that created modern wind turbines. In the future, the technology behind windmills will develop even further. Engineers are thinking ahead and are in the early development stages of designing airborne wind turbines. These will be used in places where traditional wind turbines are difficult (and expensive) to install and where the wind is stronger. Partly due to climate change, engineers are challenged to deal with extreme winds and more unusual weather conditions. These conditions ask for new ways of extracting energy from wind, and as a result, engineers are looking into other designs for the future. One of the possibilities is to copy the way trees are designed in nature, as they are capable of withstanding gale-force winds by simply moving with the wind from any direction. Engineers are speculating about this new

+ Benjamin Von Plehn
Theoretically, we could supply the whole world with solar power thanks to a small portion of the Sahara. German physicist Gerard Knies said: "In six hours, the deserts receive more energy from the sun than the entire human race consumes in a year." Therefore, the issue isn't just having enough space but also technical. First, the yield rate is about 15%, which basically means that 75% of the energy is lost during the conversion. Major breakthroughs are expected in the coming century. Furthermore, if a small square of the Sahara allows supplying the world, routing energy remains a considerable challenge and extremely expensive.

Example: Noor project in Morocco was abandoned because of the financial investment required. There are also diplomatic and geopolitical reasons. The southern countries (the Middle East and North Africa) denounce an "eco-colonialism" of Europe, while the northern countries fear a new form of energy dependence with the countries producing renewable energy.

+ Kim Tan
Do developing countries have the same opportunity to achieve/implement this?

531. Environmental and Energy Study Institute, "Solar," in Environmental and Energy Study Institute, viewed on December 5, 2021, https://www.eesi.org/topics/solar
532. Y. Abdelilah, H. T. P. Bojek, F. Briens, P. Le Feuvre & G. Rodríguez Jiménez, "Challenges and opportunities beyond 2021," in iea, viewed on December 5, 2021, https://www.iea.org/reports/renewable-energy-market-update/challenges-and-opportunities-beyond-2021
533. Ibid., p.481.
534. R. Snead, "Floating a New Solution for Solar Deployment," in Environmental and Energy Study Institute, March 30, 2021, viewed on December 5, 2021, https://www.eesi.org/articles/view/floating-a-new-solution-for-solar-deployment
535. Ibid., p.481.
536. B. Williams, "Solar for All Demonstrates the Importance of Equity in Clean Energy," in Environmental and Energy Study Institute, June 8, 2020, viewed on December 9, 2021, https://www.eesi.org/articles/view/solar-for-all-demonstrates-the-importance-of-equity-in-clean-energy
537. R. Elliott, "Solar-Powered Electric Vehicles Are Almost Ready to Hit the Road," in The Wall Street Journal, November 7, 2021, viewed on December 9, 2021, https://www.wsj.com/articles/solar-power-electric-vehicle-11635259950
538. Ibid., p.130.

type of technology. Therefore, in the future, there might be artificial wind-harvesting trees.[539]

Moreover, people in the wind industry have to start working together with climate change scientists to understand what the weather patterns are and how they might change in the near future. This, in turn, could also be crucial to knowing how to adapt wind turbines.[540] Another change that will take place in the future is inspection and maintenance-related activities will become automatic.[541] Maintenance-related activities can both be preventive and predictive. The first one is aimed at extending the lifespan of the machine, e.g., cleaning the machine, replacing parts, or adjustments. The latter focuses on monitoring the actual condition of the machine and its assets, e.g., repairing corrosion, assessing the blades, or measuring oil levels.[542] Nowadays, these are things still done manually, which is highly labor-intensive. In the future, they will be done by robots and drones to a large extent.[543]

Demand for offshore wind power continues to increase; therefore, in the future, transmission infrastructure will become a key priority. The development of transmission is necessary to enable the connection of renewable energy sources, which are often located remotely, to centers for electricity consumption. This change needs support from the implementation of different policies and regulations. Currently, it is a big challenge for transmission projects to facilitate growth in the renewable energy industry. Especially with offshore wind, there is the problem that extended regulations are needed in order to be connected to coastal infrastructure. In the future, this problem can be overcome by building new infrastructure lines and improving the capacity of already existing lines.[544]

2.3 the majority of our planet's surface — water & the potential of hydropower

For over 2000 years, water has been used as a natural resource for deriving energy. There are different ways in which water can do this. In the United States, for instance, energy is generated by hydroelectric reservoirs that are connected to dams. Moreover, currents, tides, and waves serve as hydrokinetic energy generators.[545] As a result of the immensely decreasing prices of solar and wind power, governments can now generate energy without having to build dams, which ask for big tradeoffs.[546] Generating energy through dams has a huge impact on free-flowing rivers. Dams retain sediments that are needed for agriculture and fishing. If all hydropower dams that are currently scheduled to be built are actually completed, there will be 260,000 km less of free-flowing rivers worldwide. This means that more than 50% of free-flowing rivers will be impacted. Moreover, freshwater fisheries will be hurt as well.[547]

Over the past few years, the technology behind hydropower has reached relatively high levels of maturity in comparison to solar and wind power technology. Therefore, there are not as many possibilities to innovate further or apply new disruptive innovative designs. However, due to the dominance of solar and wind power innovations, actions need to be taken for the renewal of electrical power systems (EPS). New technologies will allow the digitalization of hydropower.[548] One of the technologies that could be applied to hydropower is the Industrial Internet of Things (IIoT), which is basically machine-to-machine communication. It will make hydropower smarter and will result in fewer carbon emissions.[549] Furthermore, the implementation of IIoT solutions will make sure that plants are constantly monitored so people know when a plant requires maintenance. Efficiency will increase and costs will decrease, and IIoT will provide for sustainable, reliable, and long-term operation for hydropower plants.[550]

In addition, big data could be used in the future to optimize efficiency as well. It could be used as a strategic tool for hydropower plant owners to stay up to date about the productivity and the state of the machines and plants used. As a result, a malfunctioning device can be detected and dealt with as soon as possible.[551]

Climate change is expected to have a huge impact on the development of generating hydropower electricity. Often the use of hydropower involves environmental and social damage. For example, a University of Copenhagen study showed that hydropower dams and the process of building them would be a threat to freshwater biodiversity. Because of this, many people are unsure if the benefits outweigh the costs. However, there is a potential type of hydropower dam for the future; this is the so-called run-of-the-river plant, which could be used. There would be little or no damage to the environment since this type of plant uses the natural river flow in combination with small turbine generators to generate

539. Caltech, "What Is the Future of Wind Energy," in Caltech Science Exchange, viewed on December 6, 2021, https://scienceexchange.caltech.edu/topics/sustainability/wind-energy-advantages-disadvantages
540. Wind Energy The Facts, "Future Developments," in Wind Energy The Facts, viewed on December 6, 2021, https://www.wind-energy-the-facts.org/future-developments.html
541. TNO, "Innovative methods for wind measurements," in TNO, viewed on December 6, 2021, https://www.tno.nl/en/focus-areas/energy-transition/roadmaps/renewable-electricity/wind-energy/innovative-wind-measurement
542. Enerpac, "Wind Turbine Maintenance: Components, Strategies, and Tools," in Enerpac, September 28, 2021, viewed on December 27, 2021, https://blog.enerpac.com/wind-turbine-maintenance-components-strategies-and-tools/
543. TNO, "Innovative methods for wind measurements," in TNO, viewed on December 6, 2021, https://www.tno.nl/en/focus-areas/energy-transition/roadmaps/renewable-electricity/wind-energy/innovative-wind-measurement/
544. Ibid., p.130.
545. A. Todoroff & U. Atre, "Innovations in River Renewable Energy Power Remote Alaskan Communities," in Environmental and Energy Study Institute, May 5, 2020, viewed on December 8, 2021, https://www.eesi.org/articles/view/innovations-in-river-renewable-energy-power-remote-alaskan-communities
546. J. Opperman, "Dams, Rivers, And Drive-By Truckers: Songs That Explain The Challenge Of Sustainable Energy," in Forbes, December 6, 2021, viewed on December 8, 2021, https://www.forbes.com/sites/jeffopperman/2021/12/06/dams-rivers-and-drive-by-truckers-songs-that-explain-the-challenge-of-sustainable-energy/
547. J. Opperman, "Energy Will Always Leave Footprints: Projected Hydropower Would Leave Deeper Global Footprint Than Solar Power And Wind Power," in Forbes, September 2, 2021, viewed on December 8, 2021, https://www.forbes.com/sites/jeffopperman/2021/09/02/energy-will-always-leave-footprints-projected-hydropower-would-leave-deeper-global-footprint-than-solar-and-wind/
548. I. Kougias, G. Aggidis, F. Avellan, S. Deniz, U. Lundin, A. Moro, S. Muntean, D. Novara, J. I. Pérez-Díaz, E. Quaranta, P. Schild & N. Theodossiou, "Analysis of emerging technologies in the hydropower sector." Renewable and Sustainable Energy Reviews, vol. 113, 2019.
549. J. Unwin, "The future of hydropower energy," in Power Technology, February 6, 2020, viewed on December 8, 2021, https://www.power-technology.com/features/hydropower-energy-future
550. Global Water intelligence, "From Old to New," in Global Water Intelligence, September 1, 2018, viewed on December 8, 2021, https://www.globalwaterintel.com/sponsored-content/from-old-to-new-andritz

energy.[552] Critics mention that new hydropower dams only generate 1% of renewable energy that fragmenting flowing rivers dams produce.[553]

In the future, rivers are expected to be restored via dam removal, and the connectivity between rivers improved, which is already a trend in the United States. This change is in line with the Federal Power Act, where two particular dams were removed and the fish passage was improved. At the same time, new equipment was recommended and operational changes were executed for the remaining dams connected to the river. The electricity generated afterward was the same as before the removal of the two dams.[554]

2.4 inner heater — geothermal power

Geothermal energy comes from the Earth's heat, which is the heat that converts water into steam. Since the eighteenth century, this heat has been used for the purpose of heating, cooking, and later on, for generating power. At first, geothermal energy was only used in Italy, but starting from 1913 onward, it became popular, widely used, and was then developed further. What makes geothermal energy different from the aforementioned energy sources is that it is scarce because not every area has large, trapped pockets of heat in the Earth's crust.[555]

Geothermal power generation is special in the way that it is always present. Weather conditions and time do not influence it; it continuously supplies energy.[556] In the future, geothermal power is expected to be more widely used and will become more important. One technological development that will shape the future of geothermal power is the enhanced geothermal system (EGS).[557] An EGS is a reservoir made by humans at places where there are hot rocks. Because there is little natural water permeability present, to actually reach this, people could carefully inject fluid into the subsurface. This results in old fractures opening up again; water permeability is created as a result. Moreover, more water permeability means that heat will be transported to the surface and, in turn, can be used to generate energy. There have already been successful pilots with this in the United States and Europe. What makes this appealing for future practices is the fact that using EGS results in little to no carbon emissions.[558] Even further in the future, it might not even be necessary to inject fluids into the

551. Enel Green Power, "Hydroelectric energy and Big Data together to promote environmental sustainability," in Enel Green Power, January 4, 2019, viewed on December 15, 2021, https://www.enelgreenpower.com/stories/articles/2019/01/sustainable-development-passes-through-hydroelectric-energy-and-big-data
552. Ibid., p.133.
553. Ibid., p.133.
554. M.L. Thieme, D. Tickner, G. Grill, J.P. Carvallo, M. Goichot, J. Hartmann, J. Higgins, B. Lehner, M. Mulligan, C. Nilsson, K. Tockner, C. Zarfl & J. Opperman, "Navigating trade-offs between dams and river conservation." Global Sustainability, vol. 4, June 2021, pp. 1–7.
555. Enel Green Power, "Geothermal energy," in Enel Green Power, December 15, 2021, https://www.enelgreenpower.com/learning-hub/renewable-energies/geothermal-energy
556. Environmental and Energy Study Institute, "The Growing Role of Renewable Energy in the U.S. Energy Mix," in Environmental and Energy Study Institute, November 15, 2019, viewed on December 15, 2021, https://www.eesi.org/briefings/view/111519cetsa
557. B. Merchant, "What is the future of geothermal energy?" in how stuff works, viewed on December 15, 2021, https://science.howstuffworks.com/environmental/energy/future-geothermal-energy.htm
558. Oil & Gas Portal, "Geothermal Energy Future Development," in Oil & Gas portal, viewed on December 15, 2021, http://www.oil-gasportal.com/geothermal-energy/geothermal-energy-future-development/

subsurface or use drilling machines. Horizontal drilling and pipes could be the solution instead. Fluid could be added to the pipes, facilitating heat exchange.[559] +

3. towards a circular economy — living within the earth's biocapacity

Imagine that each time someone buys groceries, shops for new clothes, or pays their bills, half the money they spend is money they do not have in their bank accounts and will not be able to cover from their next paychecks. This is exactly the way in which humans are consuming the Earth's resources. Biocapacity is the ability of Earth's ecosystems to naturally regenerate resources and services. Currently, humanity's consumption and its demand for resources are 56% greater than Earth's biocapacity. In other words, each year, humans are consuming 56% more resources than the planet can sustainably regenerate.[560] +

As a solution to overconsumption, the concept of circular economy was introduced. This economic system shifts from a linear, "end-of-life" business model to one that minimizes waste and maximizes recycling materials as well as resources during the production, distribution, and consumption processes.[561] As shown in the graphic below, a fully circular economy is one in which any byproducts or waste materials are fully reused rather than discarded.

In short, a circular economy focuses on three principles: eliminating waste and pollution, circulating products and materials at their highest value, and regenerating nature. There are multiple waste-management strategies that can be used to achieve circularity, including refuse, reduce, reuse, recycle, and recover.[562] The outcome is a resilient economic system that does not rely on indefinitely consuming Earth's finite resources.[563] Instead of discarding an item once it has reached the end of its life, the item would be repurposed or broken down into its foundational materials, which could then be reused.

Studies have shown that recycling foundational materials would be highly beneficial not only for the environment but also for the economy. For example, researchers have estimated that adopting a circular-economy model would add 1 to 8 billion euros annually to a country's GDP, add between 50,000 and 2 million new jobs, and result in the reduction of carbon dioxide (CO_2) emissions by 30% to 66%, depending on the regional scope of the particular study.[564] The *Ellen MacArthur Foundation* has found that implementing a circular economy could reduce the volume of plastics entering the oceans each year by 80% by 2040.[565] It also estimates a reduction in healthcare costs, savings in the consumer goods sector, less congestion in cities, and a 15–50% saving in household costs in 2050.[566] In short, transitioning to a circular economy would have far-reaching positive impacts across many areas of life, from urban planning to healthcare to environmental and economic health.

The following section explores some of the components of circular economies, which are likely to see continuing advances in development in the coming years: corporate sustainability, bio-based materials, and recycling and waste innovations.

3.1 bio-based materials

Imagine the following morning routine: a bike ride to work with a stop to pick up a coffee and some snacks along the way. The interesting part is in the details: the rubber of the bike tires is made from dandelions rather than from rubber trees grown on plantations on deforested land. Instead of cardboard, the coffee cup is made from cornstarch, and the cookies are wrapped in plastic-like packaging made from renewable sources rather than oil and petroleum. Innovations in bio-based materials could make these products a reality.[567] Bio-based materials, or biomaterials, are materials made from renewable raw materials and developed for a wide range of uses. Biomaterials are currently being developed or already produced for use in packaging, textiles, automotive parts, consumer electronics, construction materials, and even biomedical materials.[568]

Bioplastics, plastic polymers made entirely from renewable raw and/or biological material, are poised to replace some of the oil-based plastics predominately used today.[569] Plastic alternatives are important because less than 9% of plastic is recycled,[570] with the vast majority ending up in landfills, oceans, or scattered throughout

+ Sten Uijtewaal
As you might know, a big problem in the energy transition is that many renewable sources produce energy in a weather-dependent manner.

Energy storage is, therefore, an important part of the solution, and there are many cool suggested solutions; think of hydrogen gas or storing energy by pumping water to a higher place.

+ Daphne Prieckaerts
One of the things that actually doubles when being shared is happiness. If we define happiness as the right to share wealth, materials, and time, the solution for a lot of the upcoming issues is the sharing economy: the more we share, the happier we get, the less we want to own, the more we want to share, etc. Let's give it a try...

559. A. Kessler, "Drill, Baby, Drill' Is the Future," in The Wall Street Journal, June 27, 2021, viewed on December 15, 2021, https://www.wsj.com/articles/drill-baby-drill-is-the-future-11624810731
560. World Wildlife Foundation, "Living Planet Report 2020: Bending the curve of biodiversity loss," WWF, p. 74. R.E. Almond, M. Grooten, & T. Petersen (Eds). 2020, viewed on December 10, 2021, https://livingplanet.panda.org/en-us/
561. T. Bauwens, M. Hekkert, & J. Kirchherr, "Circular futures: What Will They Look Like?" Ecological Economics, vol. 175, no. 175, Sep. 2020, p. 1. doi: 10.1016/j.ecolecon.2020.106703
562. Bauwens, Hekkert, & Kirchherr, "Circular futures: What Will They Look Like?", p. 5.
563. Ellen MacArthur Foundation, "What Is a Circular Economy?" in Ellen Macarthur Foundation, 2019, viewed on December 22, 2021, https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview
564. Bauwens, Hekkert, and Kirchherr, "Circular futures: What Will They Look Like?", p. 3.
565. Ellen MacArthur Foundation, "Plastics and a Circular Economy," in Ellen Macarthur Foundation, 2021, viewed on December 22, 2021, https://ellenmacarthurfoundation.org/topics/plastics/overview
566. Ellen MacArthur Foundation, "Completing the Picture: How the circular economy tackles climate change | Shared by Climate Change," European Circular Economy Stakeholder Platform, p. 32. September 23, 2019, viewed on December 22, 2021, https://circulareconomy.europa.eu/platform/sites/default/files/emf_completing_the_picture.pdf
567. C. Bolck, "Renewable materials," in Wageningen University & Research, April 18, 2020, viewed on December 17, 2021, https://www.wur.nl/en/Research-Results/Research-Institutes/food-biobased-research/Research-themes/Renewable-materials.htm
568. C. Bolck, "Renewable materials."
569. BASF, "Naturally good? Searching for new bio-based raw materials for industry," in Creating Chemistry Magazine Issue #6. 2017, viewed on December 17, 2021, https://www.basf.com/global/en/media/magazine/archive/issue-6/naturally-good-searching-for-new-bio-based-raw-materials-for-industry.html
570. Footprint, "Science," in Footprint, viewed on December 22, 2021, https://www.footprintus.com/science

the ocean and other ecosystems in the form of tiny microplastic particles.[571] Cellulose, the material that makes up vegetable fibers and the walls of plant cells, is one substance that can be used to replace plastic packaging and as an alternative to cotton and polyester.[572] Cellulose is an attractive biomaterial because it is the dominant form of waste from the agri-food industry, coming in the form of prunings, clippings, and the leaves and stems of food crops.[573]

The "plant-based fiber tech" company Footprint works to create a more sustainable economy by producing biodegradable, compostable, and recyclable plant-based alternatives to polystyrene foam and single- and short-term-use plastics in the food industry. They produce a variety of products, including supermarket trays, frozen food bowls, and fiber cups. Since 2014, their products have saved 61 million pounds of plastic waste from disposal into the environment and eventual arrival as plastic microparticles in the air, earth, and waterways.[574]

Plant-based biomaterials can do more than replace plastic containers. Design company *MOGU* creates interior design materials from low-value organic industrial waste with the goal of producing durable, sustainable products with the lowest possible environmental impact. *MOGU* produces flooring and acoustic wall panels using mycelium, the vegetative state of fungus. The mycelium feeds off the raw input materials and converts them into a new composite material; this is then combined with upcycled or bio-based elements to make the final, biodegradable product.[575] Given that industrial production of materials like steel, cement, aluminum, and plastic account for 45% of global GHG emissions, reducing the need for material production will lower the 10.2 billion tons of CO2 released annually in that process.[576] In the auto industry, one potential way to lower a car's CO2 emissions is to reduce the car's overall weight by incorporating natural materials such as flax, hemp, and sisal into its structure.[577] Replacing 1 kilogram of mild steel with aluminum reduces a car's weight by up to 23% and is estimated to save 6 kilograms of CO2 equivalent.[578] So, using a lighter, bio-based material like hemp can lead to countless savings in both CO2 emissions and material production waste.

Medicine is another area in which biomaterials are proving to be very useful. Polylactic acid (PLA) is a biomaterial

571. Ellen MacArthur Foundation, World Economic Forum, & McKinsey & Company, "The New Plastics Economy: Rethinking the future of plastics," World Economic Forum. 2016, viewed on January 10, 2022, https://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf
572. J. van Bon, "Cellulose: sustainable alternative to a wide range of materials," in Wageningen University & Research, June 28, 2020, viewed on December 17, 2021, https://www.wur.nl/en/Research-Results/Research-Institutes/food-biobased-research/Solutions/Cellulose-sustainable-alternative-to-a-wide-range-of-materials.htm
573. Ibid.
574. Footprint, "Footprint Recognized as one of World's Most Socially Impactful Brands," in Footprint News, November 8, 2021, viewed on December 22, 2021, https://news.footprintus.com/en/footprint-recognized-as-one-of-worlds-most-socially-impactful-brands?hsLang=en
575. Mogu, "Mogu Technology," viewed on December 19, 2021, https://mogu.bio/technology/
576. Ellen MacArthur Foundation, "Completing the Picture: How the circular economy tackles climate change | Shared by Climate Change (2021 Reprint)," European Circular Economy Stakeholder Platform, September 23, 2021, viewed on January 10, 2022, https://emf.thirdlight.com/link/w750u7vysuy1-5a5i6n/@/preview/1?o
577. BASF, "Naturally good? Searching for new bio-based raw materials for industry."
578. A. C. Serrenho, J. B. Norman, & J. M. Allwood, "The impact of reducing car weight on global emissions: the future fleet in Great Britain," Philosophical transactions. Series A, Mathematical, physical, and engineering sciences, vol. 375, no. 2095. June 13, 2017, doi: 10.1098/rsta.2016.0364
579. V. DeStefano, S. Khan, & A. Tabada, "Applications of PLA in modern medicine," Engineered Regeneration, vol. 1, 2020, p. 78. doi: 10.1016/j.engreg.2020.08.002
580. T. Casalini, F. Rossi, A. Castrovinci, & G. Perale, "A Perspective on Polylactic Acid-Based Polymers Use for Nanoparticles Synthesis and Applications," Frontiers in Bioengineering and Biotechnology, vol. 7. October 11, 2019, doi: 10.3389/fbioe.2019.00259
581. Ibid.
582. Ibid.
583. European Commission, "Circular economy action plan," in European Commission, viewed on January 10, 2022, https://ec.europa.eu/environment/strategy/circular-economy-action-plan_nl
584. European Commission, "Policy Framework on biobased, biodegradable and compostable plastics: a Roadmap | European Circular Economy Stakeholder Platform," in European Commission. October 7, 2021, viewed on January 10, 2022, https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13138-Policy-framework-on-biobased-biodegradable-and-compostable-plastics_en

that can be synthesized by bacterial fermentation of corn starch, sugarcane, beet sugar, or similar compounds — all of which are renewable materials.[579] Polymers made from PLA are used to develop a variety of biomedical tools such as suturing threads, bone fixation screws, stent coating, and even devices to deliver drugs.[580] PLA is particularly useful for these applications because it is biodegradable and naturally degrades when exposed to water, allowing medical devices made of PLA (nano)particles to eventually exit the body without the need for additional surgery or invasive procedure to remove them.[581] PLA also needs 25–55% less energy than the standard petroleum-based polymers in order to be produced.[582] Although PLA has some disadvantages such as being brittle, its status as a "green" polymer makes it an attractive and sustainable alternative to oil-based polymers.

In March 2020, the EU adopted the new circular-economy action plan (CEAP). Among the CEAP objectives are to "make sustainable products the norm in the EU" and "make circularity work for people, regions, and cities," and it includes thirty-five planned actions such as regulating packaging waste and waste shipments and adopting strategies for circularity in the textiles, plastics, and electronics sectors.[583] As part of this plan, the European Commission is set to adopt a policy framework for the use of bio-based, biodegradable, and compostable plastics in mid-2022.[584] Bio-based materials are a crucial part of the shift toward a circular economy because they can be derived either from renewable raw materials or from the byproducts and waste products of other products and processes. Shifting product sourcing and supply chains to incorporate biomaterials whenever possible can go a long way toward reducing waste at the end of a product's life cycle.

While bio-based materials are still used relatively infrequently, the upcoming decades will most likely see their steady adoption in daily life and popular products. Right now, scientific developments are being made which will enable bio-based materials to be used more widely in product packaging, medical tools and operations, automotive manufacturing, construction materials, and much more. The EU is one of the players at the forefront of developing and implementing circular economic policies, especially in the realm of bio-based materials and bioplastics. Through its many upcoming policy actions, it will help to normalize the use of bio-based materials

in applications across various industries. This, in turn, will strengthen the concept of transitioning to a circular economy and encourage more countries, companies, and economies to adopt similar policies and make the transition to a more sustainable economy.

3.2 waste recycling, upcycling, and remanufacturing

While bio-based materials support circular economies due to using renewable raw materials or waste as inputs, various industries are also using other strategies to reduce waste and work toward a (more) circular economy. Recycling is the reuse of products or materials to make something new at the same level of quality. Upcycling, on the other hand, is the reuse of products or materials to make something at a higher quality level than what it was before.[585] Remanufacturing is rebuilding a product like new, using a combination of reused, repaired, and new parts. It has the advantage of using less energy than recycling because the entire product does not need to be dismantled.[586]

In 2020, 12.8% of the material resources used in the EU came from recycled waste materials. This circularity rate was highest in the Netherlands (31%), Belgium (23%), and France (22%), and overall represents an 8.4% increase since 2004. Metals had a 25% circularity rate, biomass (including paper, wood, and tissue) 10%, and fossil fuels 2%.[587] Businesses that remanufacture hardware and appliances allow the original equipment manufacturers to reduce their carbon footprints because the lives of their products are extended.[588] One such business is Circular Computing, which has designed a 5+-hour "circular remanufacturing process" and accompanying laptop remanufacturing factory. The process is designed to certify that a remanufactured laptop is "equal to or better than new," and they boast that this process is both carbon neutral and saves the consumer 40% of the cost compared to an equivalent new laptop.[589]

One of the biggest trends in upcycling is to upcycle waste to energy using the processes of gasification, incineration, or anaerobic digestion.[590] This waste-to-energy process is doubly positive, providing energy and reducing waste in the process. Present in thirteen countries, energy company SEaB manufactures containers containing an anaerobic "digester" that either converts

585. J. van Kuijk, "Ik realiseerde me dat we al eeuwen aan upcycling doen. In de keuken," in de Volkskrant, November 6, 2020, viewed on December 23, 2021, https://www.volkskrant.nl/columns-opinie/ik-realiseerde-me-dat-we-al-eeuwen-aan-upcycling-doen-in-de-keuken~b5ddb4b7/
586. D. R. Prasser, "Top 8 Circular Economy Trends & Innovations in 2021," in StartUs Insights, June 17, 2021, viewed on December 23, 2021, https://www.startus-insights.com/innovators-guide/top-8-circular-economy-trends-innovations-in-2021/
587. Eurostat, "EU's circular material use rate increased in 2020," in Eurostat, November 25, 2021, viewed on January 9, 2022, https://ec.europa.eu/eurostat/en/web/products-eurostat-news/-/ddn-20211125-1
588. Prasser, "Top 8 Circular Economy Trends & Innovations in 2021."
589. Circular Computing, "The circular remanufacturing process," viewed on December 23, 2021, https://circularcomputing.com/remanufacturing-process/
590. Prasser, "Top 8 Circular Economy Trends & Innovations in 2021".
591. Seab Energy, "SEAB energy," viewed on December 23, 2021, https://seabenergy.com/products/anaerobic-digesters/
592. Ellen MacArthur Foundation, "A New Textiles Economy: Redesigning Fashion's Future," in Ellen MacArthur Foundation, December 1, 2017, viewed on December 23, 2021, https://ellenmacarthurfoundation.org/a-new-textiles-economy
593. B. Zhang, Y. Zhang, & P. Zhou, "Consumer Attitude Towards Sustainability of Fast Fashion Products in the UK," Sustainability, vol. 13, no. 4, February 2021, p. 1646. doi: 10.3390/su13041646.
594. Ellen MacArthur Foundation, "A New Textiles Economy: Redesigning Fashion's Future."
595. Zhang, Zhang, & Zhou, "Consumer Attitude Towards Sustainability of Fast Fashion Products in the UK."
596. Kleiderly, "Our Mission," in Kleiderly, viewed on December 17, 2021, https://kleiderly.com/pages/mission
597. Kleiderly, "Our Impact," in Kleiderly, viewed on December 17, 2021, https://kleiderly.com/blogs/kleiderly-magazine/kleiderly-s-impact-reduction-potential
598. VÆR Sneakers, "Facts - VÆR Sneakers," in VÆR Sneakers, viewed on December 21, 2021 https://vaerupcycled.com/sustainability
599. T. Schröder, "The Dutch have built the world's first shoe recycling machine," in Innovation Origins, December 14, 2021, viewed on December 21, 2021, https://innovationorigins.com/en/the-dutch-build-the-worlds-first-shoe-recycling-machine/
600. Zhang, Zhang, & Zhou, "Consumer Attitude Towards Sustainability of Fast Fashion Products in the UK."

farm waste into heat and electricity or organic waste into energy.[591]

Fashion is one of the industries where upcycling and recycling can have the biggest impact. Clothing makes up over 60% of total textiles used worldwide,[592] and the fashion industry is estimated to be responsible for 10% of CO2 emissions and 20% of waste streams worldwide.[593] Yet, only about 13% of the total materials used in the clothing and textile industries are recycled in some way after the clothing is used,[594] and global apparel consumption is actually expected to rise from 62 million to 102 million tons by 2030,[595] Clothing companies are beginning to tackle this problem using multiple strategies. For example, clothing retailer Kleiderly boasts the "World's first eyewear collection made from recycled textiles."[596] They claim that for each kilogram of material they produce, they save 2.5kg of "CO2 equivalent," which is a way of quantifying different GHGs in terms of their combined effect on global warming. According to a climate impact assessment conducted by climate consultancy Impact Forecast, Kleiderly has the potential to reduce almost 8,000 tons of CO2 equivalent per year, which is equal to driving a car around the world 936 times or powering 3,180 EU households with electricity.[597] Danish company VÆR upcycles denim and workwear into sneakers with completely plant-based insoles, 100% recycled cotton laces, and soles that are 70% recycled and 30% virgin rubber.[598] A Dutch company called Fastfeetgrinded has recently built the world's first shoe-recycling machine, which can separate any shoe into foam, rubber, and textile at 2,500 shoes per hour. Designed at the request of the Dutch Ministry of Defense, the machine produces outputs of yarn and granules, which could (with more development) be made into new pairs of "circular" shoes.[599]

Peoples' attitudes toward reuse, recycling, and the other circular-economy strategies also seem to be warming. Over a third of consumers surveyed across adults in five EU countries said they choose to buy from brands that are doing social or environmental good, and 53% "feel better" when they buy products that are produced sustainably (even though these sentiments do not fully translate to changes in behavior).[600] Sustainably designed "slow fashion" brands and clothing boutiques that produce longer-lasting products, sometimes from recycled or upcycled materials, are also gaining more of a

market share.[601] Thrift shopping and second-hand stores are increasingly popular, both for clothing and for other goods.[602] Lastly, buy-nothing groups, in which users may ask for, offer, or express gratitude for anything as long as it is gifted to a group member, are steadily gaining popularity. Buy Nothing has 6,700 Facebook groups in forty-four countries, and the groups continue to grow. Buy Nothing groups are among the simplest expressions of recycling and circularity; people are finding uses for everything from dryer lint (bedding for a pet hamster) to dirty fish tank water (good fertilizer) to leftover pickle juice (a somewhat popular chaser for shots of liquor).[603] These shifting attitudes toward recycling, upcycling, and reusing items, although still relatively small, point to a larger public shift toward implementing a circular economy across industries and at scale.

It is clear that as consumers, people increasingly value sustainably produced products — from clothing to home goods — whether they have been upcycled, recycled, or made from remanufactured materials. Companies in industries including fashion, computing, and energy are embracing aspects of circular design and waste recycling in their manufacturing processes, and there are certainly more examples and industries not covered in this book. The benefits that this shift will bring to the environment cannot be overstated. In the fashion realm alone, reusing 1kg of clothing would save 25 kilograms of CO2 from entering the atmosphere.[604] The public and corporate support for reusing materials, coupled with the clear increase in the use of recycled waste materials across the EU, suggests that finding ways to reuse and recycle waste will continue to increase. That is good news for the environment.

3.3 market pressures & corporate social responsibility

Changes in pressure by the market, consumer desires, and consumer expectations have shifted the attention of businesses towards sustainability. These market pressures have different origins: there are coercive drivers, resource drivers, market drivers, and social drivers. A response from businesses to these pressures is that they want to improve their competitive positions. Moreover, businesses do this by starting to integrate sustainability into their corporate strategies. A sustainable strategy provides a competitive advantage because it makes

601. WGSN Insider, “Exploring youth attitudes towards sustainable fashion | WGSN,” in WGSN. September 2, 2021, viewed on December 28, 2021, https://www.wgsn.com/en/blogs/sustainable-fashion-youth-attitudes
602. Ibid.
603. R. Kaysen, “Inside the World of Buy Nothing, Where Dryer Lint Is a Hot Commodity,” The New York Times, October 22, 2021.
604. BarcelonaTech, “Study reveals that reusing 1 kg of clothing saves 25 kg of CO2,” Innovation Origins, January 17, 2022, accessed on January 17, 2022, https://innovationorigins.com/en/selected/study-reveals-that-reusing-1-kg-of-clothing-saves-25-kg-of-co2/
605. A.J. Hoffman, The next phase of business sustainability. Stanford Social Innovation Review, 2018, vol. 16, no. 2, pp. 34–39.
606. J. Fernando, “Corporate Social Responsibility (CSR),” in Investopedia, September 4, 2021, viewed on December 16, 2021, https://www.investopedia.com/terms/c/corp-social-responsibility.asp.
607. Climate Bonds, “Explaining green bonds,” in Climate Bonds Initiative, viewed on December 27, 2021, https://www.climatebonds.net/market/explaining-green-bonds
608. H. van de Veen, “Water-related investments: thinking beyond blue bonds,” in Impact Investor, 2021, viewed on December 19, 2021, https://newsletter.impact-investor.com/editions/week-39/water-related-investments-thinking-beyond-blue-bonds.html
609. ADB, “Finance for ocean-positive investments in Asia and the Pacific,” in ADB Blue Bonds, September 2021, viewed on December 19, 2021, https://www.adb.org/publications/adb-blue-bonds
610. Ibid., p.143.

companies stand out from their competitors and helps them gain access to new markets. As a result, more companies are implementing CSR into their strategies.[605] Over the years, there have been many ways of defining CSR. This section uses Jason Fernando’s CSR definition, which is as follows: “operating in ways that enhance society and the environment, instead of contributing negatively to them.”[606]

Nowadays, green bonds, which have been created to fund “green” projects, are highly in demand. They are called green because these projects have a positive effect on the environment or bring benefits to the climate.[607] There are also blue bonds, which are a rather new type of sustainability bond, seen as a debt instrument, and only a small number of these are issued. However, blue bonds are expected to be issued more in the future.[608] By issuing blue bonds, one supports investments in marine and ocean-based projects. These, in turn, will have a positive impact on climate change, a (blue) economy, and a healthy ocean.

Different types of projects can be funded by blue bonds. The Asian Development Bank has created a framework categorizing the types of projects that are available to invest in. A few examples are fisheries, aquaculture, and ecosystem management and restoration.[609] Furthermore, private investors are becoming ever more interested in water projects in emerging markets and this trend is expected to continue in the future. The existence of blue bonds raises awareness regarding marine issues. More and more organizations are investing in these blue bonds as a part of their CSR strategies in terms of sustainable finance. As a result, projects that really need funding receive this and can work on creating a healthier ocean because of it.[610]

Currently, the world is at a point where CSR is required. In other words, firms are expected to have CSR as part of their business models instead of it being optional to integrate it into their strategies. For firms, it will become a challenge to survive in the long term in an ever-changing environment. Achieving long-term survival will necessitate doing business in ways that benefit the greatest number of people while lowering climate risk exposure. In the (near) future, firms will need to establish roadmaps to assure organizational change that supports achieving operational practices at sustainable levels. Examples are

611. S. Corcut, “The Evolution and the Future of Corporate Social Responsibility in a Post Covid-19 World,” in The Sustainabilist, May 6, 2020, viewed on January 17, 2022, https://thesustainabilist.ae/the-evolution-and-the-future-of-corporate-social-responsibility-in-a-post-covid-19-world/
612. T. Begum, “What is mass extinction and are we facing a sixth one?” in Natural History Museum of London. May 19, 2021, viewed on December 11, 2021, https://www.nhm.ac.uk/discover/what-is-mass-extinction-and-are-we-facing-a-sixth-one.html
613. K. Pavid, “What is biodiversity?” in Natural History Museum of London, April 3, 2020, viewed on December 11, 2021, https://www.nhm.ac.uk/discover/what-is-biodiversity.html
614. WWF, “Living Planet Report 2020: Bending the curve of biodiversity loss,” WWF, p. 74. R.E. Almond, M. Grooten, & T. Petersen (Eds). 2020, viewed on December 10, 2021, https://livingplanet.panda.org/en-us/
615. S. Whitmee, A. Haines, C. Beyrer, F. Boltz, A.G. Capon et al, “Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health,” The Lancet, vol. 386, no. 10007, July 15, 2015, p. 1973–2028. doi: 10.1016/S0140-6736(15)60901-1
616. WWF, “Living Planet Report 2020: Bending the curve of biodiversity loss,” p. 80.
617. World Economic Forum, “Global risks perception surveys 2007–2020,” in The Global Risks Report 2020, World Economic Forum, 15th Edition, p. 89. January 15, 2020, viewed on December 11, 2021, https://www.weforum.org/reports/the-global-risks-report-2020

sustainable production methods, net-zero emissions, and zero waste management.[611]

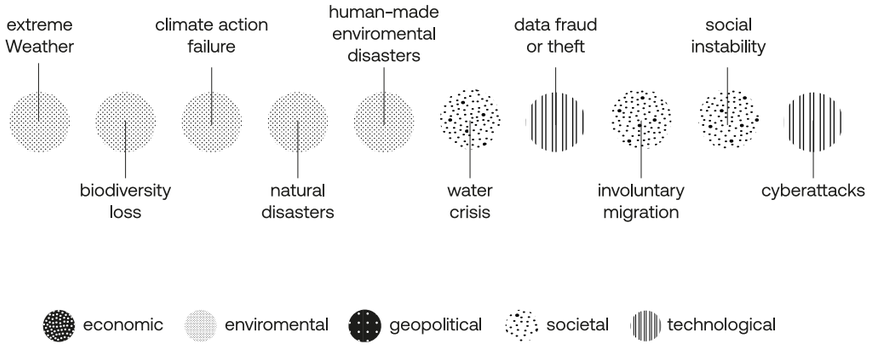
4. conservation & the natural environment

Everything, from the quality of water within a river to a frog sitting on a nearby tree leaf, to the microbes in the soil beneath the tree’s roots, is interrelated. If the health of one changes, that of the others will eventually respond in kind. The Earth is made up of countless ecosystems: dynamic communities of plants, animals, and microorganisms, each with its own internal order yet also interconnected with other communities. These connections mean changes that affect the balance of one ecosystem can put others in jeopardy as well.[612] Although ecology is usually seen as relating specifically to the relationships between plants, animals, and other organisms in a given area or community, humans are also part of these ecosystems.

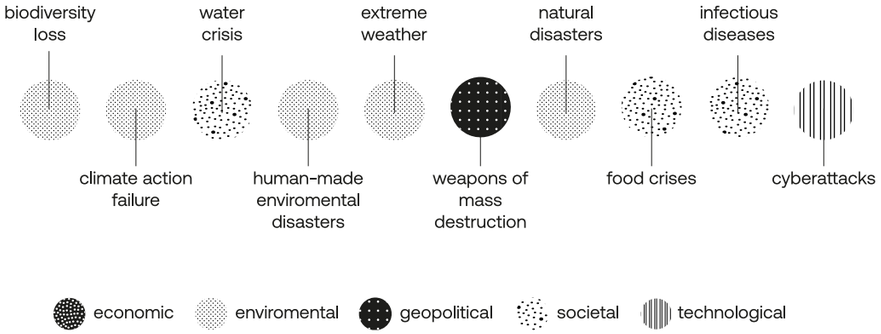
Healthy ecosystems play an important role in keeping the natural world suitable for humans to survive. Ecosystem elements such as forests, coastlines, and wetlands provide *services* such as diminishing floods, protection against rising sea levels, and regulation of pollution.[613] For better and for worse, the health of an ecosystem impacts the health of all the living beings within it — including humans.[614]

The term “planetary health,” coined in 2015 by the Rockefeller Foundation-Lancet commission, is defined as “the health of human civilization and the state of the natural systems on which it depends.”[615] It recognizes that the degradation of Earth’s natural and living systems is a direct threat to the health of human communities as well.[616] This is one reason why the concept is increasingly recognized as a critical requirement even by people outside the world of environmental conservation. According to the World Economic Forum’s 2020 Global Risks Survey, all five of the top-five likelihood global risks and three of the top-five potential impact risks are all climate-related. Climate-action failure, biodiversity loss, and extreme weather are among the top risks, with natural disasters and human-made environmental disasters rounding out the top-five list.[617]

top ten most likely long-term risks 2020-2030[617]



top ten most impactful long-term risks 2020-2030[617]



618. M. Greshko, "Mass extinction facts and information from National Geographic," in National Geographic, September 26, 2019, viewed on December 12, 2021, https://www.nationalgeographic.com/science/article/mass-extinction
619. WWF, "How Many Species Are We Losing?" in World Wildlife Fund, 2019, viewed on December 12, 2021, https://wwf.panda.org/discover/our_focus/biodiversity/biodiversity/
620. D. P. G. Bond & S. E. Grasby, "On the causes of mass extinctions," Palaeogeography, Palaeoclimatology, Palaeoecology, vol. 478, July 2017, pp. 3–29. doi: 10.1016/j.palaeo.2016.11.005.
621. Ibid.
622. Begum, "What is mass extinction and are we facing a sixth one?"
623. Pavid, "What is biodiversity?"
624. Ibid.
625. Begum, "What is mass extinction and are we facing a sixth one?"
626. WWF, "Living Planet Report 2020: Bending the curve of biodiversity loss," p. 12.

In short, biodiversity — the variety of life on Earth or within a given ecosystem — is an important part of understanding and measuring planetary health. Current environmental activism and shifts in public opinion are one way the fight for planetary health continues, and there are many technological innovations being put to use for the same cause. This section of the book explores each of these facets of the natural environment and conservation in more detail.

4.1 biodiversity — how do we prevent mass-extinction?

Imagine waking up one morning to find that 95% of all living creatures existing on this planet — birds, land mammals, even bugs — had disappeared without leaving so much as a feather behind. Earth has experienced five such mass-extinction events in the past, each time losing the vast majority of the species alive at the time.[618] Given that in the present day somewhere between 200 and 100,000 species are going extinct each year, we appear to be on the brink of another mass extinction.[619]

Each past extinction event was caused by some kind of drastic change to the Earth's environment: volcanic-eruption-induced global warming, ocean acidification and lack of oxygen in the oceans, acid rain, or other changes in the atmosphere and carbon cycle.[620] It is not understood how exactly the environmental stresses caused these mass extinctions,[621] but it is clear that the Earth's ecosystem is impacted by drastic changes in the environment when those changes occur over a "short" (less than 2.8 million years) period of time.[622] These changes have the same effect whether they are caused by humans or by natural disasters.[623]

Biodiversity, or biological diversity, refers to all living things existing in their various ecosystems on Earth.[624] It can be impacted by invasive species, extreme weather events, and agriculture among other factors.[625] Land-use change, especially the changing of natural landscapes into agricultural land, has been the biggest driver of modern-day biodiversity loss thus far. This is not surprising considering that humans have significantly altered 75% of the Earth's ice-free land (the other 25% being what we call "wilderness").[626] When plant and animal species naturally go extinct, their role in the ecosystem is filled by

a new or different species. When they go extinct more quickly, it can be difficult for the ecosystem to adapt and stay in balance on that same timescale. The typical natural extinction rate is between 0.1 and 1 species per 10,000 species per hundred years. Mass-extinction events occur when the rate of species extinction is higher than this "background rate."[627] According to Katie Collins, a Curator of Benthic mollusks at the Natural History Museum in London, "the current rate of [species] extinction is between 100 and 1,000 times higher than the pre-human background rate of extinction, which is jaw-dropping."[628] Globally, wildlife population sizes of still-existing species have dropped by an average of 68% since 1970 with no signs of stopping;[629] also, species diversity in over 50% of land ecosystems is critically low, compromising the health of the ecosystems they belong to.[630] These and similar trends have led many scientists to declare that we have entered a sixth mass extinction. Dr. Collins is one of them; in her words, "We are definitely going through a sixth mass extinction."[631]

While the extinction of plants and animals on its own may not seem to some people to be a cause for worry, this biodiversity loss actually has huge implications for human lives as well. In the wake of the Covid-19 pandemic, discussions of pandemic causes and prevention have surged and there has been renewed public awareness of how closely environmental health and public health are related. Almost half of new infectious diseases that emerge from animals are linked to land-use change and industrial and agricultural expansion into natural areas.[632] This is partly because the loss of biodiversity leads to a larger presence of disease-bearing species, which can host pathogens that spread to humans.[633] Many serious disease outbreaks also result from increased human-wildlife contact due to deforestation, expanding agriculture, and people moving into previously undeveloped areas.[634] Given that humans continue to do these things and have yet to curb biodiversity loss, the chances of future pandemics following in the footsteps of Covid-19 seems ever more likely.

However, recently there have been various policy and business efforts to help tackle the biodiversity loss problem. In October 2021, world leaders at the UN's COP15 meeting on biodiversity, created and agreed upon a new global biodiversity framework for 2021 to 2030.[635] There, ninety-three countries signed the Leaders' Pledge for Nature, committing to reverse biodiversity loss, place environmental health at the center of pandemic response, and transition to sustainable production and consumption.[636] The European Commission also adopted its own biodiversity strategy in 2020, with a target to turn 30% of the EU's land and 30% of its seas into "effectively managed and coherent protected areas" by 2030.[637] Lastly, many companies are creating policies that address the biodiversity impacts of their business practices. For example, Unilever has pledged to stop business with any suppliers who enable deforestation through the production of palm oil, soy, and packaging.[638] As part of its efforts to trace and improve its supply chain, Unilever has partnered with Google, the UN Food and Agriculture Organization (FAO), the U.S. National Aeronautics and Space Agency (NASA), and other organizations to establish the Forest Data Partnership. This partnership will provide open-source, accessible geodata about forest health and deforestation while also helping Unilever achieve its goals of (1) a deforestation-free supply chain by 2023 and (2) driving change across other deforestation-heavy industries.[639] In a similar vein, partner organizations (coffee producers, traders, roasters, and retailers) to an initiative called the Sustainable Coffee Challenge have made forty-six commitments related to forest conservation and fifty-one related to climate.[640]

The prospect of a sixth mass extinction looms large, the biodiversity loss crisis is urgent, and both will have decidedly negative impacts on human and environmental health if left without intervention. But fortunately, there is still time to protect the world's biodiversity and with it, human life. As the World Wildlife Fund's 2020 Living Planet Report 2020 states, "For the first time, we know what needs to be done if we're to have a chance of putting nature on a path to recovery by 2030. With global action to protect wildlife, produce food in better ways, and change what we choose to eat, we can turn things around."[641]

4.2 environmental awareness and activism

Activism for the environment and environmental protection is not new. Environmentalism has been around in some form since the first time that someone tried to stop pollution, protect public health, or preserve and protect a part of the natural world from harm. In other

627. Begum, "What is mass extinction and are we facing a sixth one?"
628. Begum, "What is mass extinction and are we facing a sixth one?"
629. WWF, "Living Planet Report 2020: Bending the curve of biodiversity loss," p. 16.
630. Pavid, "What is biodiversity?"
631. Begum, "What is mass extinction and are we facing a sixth one?"
632. WWF, "Living Planet Report 2020: Bending the curve of biodiversity loss," p. 82.
633. C.L. Faust et al, "Pathogen spillover during land conversion," in Ecology letters, vol. 21, no. 4, February 21, 2018, pp. 471–483. doi: 10.1111/ele.12904
634. J. Tollefson, "Why deforestation and extinctions make pandemics more likely," Nature, vol. 584, August 7, 2020, pp. 175–176. doi: 10.1038/d41586-020-02341-1
635. Conference of the Parties, "Report of the Conference of the Parties to the Convention on Biological Diversity on its fifteenth meeting (Part I)," presented at the COP Convention on Biological Diversity, Kunming, China, October 11–15, 2021, viewed on December 15, 2021, https://www.cbd.int/doc/c/d707/6fca/f76569ac6b47ae9930a3b251/cop-15-04-en.pdf
636. Leaders' Pledge for Nature, "LEADERS' PLEDGE FOR NATURE United to Reverse Biodiversity Loss by 2030 for Sustainable Development," in Leaders Pledge for Nature, September 27, 2020, viewed on December 15, 2021, https://www.leaderspledgefornature.org/wp-content/uploads/2021/06/Leaders_Pledge_for_Nature_27.09.20-ENGLISH.pdf
637. European Commission, "Biodiversity Strategy for 2030," in European Commission, viewed on December 10, 2021, https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en
638. L. Street, R. Powell-Tuck, A. Brackley, & M. Lee, "2021 Sustainability Trends report," in ERM, 2021, p. 15, viewed on December 6, 2021, https://www.sustainability.com/thinking/2021-sustainability-trends-report/
639. Unilever, "New Forest Data Partnership to help keep our forests safe," in Unilever. November 29, 2021, viewed on January 12, 2022, https://www.unilever.com/news/news-search/2021/working-together-to-protect-nature/
640. www.sustaincoffee.org
641. World Wildlife Fund, "The Living Planet Report," in WWF. 2020, viewed on December 16, 2021, https://www.wwf.org.uk/living-planet-report

words, it has likely been happening somewhere on Earth since the first humans appeared. Today's version of environmentalism builds upon the environmental challenges society faces today. Its focuses include advocating against pollution, excessive consumption, (over-)exploitation of natural resources, and advocating for fighting climate change, protecting vulnerable ecosystems, and investing in sustainable energy sources.

The climate crisis has only worsened, globally, since the 1970s. Warming and acidifying oceans hurt sensitive marine ecosystems while melting glaciers and ice sheets cause flooding, which will impact the roughly 75% of the world's population who will live on or near a coast by the year 2025.[642] In addition, over the coming years, climate change is projected to become one of the strongest drivers of biodiversity loss.[643] Climate change will be destructive economically as well; a 2018 report compiled by United States federal agencies suggests that climate-related economic damage in the U.S. alone could reach 10% of U.S. GDP by 2100.[644] A 2019 report by Scotland's Institute for Public Policy Research states that environmental breakdown could "trigger catastrophic breakdown of human systems … through the globally linked system — in much the same way as occurred in the wake of the global financial crisis of 2007–08."[645]

The climate crisis has led to ever-intensifying large-scale activism, from the loosely environmentally focused Occupy movement of the early 2010s to the more targeted global protests (Global Climate Strike, Fridays for Future), "green influencers" on social media, and youth-led environmental movements (Extinction Rebellion, the Sunrise Movement) of recent years. The formation of Extinction Rebellion groups in seventy-two countries and the participation of millions of school-aged children in the climate strikes are two of many indicators that public concern about climate change is shifting[646] and that climate activism will continue to grow in the near future. More broadly, Pew Research's Spring 2021 Global Attitudes Survey found that 72% of adults globally are very or somewhat concerned about the personal impacts climate change could have on them and 80% are willing to make "some" or "a lot" of lifestyle changes to help reduce the effect of climate change. At the same time, 49% of those surveyed felt that the UN's climate change response was somewhat good and 5% felt it was very good.[647] These shifts in public opinion as well

642. Intergovernmental Panel on Climate Change, "Special Report on the Ocean and Cryosphere in a Changing Climate," in IPCC. 2019, viewed on December 16, 2021, https://www.ipcc.ch/srocc/home/ ; M. F. Guillen, 2030: How Today's Biggest Trends Will Collide and Reshape the Future of Everything: How Today's Biggest Trends Will Collide And Reshape The Future Of Everything, The History Press, Stroud, UK, 2020, p. 169.
643. WWF, "Living Planet Report 2020: Bending the curve of biodiversity loss," p. 12.
644. US Global Change Research Program, "Fourth National Climate Assessment. Volume II: Impacts, Risks, and Adaptation in the United States," in National Climate Assessment, vol. 2, no. 4, pp. 1–470, December 2017, viewed on December 17, 2021. https://nca2018.globalchange.gov/
645. L. Laybourn-Langton, L. Rankin, & D. Baxter, "This is a crisis: Facing up to the age of environmental breakdown," in Progressive Policy Think Tank. February 12, 2019, viewed on December 18, 2021, https://www.ippr.org/research/publications/age-of-environmental-breakdown
646. D. Breitinger, E. Farnworth, A. Pickens, & J. Swanborough, "Chapter 3, A Decade Left: confronting runaway climate threat" in The Global Risks Report 2020 Insight Report, E. Granados Franco (lead author), 15th Edition, World Economic Forum, January 15, 2020, viewed on December 17, 2021, http://reports.weforum.org/global-risks-report-2020/a-decade-left/#view/fn-68
647. C. Blazina, "Fast facts about international views of climate change as Biden attends UN COP26 conference," in Pew Research Center, October 29, 2021, viewed on December 16, 2021, https://www.pewresearch.org/fact-tank/2021/10/29/fast-facts-about-international-views-of-climate-change-as-biden-attends-un-cop26-conference/
648. Begum, "What is mass extinction and are we facing a sixth one?"

as the large amount of youth involvement in climate protests and activism suggest that green policies and innovations will only become more common in the coming years.

There is also a growing sentiment among both science professionals and the broader public that decisive action is needed from corporations and government leaders in order to make changes on a scale necessary to avert the worst effects on the natural environment. According to Katie Collins, a curator at the Natural History Museum in London, "There is a lot of emphasis on individual action but most of the climate-altering pollution and fossil fuel burning is the responsibility of a small number of parties. It would be much more effective for individuals to put pressure on policymakers and businesses to reduce emissions and target companies that are major emitters."[648] The core idea is that while individual actions can make a positive impact in the fight, going after the largest contributors to pollution and climate destruction means directing protest and other efforts mainly toward major corporate emitters. This idea will likely continue to gain traction among people concerned about climate change and the environment because the large scale of potential climate devastation continues to become more evident with each deadlier-than-average natural disaster, each oil spill that devastates a section of the ocean, and each larger/stronger-than-average flood, cyclone, or hurricane.

A final, crucial thread in the tapestry of current environmental movements is the work of indigenous people and activists around the world. The past decade has seen: Water Protectors in North Dakota, U.S., fighting the construction of the Dakota Access oil pipeline; native Hawaiian kia'i pushback against the scientific community building the Thirty Meter Telescope on the sacred Mauna Kea volcano; and continued activism against logging, deforestation, and agricultural expansion from indigenous activists across the Amazon. These are just a few recent, high-profile examples of movements that are being led by indigenous people. To call these movements purely environmental would not do them justice because often their goals are multifaceted. Protecting the wildlife and natural environment of native land goes hand in hand with reclaiming and/or protecting the homelands of indigenous people, the health of the surrounding environment and ecosystems, and ultimately autonomy over

their culture and history, and future.[649] In a 2017 op-ed, LaDonna Brave Bull Allard, a member and historian of the Standing Rock Sioux tribe, wrote:

> This movement is not just about a pipeline. We are not fighting for a reroute, or a better process in the white man's courts. We are fighting for our rights as the indigenous peoples of this land; we are fighting for our liberation, and the liberation of Unci Maka, Mother Earth. We want every last oil and gas pipe removed from her body. We want healing. We want clean water. We want to determine our own future... We have no choice but to break the cycle of trauma so our future generations can have a better life.[650]

Indigenous activism and self-determination movements are not new — to the contrary, they have been ongoing since the first European settlers took land from the original inhabitants of North America. The difference is that now, such movements have been brought further into the spotlight and are gaining more support from communities around the world. Allard, who was one of the founders of the Sacred Stone Camp in Standing Rock, North Dakota, explained this shift well: "We are expendable people. We always have been. But we have the answers on how to save the world. We have the answers on how to live with this Earth. We have to stand up and share that knowledge."[651] More and more people around the world understand the urgency of living in harmony with the Earth rather than exploiting it, and understand that there is much to learn from the ways indigenous communities have historically done so. This is why environmental awareness will only keep growing, and why activism for a healthier planet will continue to be a key component of activism and social justice until the goal is finally achieved. +

4.3 technology for ecology & conservation

As mentioned in the Energy & Natural resources section, the fields of energy technology and renewable energy are developing, birthing new innovations, and growing in popularity every day. But technology can make the world a better place ecologically in other ways too. The constant pace of technological development has made it possible to use the tools already available, on a large scale, to help fight climate change, protect wildlife, and protect or restore the environment.

+ Camera Ford
Candace Fujikane's 'Mapping Abundance for a Planetary Future' discusses climate change and ecological protection from the perspective of native Hawaiian history and community. It is a very interesting look at environmentalism from this indigenous perspective, where protecting and restoring the natural environment is fueled by observations locked in stories, chants, and songs over many generations. This is a very cool book if you would like to understand how environmental conservation goals like replenishing the earth's natural resources are and have also been expressed in terms of cultural histories that are linked to the way the natural world works and describe ways of adapting to environmental changes. It also explores the self-determination of Hawaiian communities and the role that capitalism and settler colonialism play in harming Hawaiian lands, abundance, and nature.

649. L. Brave Bull Allard, "To Save the Water, We Must Break the Cycle of Colonial Trauma," in Sacred Stone Camp - Iŋyaŋ Wakháŋagapi Othí, February 4, 2017, viewed on December 14, 2021, http://www.sacredstonecamp.org/blog/2017/2/4/to-save-the-water-we-must-break-the-cycle-of-colonial-trauma/ ; A. Chavez & M. A. Pember, "LaDonna Brave Bull Allard 'changed history,'" in Indian Country Today, April 12, 2021, accessed January 13, 2022, https://indiancountrytoday.com/obituaries/ladonna-brave-bull-allard-changed-history
650. Brave Bull Allard, "To Save the Water, We Must Break the Cycle of Colonial Trauma."
651. R. Bengal, "Standing Rock Rising: Inside the Movement to Stop the Dakota Access Pipeline," in Vogue, November 22, 2016, viewed on December 14, 2021, https://www.vogue.com/projects/13505511/standing-rock-movement-dakota-access-pipeline

+ Elias Sohnle Moreno
Methane is a GHG that accounts for about 20 percent of global emissions.

652. H. Nijenhuis, "Deze satelliet meet wereldwijd een van de belangrijkste bronnen van klimaatverandering," in Algemeen Dagblad, December 21, 2021, viewed on December 28, 2021, https://www.ad.nl/wetenschap/deze-satelliet-meet-wereldwijd-een-van-de-belangrijkste-bronnen-van-klimaatverandering~ac77647f/
653. M. Egan, "Secretive energy startup backed by Bill Gates achieves solar breakthrough," in CNN Business, November 19, 2019, viewed on December 17, 2021, https://edition.cnn.com/2019/11/19/business/heliogen-solar-energy-bill-gates/index.html
654. E. Kobayashi-Solomon, "Heliogen And Bloom Energy Agreement Signals The Start Of The Hydrogen Age," in Forbes, July 22, 2021, viewed on January 2, 2022, https://www.forbes.com/sites/erikko-bayashisolomon/2021/07/22/heliogen-and-bloom-energy-agreement-signals-the-start-of-the-hydrogen-age
655. Newsweek Staff, "America's Greatest Disruptors: Planet protectors who are helping to counter climate change and other environmental challenges," in Newsweek, December 15, 2021, viewed on December 21, 2021, https://www.newsweek.com/2021/12/24/americas-greatest-disruptors-planet-protectors-1659074.html

Satellites orbiting the Earth in space are proving to be a good way to measure how well countries, companies, and organizations are following up on their climate commitments. In November 2021, a Dutch instrument on a European Space Agency (ESA) satellite detected that Australian coal mines were likely emitting much more methane than was being officially reported. The instrument, TROPOMI, is able to measure methane levels around the globe every day — so it can detect anything from oil pipeline leaks to coal mines to natural gas extraction. Satellites can also be used to combat deforestation, providing companies with data about whether their goods — for example, palm oil, cocoa, wood, or coffee — have come from deforested land.[652] In both cases, being able to measure phenomena that are harmful to the environment will make it easier to determine when an organization or government is producing excessive or unexpected emissions and hold them accountable for it. +

Solar energy has been used as a source of renewable energy for some time. But a company called Heliogen is going a step further by using concentrated solar energy to provide high-temperature heat sources for processes like making cement and steel and creating clean hydrogen.[653] One of the barriers to transitioning to a zero-carbon world has been that 75% of global GHG emissions come from agricultural, industrial, transportation, and building processes — all of which are very difficult to decarbonize. But Heliogen and partner company Bloom Energy have devised a method to produce green hydrogen, a powerful industrial energy source, from only water and concentrated solar power.[654] This method produces hydrogen in an environmentally clean way and also has the capacity to replace the use of fossil fuels in many industrial applications, which would go a long way toward solving the so-called 75% problem.

Mobile device applications are also proving to be useful for environmental protection and conservation. The Treetracker application, developed by a nonprofit organization called Greenstand, tries to combat deforestation and global poverty at the same time.[655] The open-source app allows farmers around the world to submit periodic updates of the growth of their trees, which Treetracker converts into value based on ecological impact. The farmers are then directly compensated for the value of the tree growth they have nurtured. In addition,

citizen-science applications such as *Map of Life, eBird*, and similar ones allow users to submit photos and information about everything from plant and animal sightings to soil types to water temperatures encountered in their daily lives. This data is then often used in research in ecology, conservation, or other environmental fields.[656]

These are just a few examples of the ways that technology can and is being used to fight against climate change and for the environment. These efforts will continue and intensify in the future, and thus it is clear that technology will play a key part in curbing environmental decline and mitigating the effects of climate change and other human-caused natural disasters. Technology will be increasingly used to do things like measure carbon emissions, detect forest fires, help companies green their supply chains and consumers verify the sustainability of their purchases, and even achieve a carbon-neutral existence. In some cases, the necessary technology even exists already, and what is missing is the will, funding, or focus to implement it to actually accomplish these goals. With determination and participation from people, organizations, and governments, these technologies can be put to their best use: helping to protect and restore the delicate balance of Earth's environment and ecosystems, and human life along with it. +

+ Elias Sohnle Moreno
One other promising technology is carbon capture technology.

656. Nature, "Rise of the citizen scientist," Nature, vol. 524, no. 7565, p. 265, August 18, 2015, doi: 10.1038/524265a M. Burgess, "What is the Internet of Things? WIRED Explains," in WIRED, February 2018, viewed on December 9, 2021, https://www.wired.co.uk/article/internet-of-things-what-is-explained-io

5. ecology and climate change — what's heading our way?

Climate change touches on many of the challenges society will face over the coming years: a rising demand for food and water coupled with decreased supply, the need for renewable energy systems, the wastefulness and unsustainable nature of the current economic system, and the decline of the natural world and environment. These issues are in some cases caused partially by climate change and, in other cases, are contributing to the effects of climate change. But in each case, climate change will intensify these issues and the need to solve them in order to create a future where society as we know it can survive.

Luckily, there are major developments in each of these areas, either happening right now or in the near future, which will change the future prospects of the

+ Benjamin Von Plehn
What about nuclear waste, and how this will affect our future. Intending to reduce their greenhouse emissions, countries are transitioning to nuclear power. However, these generate nuclear waste that produces fatal radiation for thousands of years. We do not know how to deal with it and just encase the waste in concrete boxes underground. But this isn't a reliable solution for a safe future. To read more about Nuclear entombment:

environment and help humans live more sustainably. Future advancements such as 3D food printing, alternative proteins, and clean-water technology solutions can improve the availability of food and clean water. Engineers continue to develop technologies to improve sustainable power generation via renewable energy sources, including solar, wind, water, and geothermal power. A shift toward corporate sustainability strategies and the incorporation of bio-based materials and new ways to reuse and recycle waste products will help the world move toward a circular-economy system. Also, a rise in public awareness of the importance of biodiversity and the natural world is leading to more activism, conservation campaigns, and technology geared toward fighting climate change and preventing or reversing environmental damage. +

solving climate change is critical and only possible when collectively addressed. how can we create a collective awareness that changes global behavior?

introduction
economics
socio-cultural
politics
ecology
technology
demographics
conclusion

digitization
big data
technology & health
digital ethics
technological change

A world without technology; it's impossible. In today's increasingly digital world, technology has become a fundamental part of almost every aspect of people's daily lives. Managing finances, hospital visits, video conferences, wandering through increasingly smarter cities and homes, and even carrying a phone along in a pocket instead of leaving it tethered to the living room wall: everything has been digitized to some degree. Looking at the future, technology will expand its reach and influence how people interact with one another, conduct academic research, and even monitor their health. Nevertheless, advancements in technology have also raised many questions regarding its potentially unethical use. Furthermore, the transition to a more technological society brings an increased desire for privacy and transparency about how information about peoples' lives is monitored, collected, and used by companies, organizations, and other people. This chapter aims to highlight the future of technological advancements through the consideration of its positive benefits as well as highlighting potential concerns related to technology.

1. digitization — technology in every aspect of our cives

As a result of technological advancements, the future of our world will highly be influenced by digital technologies and mediums of communication. A key lesson that we have learned due to the Covid-19 pandemic is that the way we shop, connect, and conduct our businesses can grow within the digital sphere. Our daily lives are interconnected with our household devices, our manufacturing lines are filled with robots, and the way we communicate depends on our Internet connections. Companies are continuously looking to innovate and change the way society interacts. Hence, it is no surprise that promises of future success and profit maximization lie in the hands of digital technology.

1.1 even more connected — the internet of things

Has anyone ever imagined what a day would look like without technology? From the moment a person opened their eyes, they would be unable to check for updates on their favorite social-media applications, they would not able to find the fastest route to their destination, nor would they be able to ask Siri, "What does the weather look like today?"

Now, imagine a world that was inextricably influenced by technology and its ability to connect with numerous devices. The moment a person gets up from their bed, motion sensors detect their movements, this then opens the curtain blinds, brings their cup of coffee to a boil, and their home-assistant devices update them on the daily weather reports.

Truth be told, our lives are already highly interconnected with our technological devices. Yet, in the future, interactions with smart devices will only increase. This is the Internet of Things (IoT): an era defined by the fourth industrial revolution whereby devices, from simple sensors to smartphones and wearable devices, are connected via the Internet.[657] Nevertheless, for individuals, businesses, and organizations, the future and potential of the IoT are limitless. Integrating AI, 5G, and big data, the IoT will transform the way we interact with our devices at home, at work, and throughout cities. +

At the individual level, wearable technology will continuously monitor and track user preferences and habits, helping us improve our fitness, allowing us to listen to music wirelessly or connect to our smart devices. From smart wristwear and even medical wearables, IoT technology has the potential to generate huge volumes of personal data for consumers. On a positive note, the sharing of our data across numerous smart devices enables us to reap the benefits of personalization at scale. Our devices can automatically conduct personalized actions from turning the lights on to our favorite colors or suggesting recommendations for a new Netflix series, restaurant, or even holiday destination.[658] According to leading tech research firm Gartner, the global wearable device market is estimated to see more than $87 billion in revenue by 2023.[659] In comparison, the current market value of wearable technology is estimated to be $47.89 billion.[660] This provides an insight into the significant growth of wearable tech over the past few years.

Taking a step back to our homes, smart home devices will develop automated home-support systems for everyday tasks, including energy-efficiency trackers, safety, entertainment, access control, and personal comfort. Smart homes can leverage appliances, lighting,

657. M. Burgess, "What is the Internet of Things? WIRED Explains," in WIRED, February 2018, viewed on December 9, 2021, https://www.wired.co.uk/article/internet-of-things-what-is-explained-iot
658. T. Poongodi et al., "Wearable Devices and IoT," Intelligent Systems Reference Library, vol. 165, July 2019, pp. 245–273, https://doi.org/10.1007/978-3-030-23983-1_10
659. I. Gosh, "4 Key Areas Where AI and IoT Are Being Combined," in World Economic Forum, March 2021, viewed on December 9, 2021, https://www.weforum.org/agenda/2021/03/ai-is-fusing-with-the-internet-of-things-to-create-new-technology-innovations/
660. Grand View Research, "Wearable Technology Market Size, & Trends Analysis Report By Product, By Application, By Region, and Segment Forecasts, 2021–2028," Market View Research, October 2021, pp.1–70.

+ *Gianluca Ariello*
An interesting consequence of the more and more frequent use of technological devices in our daily lives is that we are becoming increasingly dependent on them for many tasks. Some studies have been done recently to analyze the effects of this on brain development, especially focusing on the newest generation, which has been feared to be excessively dependent on mobile devices for accessing information and for social interaction. Surprisingly, no negative correlation has been found so far, leaving with the only worry about the possible consequences of not having access — for any reason — to the internet and/or digital devices. Source:

electronic devices, and many more, communicating with each other to learn a homeowner's habits and developing automated support systems. A smart home does not only provide in-house comfort but also benefits the homeowner in cost-cutting in several aspects. For example, energy-efficient trackers on your thermostat lead to lower energy consumption, which will inherently result in comparatively lower electricity bills. The smart-home business economy is set to cross $100 billion by 2022.[661]

With a greater perspective at the municipal level, smart cities will integrate all levels of public life for better urban planning, optimized energy consumption, and increased public safety through smart traffic surveillance. With spending on smart-city development set to reach $158 billion by 2022, significant growth is expected from numerous emerging innovations.[662] Furthermore, the exponential rise is expected to continue as the global smart-cities market size is expected to reach $1.3 trillion by 2028.[663] This includes officer wearables equipping police officers with real-time information, seamless connectivity between public transportation, smart bins to track waste levels, and pollution trackers.[664] The practical applications of AI and IoT technology in traffic control are already becoming clear. In New Delhi, an Intelligent Transport Management System (ITMS) is in use to make real-time dynamic decisions on traffic flows.[665] Ultimately, technology has become a vital component in the creation of more efficient, sustainable, and resilient cities.

For businesses, smart industry devices use real-time data analytics and machine-to-machine sensors to optimize operations, logistics, and supply chains. Industries ranging from manufacturing to mining are becoming more heavily reliant on digital transformation as a means to improve efficiency and reduce human error. From real-time data analytics to sensors within the supply chain, the advances in IoT technology can prevent costly errors within different industries. Furthermore, the implementation of smart devices has the potential to increase workforce productivity and reduce miscellaneous costs.[666] In sum, manufacturers will have access to much more accurate data about what is going on.

With all the benefits of smart devices, it is difficult to imagine any downsides. Nevertheless, the integration of smart devices within the confines of our homes, cities, and industries poses privacy implications. Everything

661. S. Kumar, P. Tiwari & M. Zymbler, "Internet of Things is a revolutionary approach for future technology enhancement: a review," Journal of Big Data, no. 111, December 2019, https://doi.org/10.1186/s40537-019-0268-2
662. K. Jones, "How the Internet of Things is Building Smarter Cities," in Visual Capitalist, February 2020, viewed on December 9, 2021. https://www.visualcapitalist.com/iot-building-smarter-cities/
663. Polaris Market Research, "Smart Cities Market Size to Reach $1.03 Trillion By 2028 | CAGR: 14.4%: Exclusive Report by Polaris Market Research," in Polaris Market Research, November 10, 2021, viewed on December 23, 2021, https://www.prnewswire.com/news-releases/smart-cities-market-size-to-reach-1-03-trillion-by-2028--cagr-14-4-exclusive-report-by-polaris-market-research-301421024.html
664. KPMG staff, "Modernizing government: Global trends", in KPMG. April 2020, viewed on 27 December 2021, https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/04/modernizing-government-global-trends.pdf
665. Ibid.
666. S. Ranger, "What is the IoT? Everything you need to know about the Internet of Things right now," in ZDNet, February 2020, viewed on December 9, 2021, https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/
667. M. Burgess, "What is the Internet of Things? WIRED Explains," in WIRED, February 2018, viewed on December 9, 2021, https://www.wired.co.uk/article/internet-of-things-what-is-explained-iot J. Tilley, "Automation, Robotics, and the Factory of the Future," in McKinsey & Company Operations, September 2017, viewed on December 9, 2021, https://www.mckinsey.com/business-functions/operations/our-insights/automation-robotics-and-the-factory-of-the-future
668. J. Tilley, "Automation, Robotics, and the Factory of the Future," in McKinsey & Company Operations, September 2017, viewed on December 9, 2021, https://www.mckinsey.com/business-functions/operations/our-insights/automation-robotics-and-the-factory-of-the-future
669. M. Simon, "The WIRED Guide to Robots," in WIRED, April 2020, viewed on December 9, 2021, https://www.wired.com/story/wired-guide-to-robots/

connected to the Internet can be hacked, and IoT products are no exception to this unwritten rule. In the hands of the wrong people, large volumes of personal data can pose a threat to national security and major macroeconomic consequences.[667] Data security must be improved to keep pace with the advancements in technology and our adoption of smart devices within the comfort of our personal lives.

1.2 will robots take over?

Now, let us begin to imagine a world where robots are an important part of our daily lives. From the way we conduct medicinal practices to the manufacture of essential goods, the future of robots has the potential to make our lives easier and safer. Top tech companies are in a constant race to change the way robots are implemented in people's everyday lives. Inherently, greater investment in research and development within robots will lead to falling robot prices, greater accessible talent, and seamless integration within supply-chain management or even home appliances. Therefore, as new technologies promise to let robots sense the world in ways that are far beyond humans' capabilities, the future of robotization promises to change virtually every aspect of human life.

With regards to human-robot interaction, advanced safety systems mean robots can take up new positions alongside their human colleagues. For example, the implementation of sensors, indicating the risk of a collision with an operator, will cause the robot to automatically slow down or alter its path. This technology permits us to put robots and people side by side. In effect, this technology enables the use of robots for individual tasks on otherwise manual assembly lines.[668] What the novel coronavirus pandemic has illustrated is that robots are the perfect coworkers during a pandemic. Unable to get sick and willing to conduct dull, dirty, and dangerous work, robot helpers can enable human doctors and nurses to do what they do best: use their problem-solving capabilities and be empathetic toward patients. These inherently are skills that robots are having difficulty replicating.[669] Looking forward, the potential for greater human-robot interaction promises productivity benefits and shapes a world in which people and machines get along without hurting each other.

For businesses, automation systems are becoming increasingly flexible and intelligent, adapting their behaviors automatically to maximize output or minimize cost per unit. With advancements in AI and ML, companies are now able to absorb data from a huge variety of sources as well as analyze them quickly.[670] Therefore, three important trends will likely result from the rapid adoption of advanced technologies within supply chains. Firstly, robot modules performing simple to medium complex tasks will facilitate the rise of customized solutions. From robots that can take blood samples to being a part of the manufacturing assembly line, companies are likely to rely on robots to increase volume manufacturing efficiencies, bringing down costs significantly. Secondly, robots will be identified as standard automation devices. Led by a range of less complex systems, companies will be able to design robots to complete specific tasks for specialized fields. Lastly, due to advancements in technology enabling the ability to learn, robots will play a central role in creating strategic decisions. Utilizing AI and ML capabilities, robotics will play an important role in navigating business strategies and developments.[671] The rising sentiment supporting robotics is best reflected by Peter Van Der Putten, assistant professor at Leiden University and global director at Pegasystems: "Smart machines, robotics, and other emerging technologies will fundamentally disrupt existing economic models. How we respond to these forces will shape our society for many generations to come."

For individuals, there has been recent debate on whether robotization comes at the cost of the availability of work. Although automation technologies will boost productivity and growth, they will bring large-scale transitions for workers, which will, hence, affect multiple sectors, the mix of occupations, the skills required, and the wages earned. More specifically, low to medium-skilled labor will likely be automated by 2030, while high-skilled jobs will experience the most growth. The risk is that automation will exacerbate income inequality and the lack of income advancements that has characterized the last decade of the labor market. Yet, although advancements in technologies pose significant risks to labor opportunities, they also offer some solutions. From the lessons learned from previous industrial revolutions, technology can help create new jobs and new opportunities to earn income, even outside the technology sector. A significant example can be seen in the context

670. R. Waugh, "Will Robots Change Business for the Better," in The Telegraph Media Group, January 2019, viewed on December 9, 2021, https://www.telegraph.co.uk/business/ready-and-enabled/artificial-intelligence-companies-transformation/
671. R. Lassig et al., "Robotics Outlook 2030: How Intelligence and Mobility Will Shape the Future," in Boston Consulting Group, June 2021, viewed on December 9, 2021, https://www.bcg.com/publications/2021/how-intelligence-and-mobility-will-shape-the-future-of-the-robotics-industry

672. J. Manyika, "Digitization, AI, and The Future of Work: Imperatives for Europe," in McKinsey Global Institute, September 2017, viewed on December 9, 2021, https://www.mckinsey.com/featured-insights/europe/ten-imperatives-for-europe-in-the-age
673. Tykn, "Blockchain Identity Management: The Definitive Guide (2021 Update)," in Tykn. Tech, March 2021, viewed on December 9, 2021, https://tykn.tech/identity-management-blockchain/
674. Ibid.

+ Elias Sohnle Moreno
The Danish flexicurity model is an example of how a government is trying to reap the benefits of the gig economy while preventing workers from experiencing the precarious living conditions that are by-products of the changing labor market. Source:

of e-commerce, through which related activities such as package delivery and supply chain management have complementarily increased.[672] Furthermore, the advent of the gig economy enables professionals to conduct work on digital platforms, enabling flexibility and occupational independence. The gig economy is a novel concept whereby companies hire independent contractors/freelancers instead of full-time employees. For example, delivery drivers on popular food delivery apps are a part of the gig economy as well as drivers on ridesharing apps, like Uber. Thus, policymakers and innovators must work together to identify significant solutions to these challenges that will upskill and enhance opportunities for all. +

1.3 the potential of blockchain

Blockchain is identified as a decentralized, distributed, and oftentimes public digital ledger. Imagine it as a traditional phone book; each page contains a different set of information, but without the entire book, it does not provide any value. Using blockchain technology, each page is essentially a block that records transactions. While a traditional phone book binds the pages physically together, the blockchain database is managed autonomously on a peer-to-peer basis, which links the information. An interesting thing to note is that when data has been recorded within a blockchain, it becomes very difficult to change.[673] As a consequence, an individual block cannot be tempered with without an alteration of all the subsequent blocks, it requires the consensus of the network. Hence, blockchain is an essential element in safeguarding valuable personal information and credentials online. When blockchain record-keeping is used, units are given identifiers, which serve as digital tokens.[674] Hence, participants in the blockchain are given unique digital signatures, which they use to sign the blocks they add to the blockchain. Every step of the transaction is then recorded on the blockchain as a transfer of ownership from one peer to another.

Holistically, this is important for economic development and business operations. Blockchain technology can greatly empower identity provisions for refugees who emigrate without any status. It can greatly help cash remittances for those without access to commercial banks or a financial institution. Lastly, it can improve infrastructure and services around the world. When

safeguarding valuable credentials online, blockchain technology can help insure vulnerable populations from attacks or possible breakdowns in the infrastructure. In the case of climate change, blockchain's verified nodes can help track data and accurately monitor carbon emissions.[675] With adequate foundations, blockchain technology could eliminate traditional methods of record-keeping, which could save time and reduce costs. In light of future progress, blockchain can be instrumental in giving greater empowerment to vulnerable populations while providing a platform for economic development and improving our environment.

Looking forward, the future of blockchain technology can be influential in developing business operations in addition to piloting economic development and technological change. For businesses, blockchain technology is an enabler of trust and offers greater transparency and efficiency.[676] With regards to the supply chain, blockchain has the potential to help organizations verify the sources of goods and track the movement of inventories throughout the supply chain.[677] In a more client-facing role such as customer engagement, blockchain can additionally redefine certain loyalty programs and customer-relationship management for businesses.[678] Similar to features relevant to protecting identities, blockchain holds great promise with regard to contracts and dispute resolution. Smart contracts are programs stored on the blockchain, which run when predetermined conditions are met; this can eliminate a traditional paper-based credentials system and offer greater transparency for a more efficient verification process.

In terms of technological change, many central banks have explored the idea of using blockchain to improve their nation's payment infrastructure and issue their own CBDCs. Similar to transferring payments on mobile payment platforms, CBDCs are a digital form of a legal tender created and backed by a central bank.[679] This means that physical forms of cash are soon being replaced by a digital currency that continues to be a storage of wealth, a unit of account, and a medium of exchange. The advantages of CBDCs lie in their efficiency. Wholesale CBDCs can facilitate more efficient clearing operations between central banks and commercial banks, can lower remittance costs, and enable instantaneous transactions between parties. Furthermore, due to the fact that blockchain offers greater transparency and

675. P. Boiardi & E. Stout, "To What Extent Can Blockchain Help Development Co-Operation Actors Meet the 2030 Agenda," OECD Development Co-Operation Working Papers, no. 95, May 2021, pp.1–50, https://doi.org/10.1787/11857cb5-en
676. PricewaterhouseCooper, "Time for Trust: The Trillion Dollar Reasons to Rethink Blockchain," in PWC, October 2021, viewed on December 13, 2021, https://www.pwc.com/gx/en/industries/technology/publications/blockchain-report-transform-business-economy.html
677. K. Alicke et al., "Blockchain technology for supply chains - A must or a maybe?," in McKinsey & Company Operations, September 2017, viewed on December 9, 2021, https://www.mckinsey.com/business-functions/operations/our-insights/blockchain-technology-for-supply-chainsa-must-or-a-maybe
678. Yeeply, "The Impact of Blockchain on Consumer Engagement," in Yeeply, January 2021, viewed on December 13, 2021, https://en.yeeply.com/blog/influence-blockchain-customer-engagement/
679. Consensys, "Blockchain Solutions for Central Bank Digital Currency (CBDC)," in Consensys, January 2021, viewed on December 13, 2021, https://consensys.net/solutions/payments-and-money/cbdc/
680. J. Lintz, "The Future of NFTs: Digital Entertainment at Its Finest," in Forbes, November 19, 2021, viewed on December 23, 2021, https://www.forbes.com/sites/forbesbusinesscouncil/2021/11/19/the-future-of-nfts-digital-entertainment-at-its-finest
681. Ibid.
682. N. Serenea Silver, "The History and Future of NFTs," in Forbes, November 2, 2021, viewed on December 23, 2021, https://www.forbes.com/sites/nicolesilver/2021/11/02/the-history-and-future-of-nfts

+ Martin Bernal Dávila
To clarify, this implies that Central Banks and governments will not have complete control over their currency because of the blockchain's decentralized nature.

traceability features, it protects the market from illicit activity, fraud, and money laundering activities. For businesses, this means a fairer market to remain competitive while reducing risk from any fraudulent activities. +

With regards to digital entertainment, non-fungible tokens (NFTs) have redefined the ownership and authenticity of artwork toward a more digital nature. Remember the traditional phone book; imagine that the phone book also records the owner of a specific painting. Until someone purchases an NFT from the owner, the phone book will continue to show the ownership of the digital art. Traded through blockchain technology, NFTs are simply digital assets. From artworks to tweets, NFTs allow creators to have control over their digital art as each sale is recorded on the blockchain, through which it cannot be altered by just anyone.[680] Due to its guaranteed ownership, both artists and collectors have gained confidence in NFTs. So much so, that data suggests people were buying and selling more than 85,000 NFTs in May 2021, amounting to a total trade value of $5.8 million in a single day.[681] Ultimately, authenticity within the blockchain ecosystem also promotes transparency.[682] As everyone can see who owns a specific painting, it provides certified proof of ownership that will last for eternity. This is the key differentiating factor that has made NFTs an asset of the future.

Considering the future, blockchain has the potential to benefit us all. Blockchain technology can significantly help society by improving trust, transparency, and efficiency while facilitating innovation.

1.4 living in the digital world — the metaverse

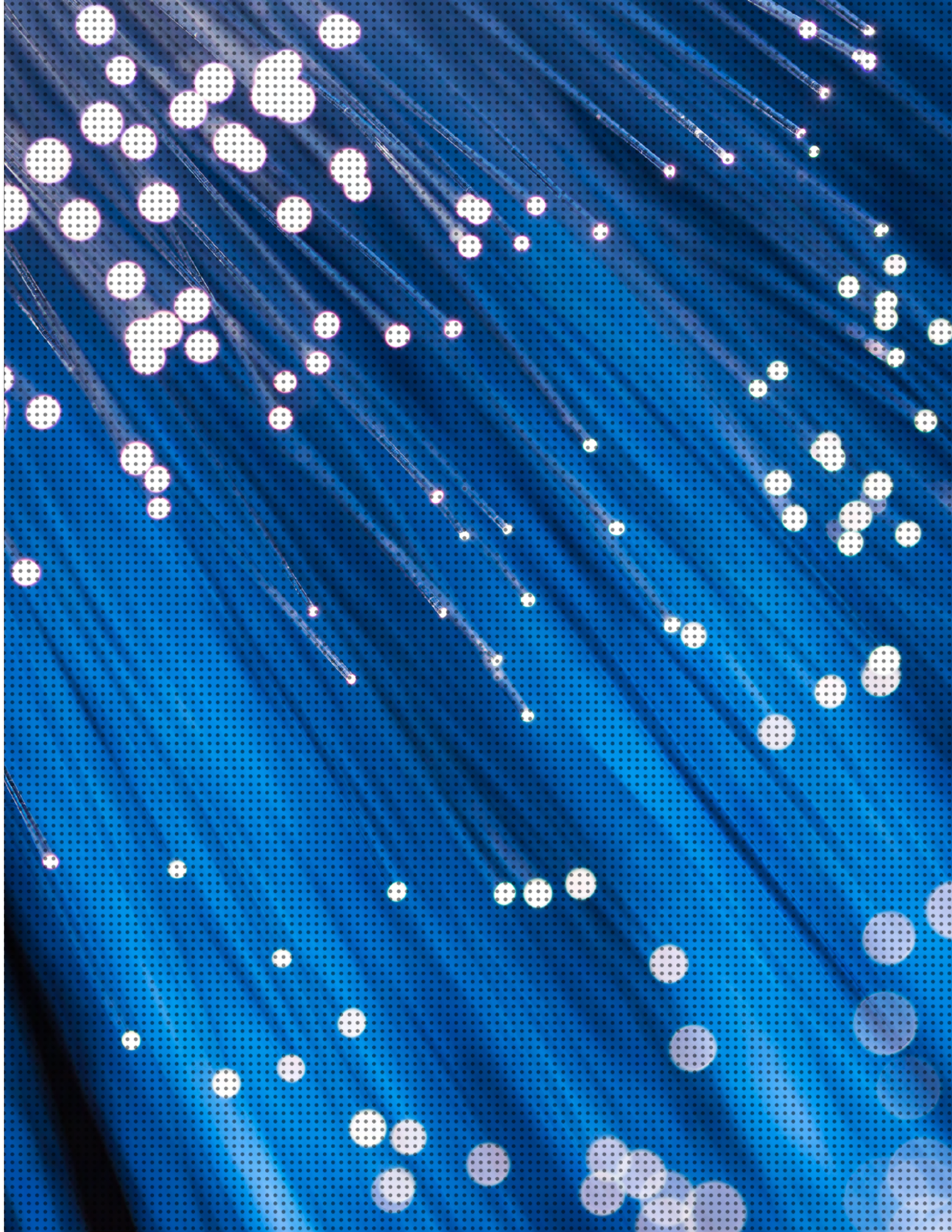
Now, imagine the world through the lens of a virtual reality (VR) headset. A world where the physicality of touch is replaced by interactions of digital avatars shared within a connected online universe. Similar to the concept of science fiction novels and movies, such as *Ready Player One*, *The Matrix*, and *Tron*, the metaverse is an iteration of the Internet supporting persistent online 3-D virtual environments. The metaverse does not have a clear, uniform definition so far. Jean Folger defines the concept for Investopedia as follows: "The metaverse is a shared virtual environment that people access via the Internet. Technologies like virtual reality (VR) and augmented reality (AR) are combined in the metaverse

to create a sense of *virtual presence*."[683] An opportunity for major tech companies to push the boundaries of connectivity, the metaverse has become the newest macro-goal. The metaverse is emerging as a generational change in how digital interactions and commerce unfold. Supporters of the metaverse say the new digital world will have a profound effect on our day-to-day lives, similar to the advent of the Internet or the invention of the telephone.[684] A key component of the metaverse ecosystem is the communications architecture enabling persistent connectivity within the virtual space. This brings enormous opportunities for individuals and artists, providing access to other creative thinkers and unlimited access to fundamental tools. To individuals who want to work from and own homes in today's urban centers, it opens the door for digital workplace-collaboration software. Furthermore, to people who live in places where opportunities for education or recreation are more limited, it enables a realm for immersive education and virtual learning.[685] The bets that Facebook parent Meta Platforms Inc, Microsoft Corp., and others are placing on the metaverse have reflected a growing belief that it is the next evolution for social connections. From harnessing greater social connections to providing an environment for immersive learning, the future of the metaverse is likely to become the gateway to most digital experiences, a key component of all physical ones, and the next greater labor platform. +

For businesses, the digital world offers a new way to provide an innovative product and engage with customers. Companies will need to transition their marketing strategies from investing in social-media campaigns to placing ads throughout the metaverse.[686] Within the retail sector, consumers will be able to rotate, test, and try items of clothing through their digital avatars. Digital clothing, world-building, and even marketing will have a large impact on brands to sustain consumer retention. In terms of digital advertising, the harnessing of data within the digital sphere provides advertisers with avenues to experiment with immersive ways of building brand recognition.[687] Customers will not just be able to talk to brands on social media. They will also be able to interact with them in a 4-D realm. For entertainment opportunities, numerous companies have already experimented within the digital realm. For example, the popular video game Fortnite recently hosted a huge performance by rap artist Travis Scott. Meanwhile, Massive Attack

+ Elias Sohnle Moreno
The metaverse is an abstract concept. It can refer to various things depending on the context in which the concept is used. The term metaverse has been attached to so many ideas that it has stopped having a common meaning. It is normal to be confused by the concept.

683. J. Folger, "Metaverse Definition," in Investopedia, February 15, 2022, viewed on March 20, 2022, https://www.investopedia.com/metaverse-definition-5206578
684. M. Bobrowsky, "Big Tech Seeks Its Next Fortune in the Metaverse," in The Wall Street Journal, November 2021, viewed on December 9, 2021, https://www.wsj.com/articles/big-tech-seeks-its-next-fortune-in-the-metaverse-11636459200
685. C. Newton, "Mark in the Metaverse," in The Verge, July 2021, viewed on December 9, 2021, https://www.theverge.com/22588022/mark-zuckerberg-facebook-ceo-metaverse-interview
686. C. Hackl, "The Metaverse Is Coming And It's A Very Big Deal," in Forbes, July 2020, viewed on December 9, 2021, https://www.forbes.com/sites/cathyhackl/2020/07/05/the-metaverse-is-coming--its-a-very-big-deal
687. M. Bobrowsky, "Big Tech Seeks Its Next Fortune in the Metaverse," in The Wall Street Journal, November 2021, viewed on December 9, 2021, https://www.wsj.com/articles/big-tech-seeks-its-next-fortune-in-the-metaverse-11636459200



headlined a music festival hosted by Minecraft. As more events are hosted within the digital realm, companies will have a plethora of opportunities for potentially profitable sponsorships.[688] As a new iteration of the Internet is being worked on, this will have massive implications for society. Marketing, communications, and branding professionals will face new challenges but also new opportunities for their businesses.

Harnessing opportunities for social connections, the metaverse will provide an immersive experience for consumers. The pandemic has already shifted culture online. For social connections, this will unlock new experiences for social gatherings such as weddings or even corporate meetings, allowing users to express themselves in more immersive ways. Within the education realm, the confines of the classroom will be eliminated and replaced with a learning environment, defined by the senses of touch, sight, and hearing. For gamers, it provides one of the most immersive experiences for fantasy worlds or traditional games, all while connecting users from all over the world in real-time. Testing the potential of the fitness industry, users will be able to work out within the digital world with friends and athletes from all around the world, connected through AR and VR technology. In short, the potential of the metaverse is that it can redefine the way we interact with each other. +

The metaverse will unleash amazing creativity and open up new frontiers for brands, businesses, and the consumer experience. Ultimately, the future of the metaverse will redefine the way we interact, create, and connect. +

+ Elias Sohnle Moreno
According to Jody Medich, the current state of graphical user interface (GUI) "limits our ability to visually sort, remember and access information, provides a very narrow field of view on content and data relationships and does not allow for data dimensionality." Extended reality technology enables the visual representation of information in a three-dimensional space, unlocking the users' ability to fully utilize spatial cognition in the digital world. Humans have evolved to thrive in a 3-dimensional environment, and the leap from traditional GUIs to VR brings tremendous implications for human interaction with the virtual world. Source:

+ Lara Hemels
Hearing from people who have personally interacted with the metaverse, it's sometimes worrisome how much technology like this can dissociate us from nature and our own biology. Even simple things like the visual components can create a huge impact; People can experience the metaverse in a super fascinating way because it is literally so bright and colorful. Once you go back to "reality," suddenly you don't experience your surroundings with the same vibrancy. It draws us further and further away from nature. I do think this warrants us to consider how far technology should be integrated into our lives.

2. big data, the internet, and connectivity

As of 2021, more than 60% of the world's population is online[689] and two-thirds of the people on Earth own a mobile device.[690] Each day in 2020, about 1.3 million people joined the Internet,[691] and by the year 2030, there will be billions of computers, sensors, and robotic arms scattered throughout all the places and infrastructure where humans live their lives. For the first time, there will also be more computers and sensors than human brains and human eyes,[692] Each of these realities points to the fact that connectivity — both to the Internet and to technology — is an integral part of life for many people around the world and will likely become even more so in the coming years.

688. B. Marr, "The Enterprise Metaverse: What It Means for Businesses," in Bernard Marr & Co., October 2021, viewed on December 9, 2021, https://bernardmarr.com/the-enterprise-metaverse-what-it-means-for-businesses/
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690. A. Turner, "How many smartphones are in the world?" in Bankmycell.com, December 2021, viewed on December 29, 2021, https://www.bankmycell.com/blog/how-many-phones-are-in-the-world
691. S. Kemp, "Digital 2021: Global Overview Report," in Datareportal.com, January 27, 2021, viewed on December 29, 2021, https://datareportal.com/reports/digital-2021-global-overview-report
692. M. F. Guillen, 2030: How Today's Biggest Trends Will Collide and Reshape the Future of Everything, The History Press, Stroud, UK, 2020, p. 207.
693. The Economist, "Data, data everywhere," in The Economist, February 27, 2010, viewed on December 29, 2021, https://www.economist.com/special-report/2010/02/27/data-data-everywhere; Danah Boyd and Kate Crawford, "Six Provocations for Big Data," SSRN Electronic Journal, 2011, p. 1 & 3, viewed on December 29, 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1926431
694. D. Reinsel, J. Gantz & J. Rydning, "The Digitization of the World From Edge to Core," Seagate, 2018, p.6, viewed on December 29, 2021, https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf
695. Reinsel, Gantz & Rydning, "The Digitization of the World From Edge to Core," p.7.
696. K. Lo, "Mobile Data: How Many Gigabytes Do You Need & How Long Will It Last?," Ken's Tech Tips, May 15, 2019, viewed on January 2, 2022, https://kenstechtips.com/index.php/download-limits-actual-meaning-of-gb#Our_Assumptions

As discussed in the digitization section, the continued pace of technological development means that the world will be influenced by digital technologies, experiences, methods of communication, and more. Living in a digital world comes with the presence of big data. "Big Data" is a somewhat vague term, which, depending on the context in which you hear it, could refer to a variety of things. It can refer to the large quantities of digital information produced by the online and offline facets of life or to the processes developed and implemented by researchers to analyze this data and derive meaning, insights, and even profit from them.[693] In this section, big data refers to the former: in other words, lots and lots of digital information. The IoT, the metaverse, and the digitization of our daily routines all produce or will produce incredible amounts of information as they continue to develop and scale. The presence of so much human-generated data at both the individual and societal scale means that technological developments for the analysis, repurposing, and mining of this data will likely continue to emerge in the future.

Past cases of data mismanagement have brought big data to the forefront of discussions about ethics in technology. These cases also indicate that when it comes to user data and to the innovations that have enabled all of this data to be produced, privacy and transparency will continue to be very important issues. The more users come online, the more data they produce — and the more relevant privacy and transparency become.

2.1 freedom and transparency

In 2025, an estimated 174 zettabytes (ZB) of data will be produced, captured, or replicated online and offline.[694] For reference, one zettabyte is equivalent to one trillion gigabytes (GB).[695] If one GB of data is equivalent to about 2 hours of streaming video on YouTube or another service, 174 ZB is equivalent to 348 trillion hours of streaming video[696] — enough for every person on Earth to watch for about five uninterrupted years, 24 hours a day. Furthermore, by 2025, 75% of the world's population will be interacting with data every day, on average

every 18 seconds.[697] As mentioned in the 2020 Global Risk Report by the World Economic Forum, data "are increasingly being collected on citizens by government and business alike... these data are then monetized and used to refine the development and deployment of new technologies back toward these citizens, as consumers."[698] With so much data being collected and so many new technologies making use of it, it is unsurprising that the subjects — everyday citizens — have begun to scrutinize both the organizations and the methods involved in the process, calling for more transparency about what is being done.

One way in which the trend toward openness and transparency in technology is evident is in the rising number of calls for open data and a more open Internet. In the words of data and intellectual property (IP) privacy lawyer Dr. Paulius Jurcys, one of the key debates in the data privacy space is over who should own personal, cell phone, and smart device data. To him, the answer is simple: "The vast majority of us would agree that individuals should be the owners of the data they generate."[699] There are a number of companies and organizations that aim to put control of personal data back into the hands of the users that generate it. For example, "consent management" companies such as *Prifina* make it possible for phone applications to run using a user's personal data without that personal data ever leaving the user's possession. In other words, the application can function without either the application developers or the consent management company ever gaining access to the user's data.[700]

The EU's General Data Protection Regulation (GDPR) has set data privacy standards that often require companies to change their operating procedures in order to stay compliant. Consent management platforms such as *Piwik Pro* and *Cookiebot* offer software that helps businesses to gather informed consent from their customers and website visitors, along with other related actions.[701] *DuckDuckGo* launched in 2008 as an alternative search engine and pledged in 2010 never to track or sell its users' data. Since then, they have expanded into a full-fledged Internet privacy company, building free mobile and desktop products that allow users to browse the Internet privately and block trackers from websites, email services, and mobile applications. DuckDuckGo CEO Gabriel Weinberg describes their work as "building

697. Reinsel, Gantz & Rydning, "The Digitization of the World From Edge to Core," p.5.
698. E. Granados Franco, "The Global Risks Report 2020 Insight Report 15th Edition," World Economic Forum, 2020, p.67, viewed on December 27, 2021, https://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf
699. P. Jurcys, 'Personal Data Ownership' on Medium.com, July 23, 2020, viewed on December 29, 2021, https://towardsdatascience.com/personal-data-ownership-f3b62e6ed07d
700. "Prifina," Prifina.com, viewed on January 2, 2022, https://www.prifina.com/
701. J. Kamińska and K. Matuszewska, "Comparison of 9 leading consent management platforms," Piwik PRO, November 20, 2020, viewed on January 2, 2022, https://piwik.pro/blog/consent-management-platforms-comparison/; K. Lubowicka, "How Consent Manager Can Help You Obtain GDPR-Compliant Consents?," Piwik PRO. May 21, 2018, viewed on January 2, 2022, https://piwik.pro/blog/how-consent-manager-can-help-you-obtain-gdpr-compliant-consents-from-your-users/
702. G. Weinberg, "DuckDuckGo in 2021: Building the Privacy Super App," Spread Privacy. December 21, 2021, viewed on January 2, 2022, https://spreadprivacy.com/duckduckgo-2021-review/
703. C. Petrov, "The Stupendous World of Google Search Statistics," TechJury, January 4, 2022, viewed on January 16, 2022, https://techjury.net/blog/google-search-statistics/#gref
704. G. Weinberg, "About DuckDuckGo," DuckDuckGo, 2010, viewed on January 2, 2022, https://duckduckgo.com/about
705. McCourt, "Civic Entrepreneur Frank McCourt Launches Project Liberty, Transformational New Initiative To Enable Healthier, More Equitable Online Economy," www.prnewswire.com, McCourt, June 21, 2021, viewed on December 21, 2021, https://www.prnewwire.com/news-releases/civic-entrepreneur-frank-mccourt-launches-project-liberty-transformational-new-initiative-to-enable-healthier-more-equitable-online-economy-301316048.html
706. @MEXC_Global, "MEXC Global Daily Trending Stories," Twitter, June 22, 2021, viewed on December 21, 20201, https://twitter.com/MEXC_Global/status/1407185329635823616?s=20 ; Project Liberty, "Project Liberty," Projectliberty.io, viewed on December 28, 2021, https://www.projectliberty.io/
707. Firing Line with Margaret Hoover, ep: Frank McCourt, podcast, PBS, October 1, 2021, viewed on December 21, 2021, https://open.spotify.com/show/1uBimoCIw9AqeoN2RwlUBq
708. European Commission, "Net Neutrality - Digital Agenda for Europe - European Commission," European Commission Website, April 24, 2014, viewed on January 2, 2022, https://web.archive.org/web/20140424065845/http://ec.europa.eu/digital-agenda/about-open-internet

a simple privacy layer for how people use the Internet today, without any tradeoffs. It's privacy, simplified."[702] With 3 billion monthly searches and 5 million monthly software downloads, DuckDuckGo's numbers are still much smaller than Google's approximately 1 billion daily active users and 6.9 billion daily searches.[703] However, the company's search metrics and user base continue to grow quickly as more and more Internet users look to protect their privacy online.[704]

In June 2021, civic entrepreneur Frank McCourt launched a $100 million initiative called *Project Liberty*, which aims to build a more equitable and collaborative web.[705] The project will, among other things, use blockchain to build the Decentralized Social Networking Protocol — a new type of Internet infrastructure that can "democratize social media data."[706] McCourt describes violations to social media users' data privacy as one of the motivations for rebuilding the Internet, saying, "I don't think people until recently understood how fundamentally broken it was and how much damage was being done because of this broken model and the abuse of the data."[707] These concepts also tie in with the related concept of the open Internet, which ensures that Internet users can "access the content, applications, and services of their choice," and "promotes competition among network, services and content providers."[708] A key component of an open Internet is net neutrality. Net neutrality requires internet service providers (ISPs), which customers subscribe to in order to access the Internet, to treat all the information that they receive and transmit equally. This means that they cannot block or slow down Internet traffic unless it is necessary for a specific legal, security, or temporary service issue. This rule prevents ISPs from choosing to transmit, withhold, or charge differently for data from certain websites or content based on what it might contain, which would violate the user's right "to be free to access and distribute information and content, use and provide applications and services of their choice."[709]

The state of the Internet as a neutral, accessible site for expression, debate, research, and connection (and more!) could falter in the coming years. This depends on many factors, including whether wide-scale data privacy legislation such as the GDPR in the EU is upheld. It also depends on whether net-neutrality laws in Chile, Canada, the United States, and other countries around the world are upheld.

The 2021 Freedom on the Net Internet freedom assessment found that Internet freedom declined globally for the eleventh year in a row.[710] In the U.S., this decline was linked to widespread misinformation spreading online. In Belarus and Myanmar, government officials targeted online journalists and shut down independent news outlets. In at least forty-five countries, authorities are suspected of obtaining spyware or data extraction technology from private vendors, and officials blocked Internet or social media access in at least twenty countries.[711] Lastly, it depends partially on how social-media companies such as Facebook, Instagram, and Twitter continue to influence the way that discourse happens. Because social media has become one of the primary ways in which people receive their news — as well as a prominent discussion forum — these entities have an enormous influence over the flow of information and emotion at a societal level. Therefore, the freedom and neutrality of the space are dependent in part on how responsibly these entities handle that influence. For example, a 2020 Pew Research survey found that 53% of adults in the U.S. "often" or "sometimes" get their news from social media sites such as Facebook, YouTube, Twitter, Reddit, and Instagram.[712] Given that these platforms have the ability to modify information-sharing algorithms and deactivate accounts at will, there are valid concerns about how much power they have to shape political debate and even indirectly cause violence.[713]

The desires for transparency and more user control over data and information also rear their heads in a different context: in academia and research, especially in science, technology, engineering, and math (STEM) fields. Formed largely of academics and researchers, the open science movement aims to make scientific research and data accessible to everyone. The main goals are to make scientific papers open access rather than kept behind an academic journal's paywall, to communicate scientific knowledge, and to make the research process more transparent and accessible.[714] Subfields like citizen science allow people to take part in research by helping to collect or interpret data for an academic project. The Unpaywall.org database compiles open access scholarly articles from 50,000 different publishers and repositories. *SciHub*, a self-proclaimed pirate website that has provided "mass and public access to tens of millions of research papers,"[715] is another manifestation of the

+ Elias Sohnle Moreno
Sometimes companies like Facebook have incentives that conflict with the end-users' interests.

709. Body of European Regulators for Electronic Communications, "All you need to know about the Open Internet rules in the EU," in Berec.Europa.eu, 2015, viewed on January 2, 2022, https://berec.europa.eu/eng/open_internet/ ; A. Gilroy, "CRS Report for Congress Access to Broadband Networks: The Net Neutrality Debate," Congressional Research Service, March 2011, viewed January 2, 2022, https://www.everycrsreport.com/files/20110311_R40616_81d-4f1aa5388126152dec-6b5a2959691d13f1145.pdf
710. A. Shahbaz and A. Funk, "Freedom on the Net 2021: The Global Drive to Control Big Tech," Freedom on the Net 2021, September 2021, viewed on January 2, 2022, https://freedomhouse.org/report/freedom-net/2021/global-drive-control-big-tech
711. Shahbaz and Funk, "Freedom on the Net 2021: The Global Drive to Control Big Tech."
712. E. Shearer and A. Mitchell, "News Use Across Social Media Platforms in 2020," Pew Research Center's Journalism Project. January 12, 2021, viewed on January 2, 2022, https://www.pewresearch.org/journalism/2021/01/12/news-use-across-social-media-platforms-in-2020/
713. Shahbaz and Funk, "Freedom on the Net 2021: The Global Drive to Control Big Tech."
714. B. R. Neupane, "Open Science Movement | United Nations Educational, Scientific and Cultural Organization," Unesco.org. 2016, viewed on January 2, 2022, http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/open-science-movement/
715. Sci-hub, "Sci-hub: the first pirate website in the world to provide mass and public access to tens of millions of research papers," viewed on January 3, 2022, https://sci-hub.mksa.top/
716. J. Walter, "The Founder of Sci-Hub Is Absolutely Unrepentant," Futurism. October 9, 2021, viewed on January 2, 2022, https://futurism.com/founder-sci-hub-unrepentant; H. Else, "What Sci-Hub's latest court battle means for research," Nature, vol. 600, no. 7889, pp. 370–371. December 13, 2021, viewed on January 2, 2022, doi: 10.1038/d41586-021-03659-0
717. Else, "What Sci-Hub's latest court battle means for research," pp. 370–371.
718. Chris Dixon, "Why Web 3 Matters", on Twitter. September 26, 2021, viewed on December 21, 2021, https://twitter.com/cdixon/status/1442201621266534402
719. Packy McCormick, "Why Web 3 Matters", on Twitter. September 26, 2021, viewed on December 21, 2021, https://twitter.com/cdixon/status/1442201626610077701

movement for open science. Launched in September 2011 by graduate student and computer programmer Alexandra Elbakyan, the website allows users to bypass academic journal paywalls and read or download research papers for free. The aim is to "fight inequality in knowledge access across the world" and equalize a power imbalance that makes it easier for educated people and especially people in rich and Western countries to access knowledge above everyone else. SciHub has been sued for copyright infringement multiple times and has been blocked in eleven countries, typically reappearing under a new web domain.[716] SciHub now faces a court case in India filed by a group of major publishers. They want Indian ISPs to block the website but according to legal experts, the court may actually rule in favor of SciHub.[717] If this happens, it will be a huge victory for open science and will likely challenge the hierarchy of the academic publishing world.

As the Internet continues to be a crucial part of life in the coming decade, and Internet users generate ever more personal data, users' privacy concerns will continue to grow. It will become even more important for companies and organizations to keep their data collection and uses of it transparent. Companies that help promote freedom, privacy, and transparency on the Internet will keep gaining popularity, and governments around the world will feel the pressure to protect the freedom of the Internet. The safety and privacy of users and their data depend largely on the strength of the regulations meant to protect them, and these regulations might become threatened if any given country turns toward political turmoil or authoritarianism. It is likely that Internet users will increasingly choose to safeguard their data in their online lives and consider avoiding platforms that do not make that possible.

2.2 web 3.0 — "the financialization of everything"

Web 3.0, also known as Web3, is a vision of a new and decentralized Internet built on the foundation of Blockchain and "owned by the builders and users" (as described by Internet investors and entrepreneurs Chris Dixon (@cdixon)[718] and Packy McCormick (@PackyM)[719] on their Twitter feeds). It is also a phenomenon that nods toward people's increasing desires for transparency and control in their technological lives.

It helps to think of Web 3.0 as an evolutionary step beyond the versions of the Internet we have had previously. Web 1.0, also known as the "read-only web," was the first version of the Internet. Active between 1990 and 2000, users were largely passive; they could read content from the producers of a given site but could not meaningfully communicate back to them. This web was characterized by static and personal websites. Web 2.0, the social or read-write web, flourished from 2000 to 2010 and, it can be argued, continues even up to today. Here, users could communicate with one another and interact with the websites they visit. Every web user has the ability to be a content producer, and their content is distributed freely by platforms that aggregate this content and find ways to make money from it.[720] These platforms, companies like Facebook, Spotify, and digital publishing site Medium, have ended up controlling large swathes of the Internet this way. While, in theory, the Internet is open for anyone to claim a space, it is very difficult to pull traffic from or make money independent of the dominating Internet/social media companies. That is why Web 3.0, or the Semantic or read-write-execute web, is often proclaimed as the future of the Internet. Mason Nystrom, a research analyst at cryptocurrency company Messari Crypto, describes it in the following way: "In short, Web3 is a trend of democratizing the Internet — taking all existing protocols and services, from Internet providers to daily apps like Spotify, and building them on permissionless blockchains with open protocols and open standards[721] ... so that they benefit people rather than entities."[722] In other words, Web3 will still have all of the Internet services and functionalities that users have come to love and rely on but they will be built in a transparent manner that gives people access and invites them to join in ownership of the community.

So, what can Web3 do? Web3 is a cryptocurrency-enabled content platform. This means that digital currency can be used to make anonymous, secure purchases[723] directly within Web 3.0. For each action users take within the system — for example, using their computers to help host data that other users can access — they receive a digital token that gives them a small stake in the Web 3.0 system and could, in theory, be exchanged for cash at a later time. So, the user essentially becomes a partial owner of the platform.[724] This could explain why Web3 has also been described as "the financialization of everything."[725] According to Mason Nystrom, right now

720. V. Madurai, "Web Evolution from 1.0 to 3.0," Medium. February 17, 2018, viewed on December 21, 2021, https://medium.com/@vivekmadurai/web-evolution-from-1-0-to-3-0-e84f2c06739; M. Gould and D. Chen, the Unstoppable Podcast, ep: 14- Introducing Web 3.0 with Mason Nystrom from Messari, podcast, Unstoppable Domains. February 26, 2021, accessed on December 21, 2021, https://open.spotify.com/episode/2xfo123ml0M-1mYs3jHlM6B?si=550c9b0b-1d3c487c
721. Gould and Chen, "14- Introducing Web 3.0 with Mason Nystrom from Messari," the Unstoppable Podcast.
722. M. Nystrom, "Web 3.0 Manifesto: Why Web 3.0 Matters," Unsyndicated by Mason Nystrom. February 17, 2020, viewed on January 3, 2022, https://nystrom.substack.com/p/web-30-manifesto-why-web-30-matters
723. N. Dabit, "What is Web3? The Decentralized Internet of the Future Explained," freeCodeCamp.org. September 8, 2021, viewed on January 3, 2022, https://www.freecodecamp.org/news/what-is-web3/
724. B. Allyn, "People are talking about Web3. Is it the Internet of the future or just a buzzword?," NPR.org, November 21, 2021, Accessed on December 20, 2021, https://www.npr.org/2021/11/21/1056988346/web3-internet-jargon-or-future-vision
725. WSJ Tech News Briefing, ep: "Could 'Web 3.0' Democratize the internet?", podcast, Wall Street Journal. December 20, 2021, accessed on December 21, 2021, https://open.spotify.com/episode/6zaoWp0OF-nBh7maDSke7VT?si=gf-hh9rosQNyRm6iZfaknmA&nd=1
726. Gould and Chen, "14- Introducing Web 3.0 with Mason Nystrom from Messari," the Unstoppable Podcast.
727. Ibid.

we are still largely in the phase of Web 2.0 characterized as "a subscription era" in which large aggregating platforms like Spotify and Substack are taking most of the value that user-contributors produce. "Sometimes (like Spotify), very little value goes to individual artists. But top Substack writers make millions of dollars per month (as compared to tens of thousands on Medium) because monetizing [as an individual person rather than relying on a content aggregation platform like Facebook or Medium] is more effective."[726] A crypto-enabled platform will allow users, for example, an independent artist, to assign a digital representation (NFT) to a piece of digital art so that they can collect a royalty on it each time it is sold in the future. In this way, an artist or creator can continue to make money off their earlier works, which were worth much less at the time of the first sale than they are once the artist has built up their career.

People who are passionate about Web 3.0 are excited by the promise of putting control back into the hands of individual users, and taking power and profit away from the large platforms, which control our current version of the web. As Nystrom further explains, "The platforms of today have largely built their networks off of the backs of individuals [think Spotify, Medium] ... and those individuals don't get the value that's being extracted from them. Another key principle is that data is also a very powerful force. As a company gets more data, it can produce more services and applications. That centralization of data is important because it's hard for any sort of innovation to happen — it's hard for a new startup to compete with the incumbents. So, making sure that that data is open and available for other applications and companies to utilize is important, and also making sure that data is not abused."[727]

However, despite the surging popularity of Web 3 in (primarily) technologist and tech investor circles, there are also doubts about whether Web 3.0 will be successful and even about whether it represents a distinct phenomenon or is just a passing fad. Indeed, scrolling through tech-focused online publications and spaces like LinkedIn shows dozens of articles, discussion panels, and even funding opportunities related to a combination of Web3.0, blockchain, and "defi" (short for decentralized finance). But often the distinction between these terms is not made clear. Some critics of Web 3.0 believe it will simply replicate the data privacy problems caused

by current tech companies because any actions users take in the Web 3.0 environment will be recorded and publicly stored on the blockchain.[728] Others do not see Web3 as serious competition for tech giants like Google because not enough people are actually buying digital assets and moving away from the major platforms.[729] To date, less than 10% of the global population owns cryptocurrency, and Web3 applications have tens of millions of users compared to the billions on traditional web 2.0. But at the same time, in 2021, investors put $30 billion into cryptocurrency startups.[730] In a December 2021 episode of the *Modern Finance* podcast, Reddit founder and tech investor Alexis Ohanian stated that "at least half" of his venture capital fund's upcoming investments "will be Web3." He sees the rate of developments in the Web3 space "continuing to accelerate," and expects his fund's investment patterns to include even more Web3 in the future. He takes his cues from the trend he sees of "talented people, [both] on the design front and the product front, saying they want to spend the rest of their life working on" the cryptocurrency space. This group includes veterans of tech innovation like Coinbase founder Brian Armstrong; people "who are building stuff [in Web3] who I know are seeing where things are headed."[731] So, while the questions and criticisms of Web3 are certainly valid, only time will tell how the ecosystem will develop. But one thing is clear: the current burst of innovation around Web3.0 — and calls for more transparency, accessibility, and community-mindedness in the realms of scientific and technological innovation — points to a genuine desire to reshape the way the Internet functions and to create a more equal system for everyone who accesses it.

2.3 human-centered data and tech

Behind every data point captured in a mobile application or logged in a database, there is a person somewhere on Earth; a person with hopes, dreams, personal preferences, and a lifetime of personal and individual choices to be made. As society becomes increasingly machine-driven and data collection and usage become even more normalized, this can be easy to forget.

One of the dangers of constant and impressive technological development is that people can start to believe that technology is neutral or by definition good — that any development is a positive development. In reality, the opposite is true — as discussed in the Digital Ethics section, it is possible to replicate unjust systems or embed human biases into algorithms, products, and technical systems. In addition, sometimes developments that appear to improve the user experience are mainly meant to help the company. For example, usually when companies collect user data, they are doing so because ultimately, it allows them to make more money from the users by offering personalized recommendations or other services. While this might be a benefit to the user, it primarily makes a profit for the company and might also introduce new complications in terms of privacy and data security.

Human-centered design (HCD) focuses on how products, services, and systems can best enhance the life of the people it is being designed for. While this may sound like an obvious goal, it marks a slight shift away from the standard design approach sometimes called user-centered design. Historically, the standard way of designing technology often focused on creating a new, advanced product, sometimes (but not always) to fill a specific need. For example, the computer. HCD focuses on the needs of the product's users and considers how the product should be designed to best accommodate a human user: for example, prompting a user to save their work before turning off their computer so that they actually make use of the computer's capabilities.[732]

Human-centered data and technology apply this same worldview specifically to the digital and technological worlds. When it comes to technological systems, they should be discoverable: in other words, users should be able to "find out and understand what the system can do."[733] Otherwise, the innovation does not provide any useful value to the user. It also urges humans to ask questions about the value that technology brings to life but also what changes or sacrifices it demands and whether they are worth it. In her 2017 Medium essay, "The Tech Humanist Manifesto," self-proclaimed "tech humanist" Kate O'Neill states that "We need technological progress ... but for our own sake, and for the sake of humans who come after us, we need to wrap that progress around human advancement."[734] She encourages everyone to consider how humanity as a whole can best build and deploy the technology that is so interwoven in their lives.

728. Allyn, "People are talking about Web3. Is it the Internet of the future or just a buzzword?"
729. Ron Miller, "The irrational exuberance of web3," TechCrunch. December 14, 2021, viewed on January 3, 2022, https://techcrunch.com/2021/12/14/the-irrational-exuberance-of-web3/
730. R. Rai, "An Overview of Web3 Venture Capital Activity In 2021," Forbes. January 2, 2022, https://www.forbes.com/sites/rahulrai/2022/01/02/an-overview-of-web3-venture-capital-activity-in-2021/
731. K. Rose, Modern Finance, ep: From Web2 to Web3: Alexis Ohanian and Kevin Rose, Modern Finance LLC. December 28, 2021, viewed on January 2, 2022, https://modern.finance/episode/web2-to-web3-alexis-ohanian/
732. Interaction Design Foundation, "What is Human-Centered Design?" The Interaction Design Foundation, viewed on January 2, 2022, https://www.interaction-design.org/literature/topics/human-centered-design; D. Norman, "The Four Fundamental Principles of Human-Centered Design and Application," jnd.org. August 1, 2019, viewed on January 2, 2022, https://jnd.org/the-four-fundamental-principles-ofhuman-centered-design/
733. B. Cosley, "Human-Centered Data Science," Medium. March 15, 2021, viewed on January 2, 2022, https://towardsdatascience.com/human-centered-data-science-3d92066bf779
734. K. O'Neill, "The Tech Humanist Manifesto," Medium. July 29, 2017, viewed on December 27, 2021, https://medium.com/intuitionmachine/the-tech-humanist-manifesto-bf9ebaa1e45f

Although they may not always call it human-centered data and technology, many people and institutions are pushing for technology to respect and, more ethically, enhance human life rather than disregard human rights or base development on seeking profit. In September 2021, the World Economic Forum and the City of Helsinki, Finland, brought innovators together from across the globe to discuss "A human-centric approach to data for progress, people, and the planet."[735] Design schools increasingly offer education in HCD principles, and more people working in technology and data science are also beginning to advocate for a human-centered approach to their work and design goals. While these changes are undoubtedly positive for product users, they often also make good business sense. As one "creative data scientist" and AI business owner wrote in an essay about human-centered data science, many businesses struggle to successfully implement data science and ML products because "their true impact is lost through the often irrational, biased, and difficult-to-predict humans who are tasked with using them."[736] In other words, the products have often not been designed with the humanness of the human user in mind.

One of the positive aspects of technical innovation is the fact that emerging technologies offer hope. As author and strategic consultant Kate O'Neill writes in her book *A Future so Bright*, "The future will be what we do the work to make it … emerging technology brings with it tremendous power and offers the potential to solve human problems at scale."[737] The flip side, however, is that these technologies must be built with human, societal, and even environmental needs in mind in order to effectively solve these problems. Approaching data and technology in this way will help improve technology safety standards, improve patient care in healthcare systems, (re)build trust in institutions, and much more.[738]

In the words of Yannis Kotziagkiaouridis, Global Chief Data and Analytics Officer, Edelman Data & Intelligence, "Data shouldn't be characterized as the new oil or gold because it is not best acquired through extraction. Nor should it be considered a currency because it must confer value to others beyond those who hold it. Data should be treated as a mutually beneficial gift. One best given and received from a place of empathy."[739] It is notable that engineers, data scientists, and others in technology management positions are waking up to the importance

+ Kim Tan
In my whole college experience, I would say that one of the most life-changing moments I had was when my professor introduced the Design Thinking principle. Design Thinking positively advocates observation and empathy to derive the best creative, innovative solutions to fulfill consumers' needs. Ever since then, I've adapted and applied the human-centered mindset in various aspects as an individual and a business major, completely redefining my outlook on conscious innovation/technology/business.

One book I highly recommend for this is Creative Confidence by brothers Tom and David Kelley:

735. K. Bettinger, J. Ziskind Ferrari, and V. Lähteenoja, "Empowered Data Societies: A Human-Centric Approach to Data Relationships," World Economic Forum. September 2021, viewed January 3, 2022, https://www3.weforum.org/docs/WEF_Empowered_Data_Societies_2021.pdf
736. Cosley, "Human-Centered Data Science."
737. K. O'Neill, A Future so Bright: How Strategic Optimism and Meaningful Innovation Can Restore Our Humanity and Save the World. New York: KO Insights, 2021.
738. K. Bettinger, "12 ways a human-centric approach to data can improve the world," World Economic Forum. August 31, 2021, viewed January 3, 2022, https://www.weforum.org/agenda/2021/08/12-ways-a-human-centric-approach-to-data-can-improve-the-world/
739. Ibid.

of respect and empathy in technology design. By adopting the mindset of HCD in data and technology, we can ensure that the technological innovations of the future will help humanity to create a more positive world rather than just a richer one.

3. what can technology contribute to healthcare?

Worldwide, hospitals and healthcare facilities have been facing catastrophic financial challenges related to the Covid-19 pandemic.[740] The pandemic has also imposed a burden on healthcare workers' general well-being. Many healthcare workers have to work long shifts and experience stress and anxiety, affecting their ability to cope.[741] Ever since the pandemic raged around the world, for most individuals, human health has probably never been so front and center compared to pre-pandemic life.[742] Suddenly, people were interested in vaccine pipelines: How is it possible that it used to take ten to fifteen years to develop a vaccine and suddenly it only took less than a year? People are more engaged in discussions regarding health and how far governmental institutions can go to impose healthcare mandates on people.[743] Just like how technology significantly accelerated the e-commerce industry, technology is playing an increasingly bigger role in healthcare. This section will explore developments in the intersection between human health and technology.

3.1 the digitization of health

A major change, accelerated by the pandemic, is the rise in telehealth. Early in the Covid-19 pandemic, telehealth usage surged as consumers and providers were looking for ways to safely access and deliver healthcare.[744] In the last few years, the terms telemedicine, telehealth digital health, and virtual healthcare have been used interchangeably.[745] Going forward, the term digital health will be used to refer to the broad scope of digital health including categories such as mobile health, health information technology, wearable devices, telehealth and telemedicine, and personalized medicine.[746] The Worldwide Digital Health market is expected to grow from $84.08 billion in 2019 to reach $220.94 billion by 2026, indicating that the market will be approximately 2.5 times larger than before the pandemic.[747] There are different

740. A.D. Kaye, C.N. Okeagu, A.D. Pham, R.A. Silva, J.J. Hurley, B.L. Arron, N. Safraz, H.N. Lee, G.E. Gali, J.W. Gamble, H.L. Liu, R.D. Urman & E.M. Cornett, "Economic Impact Of COVID-19 Pandemic on Healthcare Facilities And Systems: International Perspectives." Best Practice & Research Clinical Anesthesiology vol. 35, November 2021, pp. 293–306.
741. S. Mehta, F. Machado, A. Kwizera, L. Papazian, M. Moss, E. Azoulay, & M. Herridge, "COVID-19: a heavy toll on health-care workers." The Lancet Respiratory Medicine vol. 9, February 2021, pp. 226–228.
742. L.O. Gostin, E.A. Friedman, & S.A. Wetter, "Responding to COVID-19: how to navigate a public health emergency legally and ethically." Hastings center report, volume 50, March 2020, pp. 8–12.
743. Ibid.
744. O. Bestsennyy, G. Gilbert, A. Harris & J. Rost, "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?", in McKinsey. July 9, 2021, viewed on November 20, 2021, https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality
745. Adracare, "What is Virtual Healthcare," in Adracare. October 28, 2021, viewed on December 2, 2021, https://www.adracare.com/blog/what-is-virtual-healthcare
746. FDA, "What is Digital Health?", in FDA, viewed on December 2, 2021, https://www.fda.gov/medical-devices/digital-health-center-excellence/what-digital-health
747. GlobeNewswire, "Global Report on Digital Health Market Size Valuation," in Globe News Wire, viewed on December 1, 2021 https://www.globenewswire.com/en/news-release/2021/09/02/2290548/0/en/Global-Report-on-Digital-Health-Market-Size-Valuation-Will-Reach-to-USD-220-94-Billion-by-2026-According-to-Facts-Factors.html
748. O. Bestsennyy, G. Gilbert, A. Harris & J. Rost, "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?", in McKinsey. July 9, 2021, viewed on November 20, 2021, https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid
749. E. Olsen, "Telehealth utilization dropped by 10% in June," in Mobi Health News. September 10, 2021, viewed on December 1, 2021, https://www.mobihealthnews.com/news/telehealth-utilization-dropped-10-june
750. O. Bestsennyy, G. Gilbert, A. Harris, & J. Rost, "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?", in McKinsey. July 9, 2021, viewed on November 20, 2021, https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid
751. L. English, "Virtual Healthcare Is the Future – If Organizations Can Clear These Hurdles", in Forbes. September 19, 2021, viewed on December 2, 2021 https://www.forbes.com/sites/larryenglish/2021/09/19/virtual-healthcare-is-the-future--if-organizations-can-clear-these-hurdles
752. Ibid.

technologies that are transforming the healthcare industry as we know it. This section will focus specifically on some of the most important developments.

3.2 telehealth & telemedicine

According to a McKinsey & Company report, telehealth use has increased thirty-eight times compared to before the pandemic.[748] Despite the significant adoption of telehealth early in the pandemic, the telehealth utilization rate has generally been falling in 2021.[749] Some benefits of telehealth adoption include increased convenience for receiving routine care and improved access, especially for behavioral health and specialty care; also, improved care models and health outcomes, especially for patients with chronic conditions.[750] The future of healthcare is most likely a hybrid model, where patients receive a mix of virtual and in-person care. This shift to hybrid care could reduce some of the major problems in the healthcare system. For instance, the United States has a shortage of primary care clinicians, which means it can be difficult to get an appointment. The shortage is especially acute in rural and poor urban communities. Many patients end up turning to urgent care or emergency departments, which turns out far costlier than a standard office visit.[751]

Although hybrid healthcare offers a lot of promise, the world should be careful with increasingly digitized healthcare. There are concerns that safety and privacy may be compromised by rapid deregulation to enable telehealth. There is also a risk of a digital divide occurring in hybrid healthcare models. Generally, virtual healthcare can improve access to care for underserved communities.[752] However, what will happen to patients who do not have access to the Internet or cannot afford other remote monitoring tools needed to make virtual healthcare work? In an increasingly aging world, how will virtual healthcare affect (digitally) illiterate individuals? In the future, the healthcare system must consider how to make hybrid healthcare accessible without leaving anyone behind.

3.3 personalized healthcare

Imagine having a complete and accurate depiction of someone's overall health. Instead of having to wait for symptoms to arise and get treated, people would be

able to keep track of their health and prevent sickness instead. Advances in precision medicine and AI are making this personalized healthcare a reality. +

People's individual health is heavily influenced by their lifestyles, nutrition, environment, and access to care. Behavioral and social determinants and other exogenous factors can now be tracked and measured by wearables and a range of medical devices. These behavioral, socio-economical, physiological, and psychological factors account for about 60% of people's determinants of health. Genes account for approximately 30% of people's health determinants and people's medical history only accounts for 10%. Over the course of a lifetime, humans will generate the equivalent of over 300 million books of personal and health-related data, which could unlock insights to a longer and healthier life. Currently, however, a vast amount of untapped data, which could have a great impact on understanding people's health, exists outside of medical systems.[753] An example of a technology that can be used to improve data insights in healthcare is that of wearable technologies. This consists of wearable or implanted devices or sensors that are used for monitoring and logging vital parameters of patients. Patient data collected from wearables enables valuable insight on the prognosis of a patient's condition in a natural environment for a more extended period, which is essential for accurate and faster diagnosis.[754] +

Advances in precision medicine manifest into tangible benefits, such as early detection of disease.[755] Consequent personalized treatments are becoming more commonplace in health care.[756] Precision medicine, when integrated into healthcare, has the potential to generate more precise diagnoses, predict disease risk before symptoms occur, and design customized treatment plans that maximize safety and efficiency.[757] The power of AI technologies to recognize sophisticated patterns and hidden structures has enabled many image-based detection and diagnostic systems in healthcare to perform as well or even better than clinicians in some cases.[758] AI and precision medicine are converging to assist in solving the most complex problems in personalized care.[759] +

Current healthcare practices are not always perfect. Where humans operate, mistakes can be made. Despite technology sometimes performing equally well or even

+ Stefanie Sewotaroeno
I'm so glad that this gets its own focus, as lately, I have been wondering: what will be illegal in the future (for health reasons)? For example, asbestos was widely used in construction not too long ago, but now it is banned. Cocaine is another example. We have medications in our cabinets that are accompanied by a long sheet with possible side effects, ranging from common to rare. Will one or more of these medications become illegal in the future? If yes, why? I'm very curious about how this will develop in the future.

+ Diede Kok
We sometimes forget how much progress humanity has made in the medical field over the last century. It was only 1884 when Theodore Roosevelt's wife and also his mother died on the same day due to post-pregnancy kidney failure and typhoid, respectively, leading the president to write: 'the light has gone out of my life.' Many commonplace ailments are now reduced to the history books, and the despair that Roosevelt felt is increasingly rare, preventing millions of people from losing their light due to losing a loved one. Source: Leadership In Turbulent Times, by Doris Kearns Goodwin, p.125.

+ Benjamin Von Plehn
Very interesting to see how AI or ML already has an impact on our health. There is also robot-assisted surgery that I find interesting. The surgery is done with precision, miniaturization, smaller incisions, decreased blood loss, less pain, and quicker healing time. These are mainly used in the US and are soon to be found more often in Europe. Source:

753. K.B. Johnson, W.Q. Wei, D. Weeraratne, M.E. Frisse, K. Misulis, K. Rhee, J. Zhao, & J. L. Snowdon, "Precision medicine, AI, and the future of personalized health care." Clinical and Translational Science, vol 14, January 2021, pp. 86–93.
754. V. Wollesen, "Next Generation Cardiac Wearables and Implantables Will Integrate into Wireless Body Area Networks," in Diacardiology. 23 July 2021, viewed on December 4, 2021, https://www.dicardiology.com/article/next-generation-cardiac-wearables-and-implantables-will-integrate-wireless-body-area
755. M. van der Schee, H. Pinheiro, & E. Gaude, "Breath biopsy for early detection and precision medicine in cancer." ecancermedicalscience, vol. 12, July 2018.
756. R.J. Hartmaier, L.A. Albacker, J. Chmielecki, M. Bailey, J. He, M. E. Goldberg, S. Ramkissoon et al., "High-throughput genomic profiling of adult solid tumors reveals novel insights into cancer pathogenesis." Cancer research vol. 77, May 2017, pp. 2464–2475.
757. K.B. Johnson, W.Q. Wei, D. Weeraratne, M.E. Frisse, K. Misulis, K. Rhee, J. Zhao, & J.L. Snowdon, "Precision medicine, AI, and the future of personalized health care." Clinical and Translational Science, vol. 14, September 2020, pp. 86–93.
758. E. Topol, Deep medicine: how artificial intelligence can make healthcare human again. Hachette UK, 2019.
759. K.B. Johnson, W.Q. Wei, D. Weeraratne, M.E. Frisse, K. Misulis, K. Rhee, J. Zhao, & J.L. Snowdon, "Precision medicine, AI, and the future of personalized health care." Clinical and Translational Science, vol. 14, September 2020, pp. 86–93.
760. E. Topol, Deep medicine: how artificial intelligence can make healthcare human again. Hachette UK, 2019.
761. Time, "12 Innovations That Will Change Health Care and Medicine in the 2020s," in Time. October 25, 2019, viewed on December 3, 2021, https://time.com/5710295/top-health-innovations/
762. K.B. Johnson, W.Q. Wei, D. Weeraratne, M.E. Frisse, K. Misulis, K. Rhee, J. Zhao, & J.L. Snowdon, "Precision medicine, AI, and the future of personalized health care". Clinical and Translational Science, vol. 14, September 2020, pp. 86–93.
763. S. Groch, "Curing cancer, designer babies, supersoldiers: How will gene-editing change us?" in The Sydney Morning Herald. July 4, 2021, viewed on November 30, 2021, https://www.smh.com.au/national/curing-cancer-designer-babies-supersoldiers-how-will-gene-editing-change-us-20210511-p57qqt.html
764. A. Vidyasagar & N. Lanese "What is CRISPR?", in Life Science. October 21, 2021, viewed on November 30, 2021, https://www.livescience.com/58790-crispr-explained.html
765. YourGenome "What is CRISPR-Cas9," in Your Genome, viewed on November 30, 2021, https://www.yourgenome.org/facts/what-is-crispr-cas9
766. M. Prabhune "Diseases CRISPR Could Cure: Latest Updates On Research Studies And Human Trials," in Synthego, viewed on December 1, 2021, https://www.synthego.com/blog/crispr-cure-diseases
767. H. Ledford, "Landmark CRISPR trial shows promise against deadly disease" in Nature. June 29, 2021, viewed on December 1, 2021, https://www.nature.com/articles/d41586-021-01776-4
768. K.B. Johnson, W.Q. Wei, D. Weeraratne, M.E. Frisse, K. Misulis, K. Rhee, J. Zhao, & J. L. Snowdon, "Precision medicine, AI, and the future of personalized health care." Clinical and Translational Science, vol 14, January 2021, pp. 86–93.

better,[760] it does not mean that handing over healthcare-related work to technology will eliminate every problem. Health data can be biased while building and processing the dataset. Data can lack diversity, and contain missing values. People of Caucasian descent, for example, are a minority in the global population yet make up nearly 80% of the subjects in human-genome research.[761] AI models trained on such data might amplify the bias and make unfavorable decisions toward a particular group of people characterized by age, gender, race, geographic, or economic level. Such unconscious bias may harm clinical applicability and health quality.[762]

3.4 gene editing — perfect health

Imagine having the ability to choose hair color, type of hair, eye color, the shape of the nose, and personality traits. This probably sparks the visual of a video game played in the past where it is possible to create a character. This ability to pick and choose one's appearance is not confined to the digital world anymore. Advances in gene editing have made it possible to alter the human genome and could enable humans to customize their embryos and babies.[763]

CRISPR is a powerful tool for editing genomes; it allows scientists to easily alter DNA sequences and modify gene function.[764] First discovered in 1987, CRISPR has made significant advances ever since. Nowadays, CRISPR is shorthand for CRISPR-Cas9, the fastest, cheapest, and most reliable system for editing genes. This groundbreaking innovation has allowed for treating disease in a small number of exceptional and/or life-threatening cases.[765] Currently, many researchers are exploring gene editing on animals or isolated human cells with the goal of using gene editing as a more widespread way to routinely treat genetic diseases in humans. Examples include inherited eye diseases, neurodegenerative conditions such as Alzheimer's and Huntington's disorders, and non-inherited diseases such as cancer and HIV.[766] It seems rather inconceivable that diseases that are currently plaguing the world and millions of people and their loved ones can be "simply turned off." CRISPR could mean that in the future, many genetic diseases become a thing of the past.[767] This does not imply, however, that all humans will be perfectly healthy, since genes account for approximately 30% of people's health determinants.[768] External factors such as

climate change, other environmental changes, and new infectious diseases, could still adversely affect people's overall health.[769]

The potential positive impact of gene editing is indisputable. Nevertheless, as with any other technology, debates regarding the limits of what can and should be done come into play. Should humans even be given the power to determine whether and with which diseases people should live? In the case of a life-threatening disease, many people would agree that eliminating it with gene editing has a net positive effect. In the case of blindness and deafness, for example, the answer is not as clear-cut.[770] Is it acceptable to prevent a child from becoming deaf or blind or to make them deaf or blind? To hearing and seeing people it may be inconceivable to live without these senses and they might think it is acceptable. However, "many deaf people consider themselves to be part of a community with a strong identity."[771] This illustrates how the usage of gene editing is a complicated moral consideration. +

The biggest gene-editing controversy to date occurred in November of 2018, when Dr. He Jiankui claimed to have produced the first human babies born with CRISPR-cas edited genomes.[772] The doctor, who embarked on this project in secret, was jailed for three years, and has since coined the nickname Doctor Frankenstein.[773] As the potential to genetically modify embryos is becoming increasingly likely, what will be the consequences of creating *super babies* in the long term? What even are the consequences of making changes to embryos' genes for future generations? Some believe it may have devastating consequences for humanity. Nowadays, there is an increasingly large movement of people seeking acceptance for who they are and refusing to conform to the standards of being *perfect*. Developments in gene editing might be a shift in a different direction again. Is a world with only conventionally attractive and healthy people desirable? Is the randomness of what humans look like and what we are like not part of what makes them human? A threatening consequence of gene editing is that it could reduce human diversity. Social inequality is also likely to increase since rich people can afford to genetically alter their ways through the world and poorer people cannot.[774] Without coherent global legislation, gene-editing tourism where people travel the world to design their babies is not an unfathomable prospect.[775]

+ Elias Sohnle Moreno
Beyond the sociological benefits of diversity, genetic diversity protects humans against diseases and favors adaptability. Loss of genetic diversity could present an existential threat for the species in the long run in the event of future pandemics.

Here is another very interesting debate in game theory when it comes to gene editing. It is safe to say that European ethical safeguards will bridle the application of gene editing. But what if other nations engage in widespread adoption of gene editing, notably to enhance their population. Would this prompt Western nations to do the same, at the expense of moral and ethical safeguards? Would nations accept the potential emergence of "genetically superior" humans in the long term? The disparities in ethical and moral standards across nations are very important in the case of gene editing.

769. A. Mack, E. R. Choffnes, M. A. Hamburg, & D. A. Relman, Microbial evolution and co-adaptation: a tribute to the life and scientific legacies of Joshua Lederberg: workshop summary. National Academies Press, 2009.
770. O. Feeney, & V. Rakić, "Genome editing and 'disenhancement': Considerations on issues of non-identity and genetic pluralism," Humanities and Social Sciences Communications vol. 8, May 2021, pp. 1–7.
771. E. Mullin, "The End of Deafness," in Future Human. September 29, 2021, viewed on December 6, 2021, https://futurehuman.medium.com/the-end-of-deafness-670f06df39cd
772. A. Regalado, "EXCLUSIVE: Chinese scientists are creating CRISPR babies," MIT Technology Review. 2018.
773. K. Lo, "China's gene-editing 'Frankenstein' jailed for three years in modified baby case," in SCMP. December 30, 2019, viewed on November 30, 2021, https://www.scmp.com/news/china/science/article/3043894/chinas-gene-editing-frankenstein-jailed-3-years-modified-baby
774. S. Sufian & R. Garland-Thomson, "The Dark Side of CRISPR," in Scientific American, February 16, 2021, viewed on December 1, 2021, https://www.scientificamerican.com/article/the-dark-side-of-crispr/
775. E.Y. Adashi & I.G. Cohen, "Germline editing: could ban encourage medical tourism?", in Nature. April 30, 2019, viewed on December 1, 2021, https://www.nature.com/articles/d41586-019-01365-6

examples biotechnology applications and estimated time horizon of acceleration point[777]

	existing before 2020	short term 2020-2030	medium term 2030-2040	long term beyond 2040
human health and performance	• carrier screening • noninvasive prenatal	• CAR T-cell therapies for liquid tumors • lipid biopsy	• gene drives to reduce vector-borne diseases • CAR T-cell therapies for solid tumors	• transplantable organs produced from stem celss • embryo editing for medical purposes
agriculture, aquaculture and food	• marker-assisted breeding (crops and animals used for food) • genetic tracing of food origin, safety and authenticity	• plant-based proteins • crop microbiome diagnostics and probiotic treatments	• cultured meat • genetically engineered animals-faster growth	• genetically engineered crops-faster growth through enhanced photosynthesis
consumer products and services	• DTC genetic testing - ancestry	• personalized meal services based on genetic and microbiome profile • DTC genetic testing -personals insights about health and lifestyle	• biosensors for monitoring of personal health, nutrition and fitness based on "omics" data	• gene therapy-skin aging
materials, chemicals and energy	• new bioroutes for drug manufacturing (eg, peptides)	• novel materials - biopesticides/biofertilizers (eg,RNAI pesticides) • improve existing fermentation processes-food and feed ingredients	• novels materials-biopolymers (eg, PLA, PET)	• biosolar cells and biobatteries
other applications	• DNA sequencing for forensics		• biosequestration of CO_2 • bioremediation for pollution	

Gene editing and biotechnology are not only applied in the healthcare sector; biotechnology can also be applied in the agriculture, aquaculture, and food sectors; consumer products and services sector; and materials, chemical, and energy sectors among others. The table titled 'Examples biotechnology applications and estimated time horizon of acceleration point' provides a comprehensive overview of different biotechnology applications in different sectors divided per future time horizon.[776] +

3.5 saving lives? 3D printing organs

In 2020, in Europe, an average of twenty-one patients died every day while waiting for organ transplants.[778] In the future, such deaths may be something of the past due to advances in 3D printing. There have been some breakthroughs in 3D organ-printing technology, allowing scientists to print corneas, livers, and hearts among other things. 3D printing allows for the exact replication of the organs that need replacing and circumvents the problem of organ rejection that can take place in traditional organ transplants. Currently, some scientists are conducting experiments in space in order to develop working organs. The reason for this is that when 3D-printing tissue on Earth, there's a tendency for it to collapse in the presence of gravity. It is estimated that it could take another ten to fifteen years before fully functioning tissues and organs printed in space can be transplanted into humans.[779] In an already aging and growing population, the implications of expanding people's lifespans by years or even decades through organ transplantation will have far-reaching implications. With increasingly scarce resources on Earth, is it ethical to extend people's lifespans even further? What will happen when organ transplants are not only used to save lives but to create customizable super humans? +

3.6 robots — bridging the healthcare-worker-gap

Having a nurse called Ava, Tommy, Yumi, Stevie, Moxi, or Grace is probably nothing out of the ordinary. But what if these are the names of Robot Nurses, which are increasingly being adopted in healthcare?[780] While this may sound like the plot of a movie, it might be an inescapable reality that robots join the healthcare workforce. By 2030, it is estimated that there will be a global shortage of 18 million healthcare workers.[781] This shortage, combined with advances in technology, might leave humanity with no other choice but to increasingly depend on robots in healthcare.

The usage of robots in healthcare is not new. Currently, robotics is used in minimally invasive surgery, patient rehabilitation, and disinfection. In the short to medium term, it is expected that robots will increasingly be used for tasks that do not involve significant interaction with physicians, nurses, and patients, such as fetching and carrying materials and medications. In the long term, as software algorithms develop, robot-to-human interaction will become more likely.[782] Previously, it was thought that robots were unsuitable for robot-to-human caregiving due to their lack of human emotions and inferior intelligence. However, advances made in technology allow for the line between robots and humans to become increasingly blurry.[783] Will it be possible that robots replace humans entirely in the healthcare sector? How will the people in need of care feel about this? Will people even realize that they are being treated by a robot? Or will it become impossible to distinguish between humans and robots?

3.7 singularity — will technological growth become uncontrollable?

The advances described thus far, while at times futuristic, are generally still developments that most people can wrap their heads around. With the significant advances being made in technology, however, there is a hypothetical point in time at which technological growth becomes uncontrollable and irreversible, resulting in unforeseeable changes to human civilization.[784] This is called the singularity. According to Ray Kurzweil, former director of engineering at Google, futurist, and credited for the singularity hypothesis, humans may then be fully replaced by AI or by some hybrid of humans and machines. In his book, Kurzweil writes, "The Singularity will allow us to transcend these limitations of our biological bodies and brains. There will be no distinction, post-singularity, between human and machine."[785] He further predicts that the singularity will take place by 2045 since this is the earliest point where computerized intelligence could significantly exceed the sum total of human brainpower. Computing power will be so great that it will be impossible for ordinary humans (not augmented by technology)

+ Elias Sohnle Moreno
We've been voluntarily influencing genes for thousands of years via selective breeding of crops and livestock.

+ Kim Tan
According to the National Foundation for Transplants, a standard kidney transplant can cost an estimated $300,000 or more, while a 3D bio-printer used to create 3D printed organs will only cost $10,000 — $200,000. Furthermore, scientists at Wake Forrest are currently testing 3D machines to enable skin printing directly to the patient's body — a hopeful innovation for burn and trauma victims.

The future of 3D healthcare technology does not just revitalize optimism for individuals waiting for an organ donor, but it also reduces the possibilities and dangers of organ trafficking. Will this also be new profound hope for a safer world? Read more in these sources:

776. M. Chui, M. Evers, J. Manyika, A. Zheng, & T. Nisbet, "The Bio Revolution: Innovations transforming economies, societies, and our lives," McKinsey Global Institute, 2020.
777. Ibid.
778. Council of Europe, "European Day for Organ Donation and Transplantation," in Council of Europe, viewed on December 3, 2021, https://www.coe.int/en/web/human-rights-channel/organ-donation
779. J. Sims, "Why astronauts are printing organs in space," in BBC. June 2, 2021, viewed on December 3, 2021, https://www.bbc.com/future/article/20210601-how-transplant-organs-might-be-printed-in-outer-space
780. A. R. Guevarra, "Here Come the Robot Nurses," in Boston Review. August 2, 2021, viewed on December 3, 2021, https://bostonreview.net/articles/here-come-the-robot-nurses/
781. WHO, "Health Workforce," in World Health Organization, viewed on December 3, 2021, https://www.who.int/health-topics/health-workforce#tab=tab_1
782. IFR, "The role of robots in healthcare," in International Federation of Robotics. May 31, 2021, viewed on December 2, 2021, https://ifr.org/post/the-role-of-robots-in-healthcare-part2
783. Research Outreach, "Social Robots – a New Perspective in Healthcare," in Research Outreach. June 3, 2020, viewed on December 2, 2021, https://researchoutreach.org/articles/social-robots-new-perspective-healthcare/
784. A.H. Eden, J. H. Moor, J. H. Soraker, & E. Steinhart. Singularity Hypotheses: A Scientific and Philosophical Assessment. Berlin, Springer, 2012.
785. R. Kurzweil, The singularity is near: When humans transcend biology. Penguin, 2005.

to keep up, and augmentation will be so common that the line between human and machine will be blurred.[786]

This process is expected to go through different stages. In the post-immortal era, Kurzweil predicts that people will be able to extend their lives indefinitely with anti-aging medicines, replacement organs, stem-cell therapy, and medi machines, while neural uploading will lead to the first "immortals." The ability to transcend biology and enhance oneself endlessly is also likely to lead to what is commonly referred to as the *Transhuman Era*. This refers to a process where humans will begin transitioning to a higher form of life by replacing or augmenting their physical bodies with synthetic parts. It is unclear to what extent this time horizon is accurate, but advances in technology make the singularity less like a science fiction movie and more like reality. Kurzweil also predicts a period of "Posthumanism." In this era, humanity is no longer constrained by any physical or biological limitations and exists in various forms that allow it to explore the universe, live in simulated realities, or inhabit otherwise uninhabitable spaces where there is abundant energy to draw from. +

It is unclear whether, when, and at what rate — whether a gradual process or very sudden — the singularity could happen. The late Stephen Hawking stated that when the singularity is upon humanity, the end of the human race might very well be upon us.[787] While it is perhaps a dark thought, it is almost ironic how humanity has been destroying and wiping out biodiversity only for humans to be wiped out by the very technology they created. Before this dark point in the future is reached, humanity still has the potential to reverse the damage it has done to the Earth, and, hopefully, this will allow for a future where humans, biodiversity, and technology can coexist in harmony.[788] +

4. digital ethics — is there a morally right and wrong in technology?

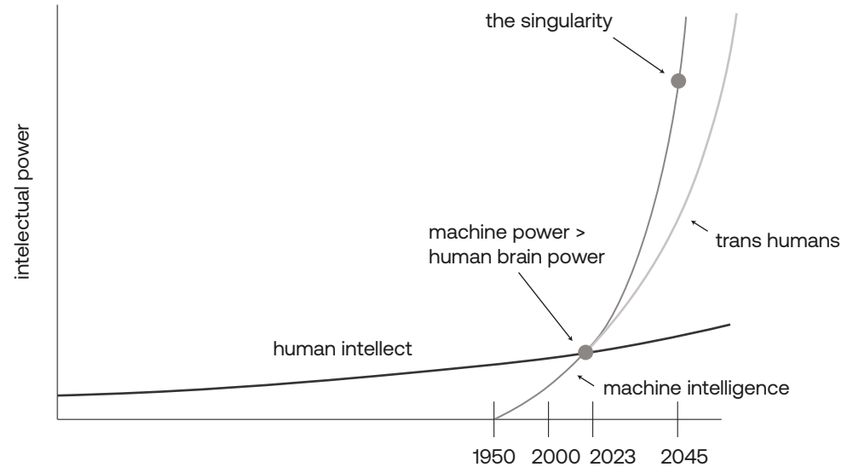
This section on digital ethics provides an examination of how technology shapes and will influence our political, social, and moral lives.[790] From a much more different perspective, this topic shows how organizations play a big part in securing millions of personal data and how

+ Elias Sohnle Moreno
Some work is already being done, like the work Neuralink is doing on brain implants and brain-computer interfaces. Source:

+ Elias Sohnle Moreno
Stephen Hawking expressed his concerns about humanity's ability to handle a technological singularity, seeing extinction as one of many possible scenarios. "Whereas the short-term impact of AI depends on who controls it, the long-term impact depends on whether it can be controlled at all." Interestingly, in the same chapter, Stephen Hawking notes: "Intelligence is characterized as the ability to adapt to change. Human intelligence is the result of generations of natural selection of those with the ability to adapt to changed circumstances. We must not fear change. We need to make it work to our advantage."

786. D. K. Johnson, "Ray Kurzweil's Crazy Yet Somewhat Precise Predictions about the Future," in the Great Courses Daily. June 1, 2021, viewed on December 4, 2021, https://www.thegreatcoursesdaily.com/ray-kurzweils-crazy-yet-somewhat-precise-predictions-about-the-future/
787. V. Luckerson, "Very smart people who think artificial intelligence could bring the apocalypse," Time, vol. 5, January 2016.
788. A.S. Nilsson, "Your 2020 Vision is Turning You into a Cyborg," in Anders Sormann Nilsson Blog. February 19, 2020, viewed on December 5, 2021, https://www.anderssorman-nilsson.com/blog/your-2020-vision-is-turning-you-into-a-cyborg
789. A.S. Nilsson, "Your 2020 Vision is Turning You into a Cyborg," in Anders Sormann Nilsson Blog. February 19, 2020, viewed on December 5, 2021, https://www.anderssorman-nilsson.com/blog/your-2020-vision-is-turning-you-into-a-cyborg
790. A. Henshall, "What is Digital Ethics?: 10 Key Issues Which Will Shape Our Future," in Process.st. September 24, 2019, viewed on November 28, 2021, https://www.process.st/digital-ethics/

singluarity timeline[789]



791. W Stouffer, “115 cybersecurity statistics and trends you need to know in 2021” in Norton. 2021, viewed on November 27, 2021, https://us.norton.com/internetsecurity-emerging-threats-cyberthreat-trends-cybersecurity-threat-review.html
792. Embroker Team, “2021 Must-Know Cyber Attack Statistics and Trends” in Embroker. December 10, 2021, viewed on December 11, 2021, https://www.embroker.com/blog/cyber-attack-statistics/
793. S. Shea, A. Gillis & C. Clark, “What is Cyber Security?,” in Techtarget. August, 2021, viewed on December 1, 2021, https://www.techtarget.com/searchsecurity/definition/cybersecurity

accountability from industries is essential in preventing damage from stolen data.

This topic emphasizes the ongoing challenges in cybersecurity, data privacy, and the heightened technological reliance today that creates a whole new medium for cyberattacks to manifest. Emerging technologies shape the future and benefit mankind through automation, but what does it take for automation to overcome bias?

Digital ethics addresses data security trends, the alarming risks present for organizations and in relation to personal matters, and the internal ethical involvement of companies in implementing fairness in their technologies.

4.1 protecting the digital — cybersecurity

Before you have finished reading this paragraph, somebody in the world has already had their data, computer, or mobile phone successfully hacked; every 39 seconds,[791] there is a new cyberattack happening on the web, and you or your organization could fall victim to one of them.

Malicious hack attempts and cybercrime attacks jumped by 600% during the Covid-19 pandemic.[792] Before the first full quarter of 2021, there had already been over 20.9 million records breached by cybercriminals globally, which alone equates to 677,270 records tampered with per day, and 28,219 records every twenty-four hours; this number was close to reaching the annual total of 30 million data breaches in 2019. The rise of technological advancements and emerging online markets in the modern world simply means that digital assets are growing rapidly. This emphasizes the heightened reliance on digital systems that enable an easier, faster, and more sophisticated flow of information inside an organization or even within one’s personal day-to-day web usage. While the new various technological innovations are relatively useful and make our digital presence a little more sophisticated, they also create a whole new avenue for cyberthreats and cybercriminals to pass through.

The increasing amount of sensitive and confidential data from enterprises and personal usage proportionally increases the cybersecurity measures we have to take. The 3.1 million gap[793] in the cybersecurity workplace,

however, is a reminder that an alarming amount of data today is already at risk, and the failure to address this issue fast enough imposes an even greater probability of potential successful cyberattacks in the near future.

Passwords, home addresses, and phone numbers are not the only data cybercriminals are attempting to hack; recent studies found that cybercriminals are also working toward havoc on infrastructures like hospitals, pipelines, meat-packing plants, and even aviation. The majority of these cyberattack attempts are unknown to the public, yet these newer advanced breach attempts can cause massive physical harm to millions, or even billions, of individuals. The healthcare industry is surprisingly the No.1 cyber-attacked industry in the world,[794] and the first reported death by ransomware was last September 2020 when a ransomware attack caused an IT failure at a hospital in Germany. Another attempt included a hacker accessing the water supply with the intent to poison it but failing to do so in Oldsmar, Florida, in February 2021.[795] The military is also not a stranger to cybercriminals; advanced fighter jets such as the F-35 or so-called "flying computer" because of its incredibly advanced system, are more likely to be brought down by a cyberattack than an incoming missile.[796] This is a fast-growing enemy we do not see nor feel yet is increasingly life-threatening at an alarming rate.

From IT professionals to elementary school children, every individual and any industry is susceptible to a cyberattack. Cybercrime-damage costs are expected to reach $6 trillion in 2021. This represents the greatest transfer of economic wealth in history; even more than the global trade of major illegal drugs combined. The consequence of paying for the damages, means organizations have to allocate money from their investments in innovation, sustainability, and prevention to dealing with risks. However, it is not too late for organizations and individuals to tap into the importance of cybersecurity and act proactively to halt successful attempts in cybercrime. Organizations and individuals can proactively act against the risk of stolen data. Companies will have to invest more in prevention against cyberattacks, both monetarily and in the workforce, to increase the chances of protection and enable the success of long-term operations without disruption and loss from hacking risks. Individuals will also have to realize the importance of cybersecurity, its growing threats, and its growing

794. S. Morgan & S. Calif, "What you need to know about the trillion dollar cyber economy over the next 2 years," in Cybercrime Magazine. March 29, 2020, viewed on November 29, 2021, https://cybersecurityventures.com/top-5-cybersecurity-facts-figures-predictions-and-statistics-for-2019-to-2021/
795. C. Stouffer, "115 cybersecurity statistics and trends you need to know in 2021," in Norton. August 9, 2021, viewed on November 27, 2021, https://us.norton.com/internetsecurity-emerging-threats-cyberthreat-trends-cybersecurity-threat-review.html
796. F. Lang, "Cyber Attacks More Likely to Bring Down F-35 Jets Than Missiles," in Interesting Engineering. February 25, 2021, viewed on November 26, 2021, https://interestingengineering.com/cyber-attacks-more-likely-to-bring-down-f-35-jets-than-missiles
797. N. Latto, "Data Brokers: Everything You Need to Know" in Avast. November 25, 2021, viewed on November 27, 2021, https://www.avast.com/c-data-brokers#gref
798. J. Holvast, "History of Privacy," Holvast & Partner, Privacy Consultants, viewed on November 26, 2021, https://citeseerx.ist.psu.edu/viewdoc/download?-doi=10.1.1.1037.5642&rep=rep1&-type=pdf
799. N. Singer, "Mapping, and Sharing, the Consumer Genome" in NY Times. June 16, 2012, viewed on November 25, 2021, https://www.nytimes.com/2012/06/17/technology/acxiom-the-quiet-giant-of-consumer-database-marketing.html

forms, ranging from well-engineered phishing emails to unknown spyware in personal cameras.

Today, cybersecurity is not just for industry professionals to be aware of but it is also a topic to be communicated to children, teenagers, and every citizen who has a first name.

4.2 data privacy in the digital era

Do you own a smartphone? Ever liked a post or a hilarious meme on your social media account, or have an email account? What about none of those but have had a regular check-up in a healthcare facility or visited a local theme park? These are just some of the few events where a data broker[797] can actively collect, buy, and sell your personal data without your consent.

In 1967, Alan Westin defined privacy in a way that every country in the world now follows; he defined privacy as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others." It is when an individual spearheads their own personal data and has ultimate control and consent over what or how it is shared with others.[798]

According to a report by New York Times in 2017, a company that a person has never heard of engages in 50 trillion personal data transactions a year,[799] meaning such a company is buying and selling their personal data without any acknowledgment, awareness, and most importantly — *consent*.

In a world where data is growing exponentially and is becoming both a backbone and a lifeline to many industries and individuals, the question of knowing if and how our personal information is disseminated and secured is just the tip of the iceberg. Everyone who has ever created a social media account, visited a website, or even downloaded a software update has been given a chance to read and agree to a mandatory privacy policy, much more commonly known as the Terms and Conditions. However, to read the privacy policy of the forty most popular websites globally would take thirty working days from end to end. If there are laws, regulations, and steps taken to give an individual a choice to agree to consent, then what exactly happens when an individual disagrees? Whether an individual signs a

consent form before a car service takes place or ticks the checkbox on agreeing to have read the Terms and Conditions to download the required software update, all who do not agree to consent are subject to refusal of those necessary services.

In 2009, The Federal Trade Commission (FTC) said, "We all agree that consumers do not read privacy policies." The FTC is known as the largest privacy regulator; this organization has done more than anyone in the world to regulate privacy policies among companies. Everyone's current ability to consent is illusory,[800] which means that individuals are left with no choice but to agree, or else such individuals will be denied access to their needs, and wants. Upon making the choice to consent, companies have the legal ability to shift the liability to you. Disguised as a right to consent, it is actually a hidden imposition of a burden for when something goes wrong, and consumers have no choice but to be left out in the cold when this happens.

Now, the question shifts to the relevance and privilege of consent — *does having the ability to consent even matter, and is everyone even given the same chance to disagree?*

From mobile gaming applications to major technological advancements, consent plays a big role in facilitating these developments. In the future, consent must both be crucial and beneficial to the individual, and not just to companies. People should have the liberty to disagree and still access the same amount of information, services, and rights, without having to compromise their ability to choose. Organizations must become more conscious in emphasizing the value of their customers' personal data and will have to ensure that the data privacy terms provided are produced ethically and do not take advantage of customers or anyone through any means.

Consent should be meaningful, effective, and communicated between both parties. Most importantly, consent should be provided in a simple language that everyone else understands in a way that is easier to read for all. *Agree or Disagree?*

4.3 bias in technology

The first-ever beauty contest with an AI judge was held in 2016. During a long and wide selection of winners

800. F. Cate, "Data Privacy and Consent" in TEDxIndianaUniversity. January 17, 2020, viewed on November 23, 2021, https://www.youtube.com/watch?v=2iPDpV8ojHA.

801. S. Bond & N. Junior, "How Racial Bias in Tech Has Developed the 'New Jim Code'" in Hyperallergic. October 8, 2020, viewed on November 26, 2021, https://hyperallergic.com/593074/how-racial-bias-in-tech-has-developed-the-new-jim-code/
802. Rock Content Writer, "Artificial Intelligence Algorithm: Everything You Need To Know About It" in Rock Content. June 28, viewed on November 21, 2021, https://rockcontent.com/blog/artificial-intelligence-algorithm
803. TRT World, "Algorithmic Bias Explained," in TRT world. June 29, 2019, viewed on November 22, 2021, https://www.youtube.com/watch?v=bWOUw8omUVg
804. J. Dastin, "Amazon scraps secret AI recruiting tool that showed bias against women," in Reuters. October 11, 2018, viewed on November 25, 2021, https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G
805. J. Stempel, "Facebook sued for age, gender bias in financial services ads," in Reuters. November 1, 2019, viewed on November 23, 2021, https://www.reuters.com/article/us-facebook-lawsuit-bias/facebook-sued-for-age-gender-bias-in-financial-services-ads-idUSKBN1XA2G8
806. F. Karimi, "People of color have a new enemy: techno-racism," in CNN. May 9, 2021, viewed on November 25, 2021, https://edition.cnn.com/2021/05/09/us/techno-racism-explainer-trnd/index.html

+ *Nadine Kanbier*
They're doing a ton of work on the subject, combining it with art as well. Some interesting recommendations on this topic worth reading are:

- 'Weapons of math destruction' - Cathy O'Neil (well known in the subject),
- 'Coded Bias' (Netflix docu) by Joy Buolamwini,
- 'Follow Algorithmic Justice League'

+ *Camera Ford*
Safiya Noble, a digital media scholar and Professor of Gender Studies and African American Studies at the University of California Los Angeles (UCLA), wrote a book called "Algorithms of Oppression" about exactly this. She studies how the internet and digital technologies reproduce racial and gender power dynamics. The book shows that search engines are not objective sources of information. Instead, search engine results actually reflect (and are heavily influenced by) social values and economic incentives (for example, advertising) determined by the dominant power structure, leading to the spreading of stereotypes, propaganda, and even political extremism such as white nationalism. Source:

for the pageant, the robot jury evaluated about 6,000 applicants, and only one out of the forty-four winners had dark skin.[801] +

AI is an extended subset of ML that teaches the computer to operate on its own[802] — its progressive nature of learning, adapting, and mirroring data that are passed on to it carries the response of outputs it constructs. An AI system is simply a set of algorithms that develops further over time from the data that it digests, and when data is produced and acquired from humans, it carries all the biases that we contain, including bias against race, gender, and a lot more. +

Discrimination manifests from the data we use and the inputs we allow computers to consider.[803] Humans have the ability to teach computers about certain attributes that are allowed and ignored during the preparation stage of modeling the AI system. As an example, to model a person's "creditworthiness," an attribute could contain a customer's age, income, or a number of paid-off loans. While modeling an AI system significantly improves the accuracy of automation in those areas, the influence of biases is still unjustified.

Amazon attempted to design an AI tool that eliminated the lengthy process of recruitment and made the selection process even quicker and more efficient through the resumé data they were able to collect over a decade. However, the majority of the resumés collected were from men, and the AI tool eventually learned this algorithmic bias. Amazon then found its recruiting system was dismissing female candidates, even applicants who went to women's colleges.[804] In the end, this AI tool was never used for several reasons. Facebook, another major tech company, was sued for refusing the advertisement of financial services to elderly and female consumers.[805] On the other hand, facial recognition technologies have ignited controversy for misidentifying women and people of color. Police departments consider facial recognition systems as a major resource for identifying criminals, however, some face analysis algorithms have been shown to misidentify people of color[806] — *and the innocent can be robbed of their freedom for a crime they did not do*. Deep-learning algorithms in AI greatly impact people's lives, and the biases hidden under these systems have the ability to sustain injustice in retail, hiring, healthcare, security, and even in the criminal justice

system. These algorithms inherit the biases of previous decision-makers and reflect these biases. These algorithms are not discriminatory but they replicate the effects of discrimination.

The mitigation of algorithmic biases does not just happen overnight; these existing systems have processes that challenge the retroactive identification of when and where the biases begin to adapt. Major big tech companies themselves are still in the process of generating unbiased AI systems. However, when these prejudices in the current state of technology continue to exist and progress without change in the future of technological advancements, they then mirror the promotion of inequality.

Technology shapes the future, and the information we have today will shape what the future generations will hold in AI algorithms. The process of inducing new worldly views from a more open and inclusive modern society helps construct a more meaningful AI system that can potentially overlap with biases from past algorithms. Although the process does not have an exact time limit, the future of AI technology, in terms of replacing old biases, is possible and positive if it is embedded with the right, ethical, and fair intelligence.

5. technological change — what's heading our way?

The common thread throughout all the advances in technology is that many parts of people's lives will become partly if not fully digitized. From incorporating AI into daily tasks to personalizing medical care, to developing a more user-centered Internet — technology is evolving in myriad ways. Each of these developments has the potential to make a positive impact on the lives of people or on society as a whole. IoT technology allows people to weave their way through cities and their homes more efficiently, for example. The increased usage of robots allows for increased efficiency and can alleviate some of the future labor shortages. Blockchain can significantly help society by improving trust, transparency, and efficiency while facilitating innovation. Technology is also revolutionizing the healthcare industry. Virtual healthcare has the potential to make healthcare more accessible for people. With personalized healthcare, people can gain more accurate and up-to-date insights into their overall health, allowing for more opportunities to prevent rather than treat a disease. Through gene editing, it might even be possible to eradicate some of the diseases currently dominating the world. However, the nature of technology is such that there is also a danger of causing more harm than good if not designed and implemented carefully and thoughtfully. This reality is reflected in increasing desires for a more open and transparent digital world, more security for private data, and more thoughtful design, which centers human needs and minimizes bias. + +

+ Lara Hemels
Noema Magazine, specifically their articles related to philosophy and technology (particularly AI), is an additional source to look into. The question of what exactly distinguishes humanity vs technology will become increasingly relevant as AI advances and integrates further into our lives. Source:

+ Elias Sohnle Moreno
Increasingly, the term "human-centered" is replacing "user-centered" when it comes to product development, highlighting a shift in how companies view the consumer. In Web 3.0, every user is also a creator with unique needs and wants, expecting a highly tailored customer experience.

3d printing, metaverse, gene editing, and data privacy will be consequential topics. how can we safeguard the ethical side of these changes for future society?

introduction
economics
socio-cultural
politics
ecology
technology
demographics
conclusion

aging
growth & degrowth
urbanization
migration
demographic change

Ever since the first humans on Earth originated two million years ago, humanity has seen significant changes. Many more people are roaming the Earth; currently, people's life expectancy has significantly increased, people have mastered the art of building cities, and more people have gained the mobility to change their place of residence. Nevertheless, the current status quo will not remain. In the decades and centuries to come, the lives of humans will change even more. More specifically, there are four major demographic trends that are shaping the lives of people in the future: population growth, aging, urbanization, and migration. More specifically, the world is projected to have a larger population, increasingly more older people, and more people who live in cities. More people are projected to migrate, both voluntarily and involuntarily. These trends are not happening in isolation but rather interacting with one another, making demographics a complex field of study. This chapter aims to dig deeper into the four megatrends of population growth, aging, urbanization, and migration to make this complex concept more understandable.

1. the future of gray hairs — aging populations

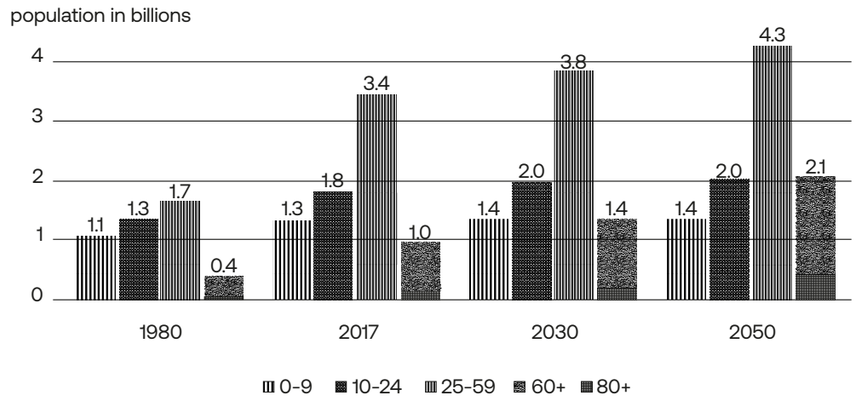
"OK, boomer" has become a statement that Generation Z uses to dismiss older people who they feel simply do not understand them.[807] Baby Boomer, Millennial, and Gen Z are labels that have become ingrained in daily society. These generational terms are not only related to people's ages but are often related to the generations' perceptions of each other and the world around them.[808]

If there was a competition based on the size of age categories, the graph 'Global population by broad age group, in 1980, 2017, 2030, and 2050' would show how the winners and losers have changed over time. By 2050, children (ages 0–9) will be in last place with a team of 1.4 billion members. The youth and adolescents (ages 10–24) will be in third place with 2 billion members, and just above, coming in second, will be the oldest group, comprising 2.1 billion individuals. Adults (ages 25–59) will receive the gold medal, making up the largest population group.

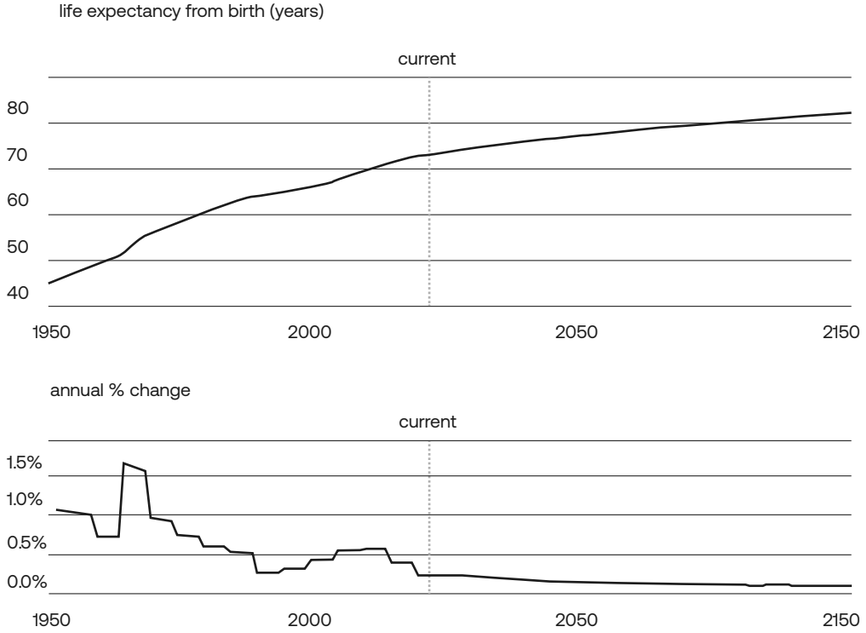
However, the world is not a competition; all the different age-groups should try to live harmoniously. With respect to the different age-groups that comprise the world, the

807. T. Lorenz, "'OK Boomer' Marks the End of Friendly Generational Relations," in New York Times. January 15, 2020, viewed on December 6, 2021, https://www.nytimes.com/2019/10/29/style/ok-boomer.html
808. Ibid.

global population by broad age group, in 1980, 2017, 2030 and 2050[810]



population division world population prospects 2019[815]



biggest changes are happening in the oldest group. There will be more people between the ages of sixty and eighty, and the number of people older than eighty will almost double.[809]

Therefore, let us further zoom in on this development. How does, and will, aging impact the world at the global and regional levels? How do people feel about the prospect of getting older? And finally, what will enable people to age happily and healthily? In this section, the process of aging will be explored

1.1 global and regional developments

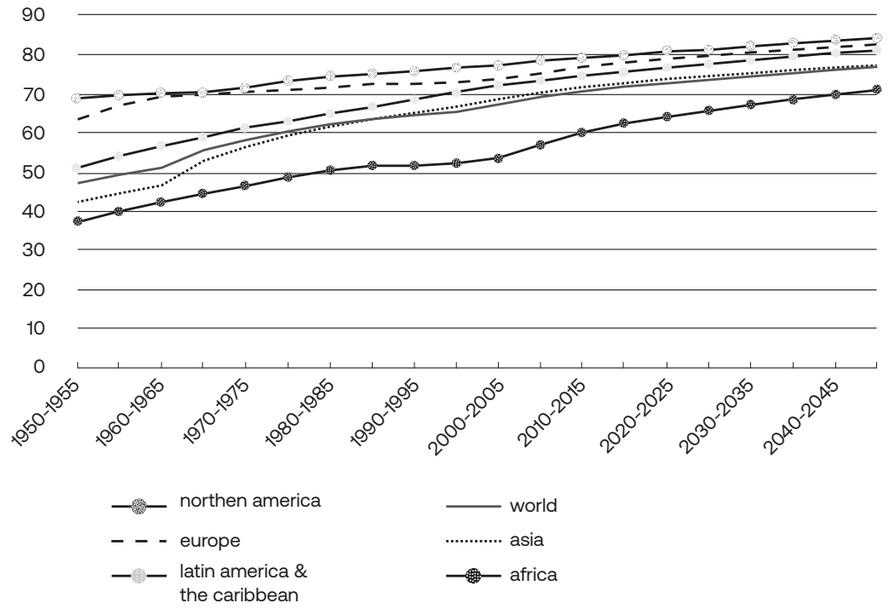
The rate at which the world population is aging is unprecedented. By 2050, it is projected that there will be 2.1 billion older people; double the number compared to 2017.[811] While in 2019, those sixty-five-year-olds and over constituted only one in eleven people in the world; in 2050, one in every six people on Earth is expected to be over sixty-five.[812] The world is aging, and it is aging rapidly. The combination of extremely low birth rates, immigration, and moderate mortality is leading to this rapid aging of the population together with population decline in many countries of the world.[813] This is largely thanks to improved understanding of health, hygiene, and technological and biomedical progress.[814] These developments are not only increasing people's life spans but also making their overall quality of life better.

In 1999, Futurist Ray Kurzweil predicted that human life expectancy would rise to "over one hundred by 2019 and to 120 by 2029."[816] While this prediction did not come true, it is undeniable that life expectancy has been rising all over the world. In 1999, at the time of this prediction, the average global life expectancy was 65.91 years. Since then, global life expectancy has risen to 72.81 years. In the future, this upward trend will continue. By 2050, the average person on Earth is predicted to reach the age of seventy-seven. In 2100, a person on Earth is expected to blow out eighty-one candles![817] As mentioned, a higher life expectancy is not the only contributing factor to an aging population. Developments in life expectancy do give some insight into the overall health of a country and region, however, and are important to consider.

With respect to life expectancy, the graph 'Life expectancy by region' illustrates that it is indeed rising all over

809. World Bank Group. "Demographic Trends and Urbanization" 2021.
810. UN, "World Population Ageing 2017 Highlights," United Nations, 2017.
811. Ibid.
812. UN, "World Population Ageing 2019 Highlights," United Nations, 2019.
813. World Bank Group. "Demographic Trends and Urbanization," 2021.
814. Ibid.
815. UN, "Population Division World Population Prospects 2019," in United Nations Population, viewed on December 4, 2021, https://population.un.org/wpp/
816. R. Kurzweil, The Age of Spiritual Machines: When Computers Exceed Human Intelligence, Pen-guin Books, New York, 1999.
817. UN, "Population Division World Population Prospects 2019," in United Nations Population, viewed on December 4, 2021, https://population.un.org/wpp/

life expectancy by region, 1950-2050[818]



number of persons aged 65 years or over by geographic region, 2019 and 2050[821]

region	number of persons aged 65 or over in 2019 (millions)	number of persons aged 65 or over in 2050 (millions)	percentage change between 2019 and 2050
world	**702.9**	**1548.9**	**120**
sub-saharan africa	31.9	101.4	218
northern africa and western asia	29.4	95.8	226
central and southern asia	119.0	328.1	176
eastern and south-eastern asia	260.6	572.5	120
latin america and the caribbean	56.4	144.8	156
australia and new zealand	4.8	8.8	84
oceania, excluding australia and new zealand	0.5	1.5	190
europa and northern america	200.4	296.2	48

the world.[819] The additional years that have been added to lifespans are not gained at the end of people's lives. Dr. Laura Carstensen at the Stanford Center on Longevity, states that these "extra" years have been added to the middle of life.[820] This means that the additional years people are experiencing are experienced in relatively good health. While population aging is a global phenomenon, depending on the geographical region someone lives, there may be some differences.

In Africa, even though the older population constitutes a smaller proportion of the total population than is the case in other regions of the world, the absolute number of older people is expected to almost quadruple between 2015 and 2050, from 29 million to 108 million.[822] Declining fertility and increasing longevity are the key drivers of population aging globally. In some countries and regions, international migration also contributes to the aging of the population. In Eastern Europe, people often leave their regions to work in other countries. Therefore, in Eastern Europe, which is experiencing a large immigration outflow, the aging process is accelerated.[823] This is because it is younger people who are more likely to emigrate for work. On the other hand, countries experiencing large immigration flows can slow the aging process. Although immigration often has a rejuvenating effect on the age structure of the population of receiving countries, it cannot halt or reverse the long-term process of population aging.[824]

1.2 perceptions toward aging

"You are such an old grump!" and *"Aw, what a sweet old lady!"* are statements illustrating the variety of stereotyping toward older people. While the fact that people can live longer is an amazing feat in human progress, it does not come without its own set of challenges. Most stereotypes related to aging are negative or slightly condescending. Aging is often associated with a lesser quality of life, deteriorated mobility, and forgetfulness, among other things. As explored in the labor economics section, aging can also put pressure on financial and health infrastructure. Also, aging does not only impact the world at a societal level. On a more personal level, the process of getting older can feel daunting for people. The concept of a midlife crisis is a popular plot point in Hollywood movies. First coined in 1965, a midlife crisis is the psychological crisis brought about by events that highlight a person's growing age, inevitable mortality, and possibly the lack of accomplishments in their life.[825] It typically occurs among those between 35 and 65 years old.[826] Research findings on how common midlife crises are, and even the existence of the phenomenon, are very mixed. According to some studies, midlife crises can affect people of any gender. One study found that they are not found in all cultures, while another study finds they are a global occurrence, which means that there is no consensus yet.[827] Despite midlife crises being quite common in popular culture, midlife crises are rarer than previously expected.[828] According to Michael Kimmel, an American sociologist, the midlife crisis does not exist and "is a myth."[829]

Regardless of whether a midlife crisis exists or not, negative stereotyping toward elder people is a fact. According to Becca Levy, associate professor of epidemiology at Yale, negative stereotypes about aging "are a public-health issue."[830] Findings show that negative age stereotyping impacts behavioral outcomes among older adults more strongly than positive age stereotyping.[831] Such negative age stereotyping about the elderly may be more pervasive in some cultures than in others.[832] In some cultures across the world, elders are highly respected and have a special role in life. In Korean culture, for example, Confucian teachings such as filial piety and respect for the elderly are important elements in society.[833] In tribal communities, elders are considered the "wisdom-keepers" and are held in the highest regard.[834] In fact, through different stages in life, people are excited about the future and getting older. Children cannot wait to get older; youth and adolescents save up for the future so they can finally quit work and retire; and partners in romantic relationships dream of growing old together. Overall, it seems as if people have a desire to live a longer life but that they do not want to be or feel older. This might be attributed to the fact that feeling and appearing older leads to experiencing more stereotyping and can remind people how much of their lives have passed by. +

1.3 ageism — discrimination & abuse

One in six people 60 years or older has experienced some form of abuse in community settings, in 2020. Globally, the number of cases of elder abuse is projected to increase in many countries due to rapid aging. If

818. UN, "World Population Prospects 2017." United Nations, 2017.
819. UN, "World Population Ageing 2017 Highlights." United Nations, 2017.
820. L. Trei, "Changing focus from 'growing old' to 'living long' matters to Laura Carstensen," in Stan-ford News. January 19, 2005, viewed on December 9, 2021, https://news.stanford.edu/news/2005/january19/carstensen-011905.html
821. United Nations, Department of Economic and Social Affairs, "Population Division 2019." United Nations, 2019
822. World Bank Group. "Demographic Trends and Urbanization," 2021.
823. UN, "World Population Ageing 2019 Highlights." United Nations, 2019.
824. UN, "Migration and population change - drivers and impacts." United Nations Population, December 2017.
825. J. Elliott, "Death and the mid-life crisis," International Journal of Psycho-Analysis, vol 46, 1965, pp. 502–514.
826. Ibid.
827. T. Parker-Pope, "The Midlife Crisis Goes Global," in New York Times, January 30, 2008, viewed on January 15, 2022, https://well.blogs.nytimes.com/2008/01/30/the-midlife-crisis-goes-glob-al/?mtrref=undefined&gwh=BCB7572DE477F0AA10326F97F1B87609&gwt=pay&assetType=PAYWALL
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829. J. Fischman, "Crisis? What Crisis?," in LA Times. October 16, 2006, viewed on January 15, 2022, https://www.latimes.com/archives/la-xpm-2006-oct-16-he-newmen16-story.html
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+ Elias Sohnle Moreno
The taboo around death in Western societies strongly influences our fear of aging. The shared tacit denial of our own vulnerability and mortality makes us react negatively to the exposure to the inescapable prospect that is common to all humans: death. It could be interesting to investigate whether societies that cultivate less taboo around death also experience less fear of aging and ageism.

the percentage of elder abuse remains constant, the global number of victims will increase to approximately 320 million by 2050.[835]

Ageism is prejudice or discrimination on the grounds of a person's age. It leads to poorer health, social isolation, earlier deaths, and costs economies billions; a WHO report calls for swift action to implement effective anti-ageism strategies. Older people are often assumed to be frail or dependent and a burden to society.[836] Among older people, ageism is correlated with poorer physical and mental health, increased social isolation and loneliness, greater financial insecurity, decreased quality of life, and premature death. Ageism seeps into many institutions and sectors of society, including those providing health and social care, in the workplace, media, and the legal system.[837]

In healthcare, a systematic review (literature search carried out in a structured manner) of the year 2020, illustrated that in 85% of 149 studies, age determined who received certain medical procedures or treatments, to the disadvantage of older people.[838] In the workplace, both older and younger adults are often disadvantaged, and access to specialized training and education declines significantly with age.[839] Moreover, the digital divide can further alienate older people from the rest of the world. The term digital divide refers to a divide in who uses digital technology and who does not as well in terms of how easily they can navigate digital technology.[840] In today's increasingly digitized world, ageism can also seep in among older adults. The WHO recommends policies and laws that address ageism, educational activities that enhance empathy and dispel misconceptions, and intergenerational activities that reduce prejudice to combat ageism and enable healthy aging.[841] Ageism evidently has some serious negative effects. From the perspective of individuals who are getting older, how do people deal with aging?

1.4 anti-aging market

"You aged like fine wine" is one of the highest compliments regarding appearance a relatively older person can receive. Although aging is inevitable, people try not to let the aging process be visible in their appearance. Anti-aging cream, wrinkle cream, and taking certain vitamins are all promoted in order to slow down the aging process (so people can maintain their beauty and youthfulness). With a growing portion of the world aging, the anti-aging market is projected to grow significantly. From $194.4 billion in 2020, the global market size for anti-aging is set to cross $422.8 billion by 2030.[842] A variety of products fall under anti-aging: anti-wrinkle, anti-stretch, hair color, anti-cellulite devices, anti-wrinkle treatment, anti-pigmentation, and skin resurfacing among others.[843] The Asia-Pacific region will see the fastest anti-aging market growth due to the rising volume of cosmetic procedures, partly because of swift urbanization and a growing population.[844]

Procedures like facelifts, Botox, and eyelid surgeries are also becoming more common. In fact, experts recommend people start sooner rather than later. Doctors recommend starting the use of anti-aging products, as well as procedures, to people in their twenties and thirties before the effects of aging become too evident.[846] But what if it were not only possible to slow down the aging process but to reverse it? No, it does not require stepping into a time machine. It does require some manipulation of cells and genes; however, scientists have succeeded in making old organisms and even mice younger.[847] The approaches to reverse aging are currently being developed to also be suitable for humans. It will probably take at least fifteen years before these technologies are ready to be used in humans.[848] + +

Whether reverse aging should be promoted in the first place is a question in itself. Too much altering of cells and genes may lead to some unwanted consequences.[849] Reverse aging is not a reality (yet). All the signs point toward people getting older. So, how can a long, healthy, and happy life be promoted with the tools that are available today?

1.5 aging healthily and happily: the blue zones

There are five places in the world where residents seem to have uncovered the secrets to healthy and happy aging. These places are Okinawa, Japan; Sardinia, Italy; Nicoya, Costa Rica; Ikaria, Greece, and Loma Linda, California. *National Geographic* fellow Dan Buettner uncovered these places and dubbed them *blue zones*. These blue zones are the places in the world where people live the longest and are the healthiest. One thing these blue zones have in common is that they are all

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836. WHO, "Ageing and health," in WHO. October 4, 2021, viewed on December 12, 2021, https://www.who.int/news-room/fact-sheets/detail/ageing-and-health
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844. Prescient & Strategic Intelligence, "Anti-Aging Market." June 2021.
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846. American Academy of Dermatology Association, "Act your age when it comes to skin care," in AAD. November 1, 2016, viewed on December 8, 2021, https://www.aad.org/news/age-and-skin-care
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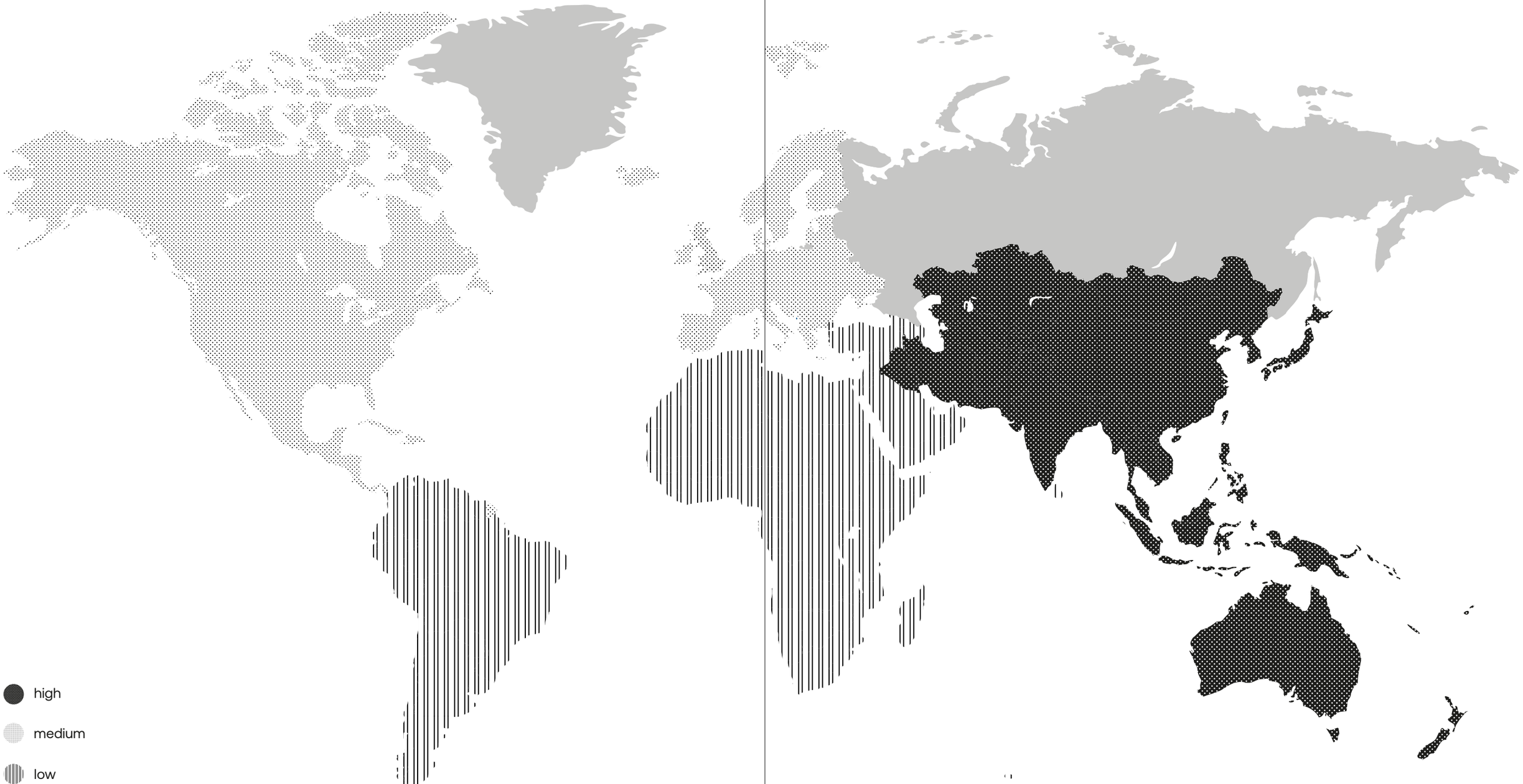
849. Ibid.

+ *Chadia Mouhdi*
If you are interested in seeing this with your own eyes take a look here:

+ *Elias Sohnle Moreno*
Strange times to be alive.

anti-aging market — growth rate by region[845]



high

medium

low

located in a warm, mild, and temperate climate. While not everyone in the world will have similar weather circumstances, someone can still integrate some blue-zone philosophy principles into their life. Buettner and a team of demographers found that these blue zones have nine specific lifestyle habits in common, called the "Power of nine."[850] These habits are:

- Moving naturally. The world's oldest people live in environments that constantly nudge them to move without thinking about it.
- Purpose. Supposedly, knowing your sense of purpose is worth up to seven years of extra life expectancy.
- Downshift. Having routines to shed stress.
- 80% rule. Stop eating when their stomachs are 80% full.
- Plant slant. The diet cornerstones of most people in blue zones are beans. Meat is eaten only five times a month.
- Wine @ 5. People in all blue zones drink alcohol moderately and regularly, one to two glasses a day.
- Belong. Almost all centenarians (people who are older than 100 years) from Dan Buettner's study, belonged to a faith-based community. Research shows that attending faith-based services four times per month will add four to fourteen years of life expectancy.
- Loved ones first. Most centenarians in blue zones put their families first. They keep aging parents nearby, commit to a life partner (which can add up to three years of life expectancy) and invest in their children with time and love.
- Right tribe. The world's oldest people chose or were born into social circles that supported healthy behaviors. +

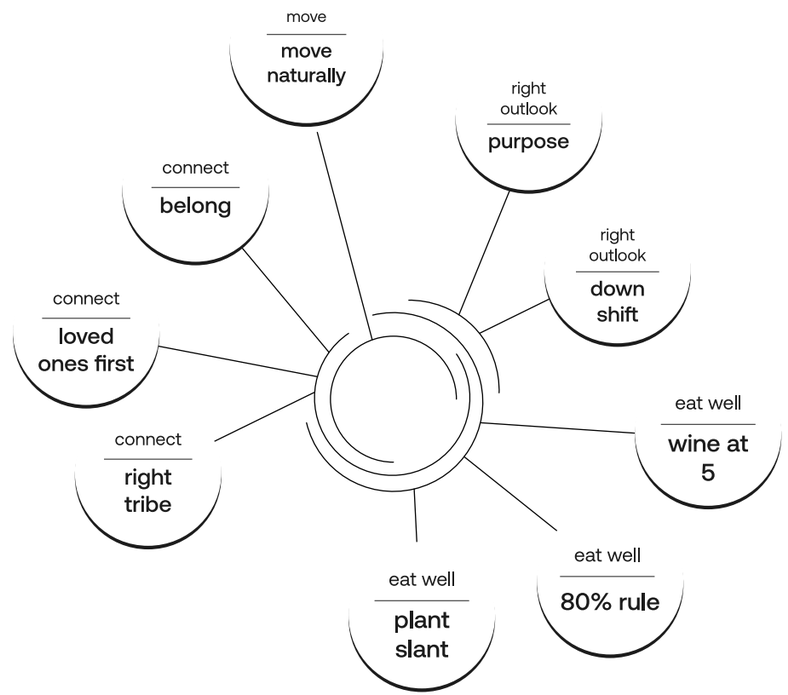
1.6 how will healthcare cope?

Even though life expectancy has increased, the proportion of life spent in good health has remained broadly constant, implying that the additional years added to our lives are those in poor health.[852] When the additional years a person experiences are spent in good health in a supportive environment, older people's ability to do what they value will not be that different compared to younger people. If declines in physical and mental capacity are very prominent in people's additional years on Earth, the

+ Cato Hemels
If you are interested in learning more about blue zones and the Power of 9, there is a fascinating, informative website about blue zones:

850. D. Buettner & S. Skemp, "Blue zones: lessons from the world's longest lived." American journal of lifestyle medicine, vol 10, September 2016, pp. 318–321.
851. Blue zones, "Power 9", in Blue Zones. n.d., viewed on December 12, 2021, https://www.bluezones.com/2016/11/power-9/
852. Deloitte, "The future of aging." Deloitte, 2019.

power of nine[850]



implications for older people and for society are more negative.[853] So, how can we ensure that our lives, which are only getting longer, will be spent in good health? According to a report by Deloitte, as more precision treatments, cures, and preventive medicine techniques for diseases (for example, cancer, heart disease, and diabetes) are developed, health care will need to shift to focus on mental and behavioral health, suicide, loneliness, and social isolation throughout one's life span and especially as people age.[854]

1.7 where and how will the elderly live?

"Healthy aging is more than merely the absence of disease and entails also the maintenance of key functional abilities throughout the lifespan," as explained by former WHO general director Margaret Chan.[855] To achieve this, it is key that health and long-term care systems are aligned to meet the needs of an increasingly aging population. The focus should be on maintaining older people's capacity to lead independent lives.[856] In fact, "Older people's living arrangements are an important determinant of their economic well-being, physical and psychosocial health and life satisfaction."[857] Older people who live alone or reside in institutions are associated with having higher overall mortality risks than those living with a spouse or other family members.[858] The majority of older people in Northern America and Europe live independently. Most older people in these countries prefer to live independently if their health allows it.[859] Independent living does not mean that there is no family support or that they have an increased mortality rate.[860] Often, older people and their children live relatively close to each other and help each other financially and through informal care.[861] In most less-developed countries, the majority of older people live with their children or extended family members. In many of these countries, there is a lack of comprehensive social protection programs. Along with declining labor market prospects for older people's adult children, co-residence of older parents with their children is important in maintaining financial, emotional, and care support within families.[862] Since living arrangements are, generally, a reflection of individual needs, preferences, and resources, there is no single best policy to enable independent lives.

Technological advances are not only impacting the living arrangements of people, in general, in smart cities but also improving living conditions within homes. Smart-home devices among others can enable more comfort as well as facilitate energy and cost savings. For older people, new technologies based on AI allow them to live independently, contributing to a higher level of life satisfaction and quality.[863] According to the WHO, one in three people in the world over sixty-five years of age falls every year, and half of them fall at least twice.[864] There are many factors that might lead to them falling. Environmental risk factors related to the design and arrangement of a space, are perceived by older people as direct causes of falls.[865] By designing a space in line with the concept of smart homes, safety for seniors can be improved in homes. Smart-home technologies allow older people to be independent, contributing to a higher level of satisfaction and quality of life.[866] Some examples of smart-home initiatives that contribute to an improved quality of life for older people are home security cameras to monitor who is coming and going, smart lighting in hallways, and smart plugs with timers to ensure that devices are on only when appropriate and necessary.[867]

While smart technologies seem like a very promising avenue to improve the quality of life of older persons, there are some challenges in the implementation. Older people might be unwilling to learn a new technology, lack confidence with technology, dislike the technology due to frustration, and fear or not be able to afford the maintenance or replacement of the technology.[868] For older people, there is no single best policy for where and how to live as they continue to grow older. Some may prefer to live alone, while others find comfort in other family members. As the role of technology is also becoming more pronounced in homes, this enables older people to live more independent lives. Nevertheless, some may be wary of such technologies within the confines of their homes.

All in all, the world will continue to age rapidly over the coming decades. From the perspective of those aging, this may be difficult at times as they might want to maintain their youth and associate aging with something negative. Nevertheless, advances in technology, lifestyle, healthcare, and living conditions might enable people to age more happily and healthily.

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861. M. Brandt, Martina, K. Haberkern & M. Szydlik, "Intergenerational help and care in Europe," Euro-pean Sociological Review, vol. 25, January 2009, pp. 585–601.
862. Y. Kamiya & S. Hertog, "Measuring household and living arrangements of older persons around the world: The United Nations Database on the Households and Living Arrangements of Older Persons 2019." United Nations, 2019.
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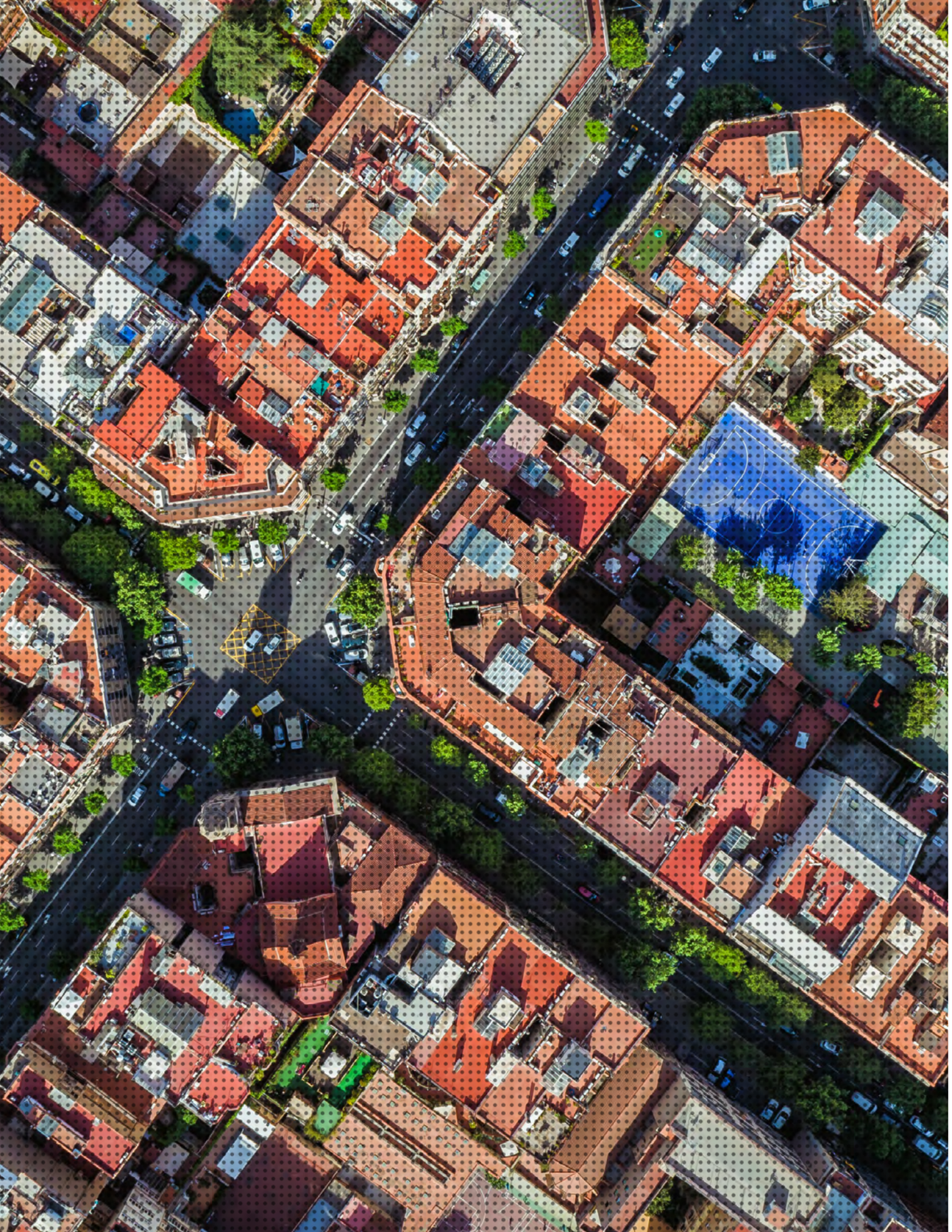

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2. growth and degrowth — dealing with changing demographics

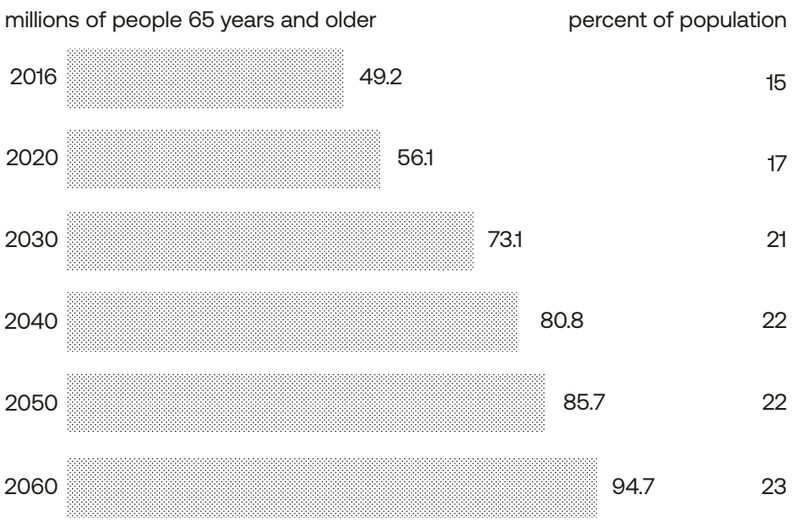
Population growth is dull on paper but everyone has an opinion on it. Many sustainability spokespersons, including David Attenborough, Jane Goodall, Carl Sagan, Malala Yousafzai, Albert Einstein, Martin Luther King Jr., and Stephen Hawking, have been of the strong opinion that a multitude of global problems cannot be solved without controlling the rate at which our world's human population is growing.[869] Some argue that we cannot meet the challenges of climate change, while others in the United States are afraid that we cannot pay the pensions of our elderly when nearly 25% of the country is above the age of sixty-five post-2060 (see graph 'Millions of people sixty-five and older in the United States, projections up to 2060'). In some countries, Germany and Japan, for example, the national population is projected to keep declining, bringing with it a wide range of problems other than those which population growth is riddled with already. And the cherry on top seems to be that scientific discoveries and improvements in healthcare are ensuring that people around the world will live longer and longer.[870] What are the challenges ahead? Is there cause for pessimism or room for optimism? This section will address this issue through four different angles: depopulation, growth, life expectancy, and pensions. One thing is for certain, the questions that come with population growth (or lack thereof) are anything but dull.

2.1 depopulation — shrinking countries

High-and-middle-income countries have seen a steady decline in population growth since 1968.[872] In the near future, this trend will be most apparent in Eastern European and Balkan countries. Bulgaria takes the lead with a projected 22.5% population decline between 2020 and 2050; Lithuania's population is projected to shrink by 22.1% over the same period, Latvia's by 21.6%, Ukraine's by 19.5%, and the list goes on and on.[873]

Causes for depopulation are as varied as the different cultures of the countries named above: mass migration out of the country, low birth rates, aging populations, high mortality rates, and many more. Other countries are

millions of people sixty-five and older in the united states, projections up to 2060[871]



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877. Ibid.
878. Quotes, in Population Matters, viewed on December 16, 2021. https://populationmatters.org/quotes.

+ Diede Kok
Part of this trend is the anti-natalism movement. In 2006, South African philosopher David Benatar's book 'Better no never have been: the harm of coming into existence.' His title may be considered controversial and pessimistic, but the sentiment of 'what kind of world am I bringing a child into?' is growing.

For those who feel inclined to agree with Benatar, I implore you to recognize the growth in wellness, healthcare, and education humanity has reached over the last century. And the decline of violence, war, and crime. I believe that, although there is pain and harm in the world, there is yet more good to experience and contribute to. In the eternal words of Fred Rogers: "Always look for the helpers." Source:

still growing but are projected to depopulate over the next few decades. For example, Germany's population is projected to decline from 2025 onwards.[874] India will begin depopulating much later, starting to shrink from 2060 onwards. +

Keep in mind that these expectations are mere projections: independent researchers make predictions, the UN makes predictions, and individual countries make predictions. These projections differ based on the variables used in their methodologies. For example, different models are used for countries where HIV/AIDS is prevalent, and the most recent UN report (2019) did not take the Covid-pandemic into account. Thirty countries are already dealing with depopulation in 2021 (see the footnote for a list of these thirty).[875] There will be unforeseen future events that drastically change the course of demographics for specific countries. But if these projections come to fruition, the countries of the world need to evolve their institutions to meet the reality of a changing world.

If one scans the Internet for doomsday scenarios that await the world when the average global fertility rate dips below 2.0 and the great curve of population growth makes a slow decline like a rocket tumbling down to Earth closer to the X-axis of the global demographic graph, one need not look for long. Because of this, this section seeks to find the positives of a depopulating Earth.

One positive is the fact that female empowerment and depopulation have a lot in common. David Attenborough framed it as follows: "One thing you can say is that in places where women are in charge of their bodies, where they have the vote, where they are allowed to dictate what they do and what they want, whether it's proper medical facilities for birth control, the birth rate falls."[876] Malala Yousafzai, Nobel Peace Prize Laureate, coupled female empowerment with a second, equally important point: "When girls are educated and when they stay in schools, they get married later in their lives, then they have fewer children and that helps us to reduce the impacts of climate change that the population increase brings."[877] So here are two problems that are strongly related to depopulation: the rights of women and climate change. The world is a closed system with finite resources. Exponential population growth is impossible to maintain over the coming centuries, as Stephen

Hawking calculated, “We will be standing shoulder to shoulder in 2600,” and not as a symbol of solidarity, but literally.[878]

Fred Pearce, author of *The Coming Population Crash and Our Planet’s Surprising Future*, summed up stagnating population growth as the potential for a calm period after decades of upheaval, because “In the past, these stable eras all involved high death rates, high birth rates, and male dominance. Now we have the chance of a low mortality, low fertility future.”[879] In conclusion, depopulation is projected to be a reality for both the developed and developing world in the coming decades. It will bring with it new challenges, some of which will result in negative outcomes. However, there are also problems that will be partially solved by a world with a slowly declining population.

2.2 unrestricted growth & population control

While depopulation is the projected course for many countries in the long run, in the short term, the world is still dealing with a rapidly expanding human population. The Oxford initiative Our World in Data, projects that there will be 10.9 billion of us by the end of this century.[880] Unlimited population growth in a world of finite resources is impossible, and Stephen Hawking’s exponential example, mentioned in the introduction, of a world in the year 2600 where we literally live shoulder to shoulder, seems unpleasant to say the least. However, all current projections indicate that the population of Earth will also begin declining at the end of this century. Of course, there are negative aspects to the growth of the global population. The emissions of greenhouse gasses, the depletion of natural resources, and less world-threatening nuances such as increased traffic and population density. However, there is also room for optimism.

Paul Morland, the author of *The Human Tide*, wrote about a clear distinction that must be made; while the global population continues to grow, and slowly declines in around eighty years, human innovation need not.[881] The average human will be older, and there will also be more of them, but it is more than likely that those of us that are around at the *fin the siècle* of this age of technology and innovation will be highly educated, have stronger networks, and greater access to information.[882] This means that our farming and land use has the potential to be much more efficient as well. With vertical farming and other innovative solutions, the crop yield per hectare has the opportunity to explode, meaning we can give back land to nature, decreasing the tension we put on our essential natural resources. Morland’s thesis can be simply summarized as “If efficiency grows faster than population then sustainability can be enhanced, whether it is more fuel-efficient cars or better storage and transport of food.”[883]

However, it must be stated that the population discussion is one we need to have. Currently, the topic is political poison. Those who think we can grow forever are called naive, and those who call for a “population policy” are called dictators. However, Italian researcher Maristella Bergaglio points out in her research on the relationship between population growth and sustainability that it is paramount that the UN SDGs are not blind to demographic developments. In her estimation, the SDGs should promote the factors that drive demographic change: family planning, empowerment of women, education, and health improvements.[884] Bergaglio ends with a call to include population growth as an independent variable for assessing our progress on sustainability; we can’t ignore the topic if we wish to be prepared for a busier Earth.

However, a strict child policy is not a clear indicator for sustainability processes. For example, Nigeria has a fertility rate of 5.212 births per woman. The country’s government is trying to lower this to an average of four births per woman.[885] However, Nigeria’s 206.1 million citizens emit a mere 0.8% of the global total, as opposed to the 329.5 million Americans who emit 15.6% of the total global GHG emissions.[886] Population-controlling policies often target poorer countries; take the Chinese one-child policy that ended in 2016, for example. Instead, economically prosperous (and therefore ecologically polluting countries) need to incorporate female empowerment mechanisms of family planning, education, and medicinal improvements to tackle population growth where it matters. In short, Bergaglio is correct with regard to the conversation about population growth that needs to take place, but it must be remembered that the impact of population growth on climate change depends heavily on where that child is born.

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2.3 life expectancy — will we still die?

Humanity nearly doubled its life expectancy during the twentieth century, from forty years to seventy. This feat has never before been accomplished in human history. And according to Yuval Noah Harrari, author of *Homo Deus*, we have the potential to reach 150 years at some point in the future.[887]

Today, people still expect to be married 'till death do us part,' and much of life revolves around having and raising children. Now try to imagine a person with a lifespan of 150 years. Getting married at forty, she still has 110 years to go. Will it be realistic to expect her marriage to last 110 years?[888]

Realistically, a life expectancy of 150 is hard to reach. So far, the increase in life expectancy has not come from modern medicine *extending* our life expectancy but, rather, from preventing *premature* deaths. Not even curing cancer would be enough to reach a life expectancy of 150. A distinction also needs to be made between life expectancy and lifespan. Life expectancy is a statistical tool. For example, child mortality plays a big role in the much lower life expectancy before modern medicine. A widely held assumption is that ancient Romans and Greeks had a life expectancy of between thirty and thirty-three years. That does not mean that a thirty-year-old was considered *old* back then. It mostly means that on average, war, famine, and disease killed many more people than they do now. For example, the Greek poet Hesiod wrote more than 2700 years ago that the perfect time to marry was when you were around thirty years old. Equally, the Roman position of consul had an age threshold of forty-three, eight years older than the prerequisite age to become U.S.[889] president. What this means is that when a child survives childhood, and when a country produces enough food, and a citizen is not thrown into war, a person was expected to reach a very old age even back then.

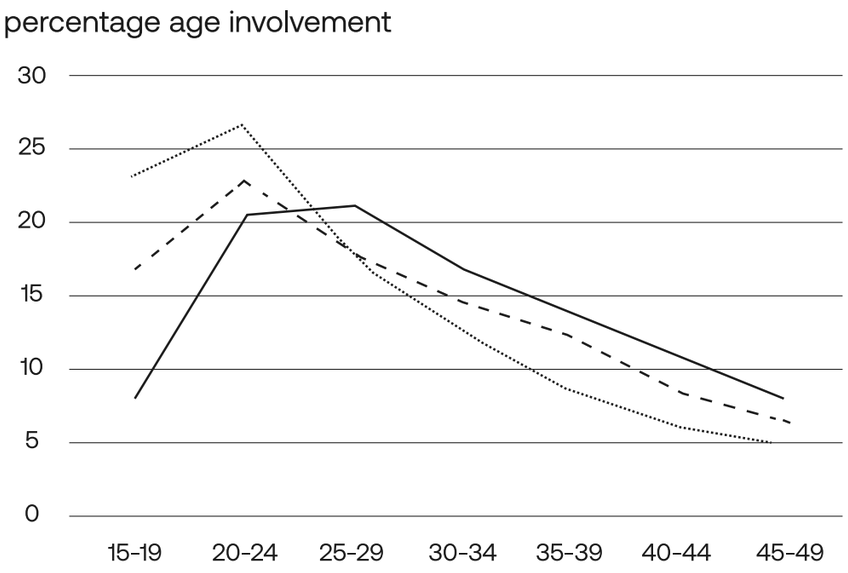
To show just how much child mortality has changed over the past century, writer Fred Pearce wrote in 2011 about his birth in 1951: "Back when I was born, 150 babies out of every thousand died before their first birthday. I could have been one of them. Now only fifty die."[890] The impact of disease was even larger. It took over 300 years to wipe out malaria in England, but in Sri Lanka, the task was completed in merely five. As a result, life expectancy in Sri Lanka rose from forty-seven to sixty years over the same period. Pearce writes that this "was the statistical equivalent of everlasting life: every year you lived, you could expect to live two more."[891] Why is it important that life expectancy be projected correctly? Because research points out that the American Social Security Administration currently underestimates male life expectancy by three years and female life expectancy by eight, and the discrepancy is projected to cost $3 to $8 trillion more for Medicare and Social Security.[892] In an age where Sri Lankans can be statistically immortal, it is important to know just how old we can get.

But what about the future? Paul Morland, mentioned in the Growth section, stated that the future will be "more gray, green, and less white." "More gray" because life expectancy is still on the rise.[893] For example, in South Korea, life expectancy has risen an astonishing twenty-two years since 1960. The middle-range UN forecast projects that the median age there will be forty by the end of the twenty-first century, which is twelve years more than it is today. Where countries such as Ethiopia and Syria are currently dominated by young adults aged between eighteen and twenty, by the end of the century, the median age will be twice that. The impacts of this change in demographic makeup, caused by rising life expectancy mixed with low fertility rates, will produce a society we have never seen before. While television shows now appeal to younger generations because they still form the majority, the romantic comedy of the future could star only older people because they will make up the largest target audience.

Positively, the world is most likely to be a more peaceful place as the average citizen grows older. There is a large correlation between a young population and crime (see graph 'Age distribution of homicide offenders across three historical periods, United States'). Morland's research points out that not all young societies are violent, but all old societies are peaceful.[894] Furthermore, according to Morland, the increase in life expectancy coupled with low fertility rates will make children a rarity. And when there are fewer children around, they have more adults to look after them and invest in them. On the other hand, societies will also be less innovative and risk-taking. This is, of course, a mere prediction. However, the older segment of society is more likely to

887. Y. Harari, Homo Deus: A brief history of tomorrow (Oxford: Signal 2015), p.30.
888. Harari, Homo Deus, p.30–31.
889. A. Ruggeri, "Do we really live longer than our ancestors?", in BBC 100-year life, October 3, 2018, viewed on December 15, 2021, https://www.bbc.com/future/article/20181002-how-long-did-ancient-people-live-life-span-versus-longevity.
890. Pearce, The coming population crash, p.17.
891. Ibid., p.43.
892. Raftery et al., "Projections of Life Expectancy," p. 796.
893. Morland, The Human Tide, p. 264.
894. Morland, The Human Tide, p. 265.

age distribution of homicide offenders across three historical periods, united states[896]



895. Morland, The Human Tide, pp. 265–267.
896. J. Ulmer & D. Steffensmeier, "The Age and Crime Relationship: Social Variation, Social Explanations," in The Nurture versus Biosocial Debate in Criminology: On the Origins of Criminal Behavior and Criminali-ty (Sage Publications: 2014), viewed on December 14, 2021, https://www.sagepub.com/sites/default/files/upm-binaries/60294_Chapter_23.pdf. pp. 377–396.
897. C. Goodhart & M. Pradhan, The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an inflation Revival (Cham: Palgrave Macmillan 2020), p. 13.
898. Goodhart & Pradhan, The Great Demographic Reversal, p. 13.
899. Ibid.

+ *Stefanie Sewotaroeno*
This is exactly what crossed my mind when I started reading this chapter. I have seen the new generation explicitly expressing their wish to not have children on social media. Even married couples are happy with their dogs and do not in the slightest desire to have children.

This doesn't seem to be a modern thing, although I do think that modern issues are fueling this. The Washington Post published an interesting article about women having fewer children throughout history:

invest in bonds than in equity, meaning that a higher life expectancy will impact the fluctuations of the economic market heavily as well.[895] +

2.4 pensions — can we afford to become this old?

What will pensions look like in the coming decades? As previous sections have indicated, the future will be gray. That does not mean it will be boring but it does mean there will be many more old people around; this is both due to falling fertility rates and rising life expectancy. According to researchers Goodhart and Pradhan, writers of *The Great Demographic Reversal*, the retirement age is likely to rise above seventy in the coming decades.[897] It is hard to imagine manual labor undertaken by someone well into their seventies: going down the pole like a fireman, working in construction in the scorching sun, or running after suspects as a police officer, etc. Still, it is financially difficult to retire in your sixties when state pensions are low due to a sea of gray. According to Goodhart and Pradhan, the best way to retire earlier is to have strong individual savings on top of state pensions. However, it is difficult to convince young people in their twenties to save up for the last decades of their lives, especially with a growing cost of living and stagnant wages.

Two good indicators for personal savings are (i) trust in the state's ability to provide a state pension, and (ii) the expected duration of retirement. It is noteworthy that due to these two indicators, an average Chinese citizen has a very high personal savings rate.[898] A final complication the two writers add is the trend in the West of children living at home for a longer period of time. This causes the parents to have fewer opportunities to save for their own retirement. Although this development can work in both directions; it is also possible that due to the absence of rent for the children, the wealth of the household overall increases.[899]

Due to low expectations for pension funds in the future, as well as higher life expectancy, labor participation of the "young-old" (meaning people between the ages of sixty-five and seventy-five) rose over the last years and is expected to rise even further. However, there is a limit to how high the working segment of the "young-old" can increase. For example, the increase over the last decades mostly came from the increased participation

900. Ibid., p.153.
901. Aegon, “The New Social Contract: Future-Proofing Retirement: Aegon Retirement Readiness Survey 2021,” December 16, 2021, viewed on January 17, 2022, p. 43, https://www.aegon.com/newsroom/news/2021/future-proofing-retirement-systems/.
902. Ibid.
903. Cavagna, G. A., P. A. Willems, & N. C. Heglund. “Walking on mars,” Nature, vol. 393 1998, 636–636.

+ Sam Slewe
Another massive challenge is to investigate the gender pension disparity. In the Netherlands, for example, women receive a pension that is 40% lower than men’s. The Netherlands is not the only country that has this gender gap. So, if these demographic factors can be ‘handled’ in the future of pensions, more has to be done to solve the gender gap.

of women; meaning that now women have largely caught up, the “young-old” working population is not growing as fast as in previous decades.[900]

With regard to the future, it is hard to make accurate predictions; instead, there are many platforms that have made strong recommendations for healthy pension policies based on economic and demographic projections. One such research project was conducted in 2021 by Aegon, a Dutch banking and insurance group. Their research comes with innovative solutions for the future. One idea is to provide government “credits” for unpaid time in caregiving roles.[901] Now, when a working citizen takes care of related elderly such as their parents, their own pension suffers while benefiting the pension of those they take care of. Providing these caretakers with pension credit for such work rectifies this issue, which is sorely needed in a society that is rapidly aging. Another idea is for societies to reform their urban planning so that the elderly can “age in place.” This means changing urban planning to adapt to the changing demographic shift, ensuring that citizens can grow old without having to move to care centers far outside of their previous residences.[902] One thing is hard to dispute: the world’s pensions schemes are in for a paradigm shift. With many demographic factors changing rapidly in this century, it is an enormous task to keep up with current developments.+

3. the future of cities — developments in urbanization

Imagine wanting to go outside for a walk. Under normal circumstances, someone would simply have to put on some shoes and, if necessary, a jacket. Instead, imagine having to put on a pressure or space suit to take a walk outside. This walk becomes even less ordinary since someone will be walking at a pace half of what they normally would.[903] This could become a reality for people living on Mars in the coming decades. Elon Musk plans to have one million people living on Mars by 2050. Sending people more than 370.38 million km away is not an easy endeavor. Significant technological advances have to be made to enable the project. Furthermore, a significant amount of resources would have to be allocated to make moving to Mars possible. In 2019, Elon

Musk estimated that the total costs could be between $100 billion and $10 trillion. For reference, it is estimated that it could cost $330 billion to end world hunger, and estimates for costs to halt climate change by 2050 range between $300 billion[904] and $50 trillion.[905]

Conditions also have to be optimal in order to send people to Mars. When Earth and Mars are closest to each other, the journey takes three months given that it is possible and permissible to fly a nuclear-powered rocket.[906] The difficulty is that this optimal time slot only happens once every twenty-six months. In order to get a million people to Mars by 2050, we would have to start at the latest by 2040 and send 100,000 people per Earth-Mars orbital sync.[907] NASA also aims to land the first humans on Mars by 2035.[908] The journey to living on Mars does not end simply after people have arrived on the planet. In fact, the journey just begins. Tremendous amounts of resources and cargo ships have to be sent to the planet, and new ways of building infrastructure by relying on local resources instead of fossil fuels have to be imagined.[909] Finally, everyday products such as ball-point pens have to be adjusted in order to be suitable for conditions on Mars.[910] Even if operations to colonize Mars run smoothly, billions of people have to make the most of what is left of/on Earth. So, before people set out into the universe, let us explore how life on Earth and, more specifically, life in cities will develop over the coming years.

On average, the world is set to become more urbanized in the future.[911] Urbanization refers to the population shift from rural to urban areas, the corresponding decrease in the proportion of people living in rural areas, and the ways in which societies adapt to this change.[912] It is a complex and dynamic process, which interacts with the other key demographic factors: population growth, aging, and migration. Economic, social, and political trends also interact with urbanization, creating a dynamic context for the functioning of cities, towns, and metropolitan areas.[913] In such a complex and dynamic environment, many questions can be raised. What will urbanization look like in different regions across the world? What will life in cities be like? And what will the city of the future look like? These questions will be explored in the following sections.

904. A. Majendie & P. Parija, "How to Halt Global Warming for $300 Billion," in Bloomberg. October 23, 2021, viewed on November 24, 2021, https://www.bloomberg.com/news/articles/2019-10-23/how-to-halt-global-warming-for-300-billion
905. S. Klebinov, "Stopping Global Warming Will Cost $50 Trillion: Morgan Stanley Report," in Forbes. October 24, 2019, viewed on November 24, 2021, https://www.forbes.com/sites/sergeiklebnikov/2019/10/24/stopping-global-warming-will-cost-50-trillion-morgan-stanley-report
906. N. Lewis, "Nuclear-powered rocket could get astronauts to Mars faster," in CNN. February 10, 2021, viewed on November 25, 2021, https://edition.cnn.com/2021/02/03/world/nuclear-powered-rocket-scn-spc-intl/index.html
907. E. Musk. Twitter Post. January 17, 2020. https://twitter.com/elonmusk/status/1217990326867988480
908. E. Howel, "NASA Aims for Mars Landings in 2035 While Building Support for Lunar Gateway," in Space. October 21, 2019, viewed on November 27, https://www.space.com/nasa-aims-for-2035-mars-landings-iac.html
909. S. Holder, "Urban Life on Mars?", in Bloomberg. November 12, 2021, viewed on November 25, 2021, https://www.bloomberg.com/features/2021-life-on-mars/
910. NASA, "Space Pens, Pencils, and How NASA Takes Notes in Space," in NASA. August 27, 2021, viewed on November 30, 2021, https://www.nasa.gov/directorates/spacetech/spinoff/How_NASA_Astronauts_Write_in_Space
911. H. Ritchie & M. Roser, "Urbanization," in Our World in Data. November 2019, viewed on Novem-ber 25, 2021, https://ourworldindata.org/urbanization
912. "Urbanization." in MeSH Browser, viewed on November 23, 2021, https://meshb.nlm.nih.gov/search#%2Frecord%2Fui%3F-name=Urbanization
913. World Bank Group. "Demographic Trends and Urbanization." 2021.
914. UN Urbanization Prospects 2018.
915. United Nations, "68% of the world population projected to live in urban areas by 2050, says UN," in UN. May 16, 2018, viewed on November 23, 2021, https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html
916. World Bank Group. "Demographic Trends and Urbanization," 2021.
917. United Nations, "68% of the world population projected to live in urban areas by 2050, says UN," in UN. May 16, 2018, viewed on November 23, 2021, https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html
918. H. Ritchie & M. Roser, "Urbanization," in Our World in Data. November 2019, viewed on Novem-ber 25, 2021, https://ourworldindata.org/urbanization

3.1 global and regional developments

In the decades to come, many people will see considerable changes happening in their lifetimes across cities. A simple Trivia fact such as Tokyo, with its 37 million residents being the city with the most inhabitants worldwide, will no longer hold in the future. Delhi is projected to continue growing, while Tokyo's population is declining, which will make Delhi the most populous city in 2028.[914] Moreover, currently, megacities — cities with more than 10 million inhabitants — are relatively rare. There are ten megacities across the world. By 2030, in only eight years, it is expected that the world will have forty-three megacities, most of which will be in developing regions.[915]
At the moment, around 56% of the world's population is urbanized. By 2050, it is expected that more than two-thirds of the world's population will live in urban areas. In 2050, seven out of ten people on Earth will live in urban areas.[916] In absolute numbers, the combination of population growth and urbanization are estimated to add another 2.5 billion people to urban areas by 2050. This is equivalent to two times the current population of India, the world's second most populated country. Close to 90% of the increase in world population will take place in Asia and Africa.[917]

Although the world at large is increasingly urbanizing, there are some differences between regions. Within regions, countries, and cities, there is even more variation with respect to urban developments. Cities in Eastern Africa will face enormous pressure to accommodate an urban population that in 2050 is projected to be five times greater than it was in 2010.[918] Sub- Saharan Africa will be majority-urban by 2035 and may be just over 58% urban by 2050. A typical African city will more than double its population over the next three decades, and many villages and towns will transform into large urban centers. The West Asian North African region will almost double its urban population from 275 million to 497 million by 2050. In all countries in South Asia except Sri Lanka, the total population will continue to increase beyond 2050, driven by urban population growth. The Eastern Europe and Central Asia region is the only region in the world experiencing both a decline in its total population and its urban population. Latin America, where almost 80% of the population lives in cities, is the most urbanized region in the world alongside North America. Soon, urban centers will face an aging and shrinking population. The

majority of cities will experience population decline in their city centers until 2050.[919]

The Covid-19 pandemic clearly illustrated how a virus can spread more easily in big metropolitan cities. Early in the pandemic, many people moved away from dense cities to other areas.[920] Many people were confined to their homes for work and school and could not engage in social activities or even go outside the house due to lockdown restrictions. Such drastic changes highlighted how small someone's world could become despite being located in a previously large and vibrant area. While some people speculated that it was the end of cities, others did not envision such drastic changes. Cities are likely to remain at the center of the global economy.[921] In fact, some of the deurbanization patterns that emerged early in the pandemic have mostly gone back to *normal*. So, while there are some factors that might lead to de-urbanization patterns, it is still indisputable that the world will continue to urbanize in the future.

All in all, cities will continue to grow in the decades to come. In some places, it will be challenging to accommodate the world's growing population in the relatively concentrated and small surface of cities. Other regions, on the other hand, will have to develop ways to combat the consequences of an increasingly aging and shrinking urban population. Living in a world with more people in the future, of whom the majority will live in cities, poses the question of what life will be like then. How can cities enable safe and good quality infrastructure and affordable housing for all residents? How can cities provide good quality of life for residents in dense areas? In a world where sustainability is increasingly emphasized, it is also important to consider what the implications of urbanization are for the Earth and its resources.

3.2 quality of life in cities

On a given day, people in cities can go outside without having to speak a word to another person. When stepping out the door, someone may not say a word to their neighbor who they barely know. After doing some grocery shopping in silence and using a self-checkout machine, they may head home to work since hybrid working is the new standard. After having worked hard and getting tired from sitting behind a screen all day, they might be craving some take-out. They might go to their favorite food-ordering app and have their food delivered in a matter of minutes to their doorstep. In the evening, they might decide to go to the 24/7 self-check-in gym, which also requires no human interaction. This *day in the life* illustrates how modern city living is both efficient and convenient, while also being quiet and perhaps lonely. In a world where more people call cities their home, it is important to understand how people's quality of life will be affected.

Living in the city is associated with higher life satisfaction compared to rural areas. On average, 18.6% of residents in cities are satisfied with their lives, compared to 16.5% of residents in rural areas.[922] Moreover, urban residents tend to enjoy a higher quality of life compared to rural residents.[923] Generally, urban areas bring about certain economic, social, and environmental benefits. On the production side, city density is associated with agglomeration economies, which make firms and workers more productive than in other locations. Density in cities also enables innovation through spillovers, which are harder to measure but also deemed substantial. Moreover, on the consumption side, higher density brings many goods and services closer, lowering travel needs. Socially, density allows for the development of a rich variety of attractions to capitalize on the wide range of interests of residents.[924] Another benefit of urbanization toward denser cities is that residents emit less GHG and fewer particles due to changes in the amount and form of transport and more energy-efficient construction.[925] In a world that is increasingly urbanizing, all of this may seem like good news. Nevertheless, living in the city is not as rose-colored as it may seem at first glance.

Some of the downsides of city life include greater exposure to pollution and diseases. Moreover, greater crowding and congestion, more costly floor space for residents and firms, and scarcer green space imply that city density also has downsides. Currently, the socio-psychological implications of urbanization are still poorly understood. Some studies have found that city life can be linked to a lower sense of community and a lack of relationship with the environment.[926] There is also a strong indication that urban people are more likely to report mental illness and depressive symptoms than rural people.[927] Finally, gentrification can also occur in urban areas, which is the process in which older working-class neighborhoods are converted to serve higher-income households.[928]

919. World Bank Group. "Demographic Trends and Urbanization," 2021.
920. E. Badger, "Covid Didn't Kill Cities. Why Was That Prophecy So Alluring?", in New York Times. July 12, 2021, viewed on January 2, 2022, https://www.nytimes.com/2021/07/12/upshot/covid-cities-predictions-wrong.html
921. R. MacGahey, "Has Covid-19 Changed Cities Forever? Probably Not," in Forbes. October 25, 2021, viewed on January 2, 2022, https://www.forbes.com/sites/richardmcgahey/2021/10/25/has-covid-19-changed-cities-forever-probably-not/?sh=d879b6ebca6c
922. OECD European Commission. "A new perspective on urbanisation." 2020.
923. M.J. Burger, P.S. Morrison, M. Hendriks & M.M. Hoogerbrugge, M. M, "Urban–rural happiness differentials across the world." World happiness report, March 2020, pp. 66–93.
924. Duranton, Gilles, & Diego Puga. "The economics of urban density." Journal of Economic Per-spectives 34, no. 3 (2020): 3–26.
925. E.L. Glaeser & M.E. Kahn, "The greenness of cities: Carbon dioxide emissions and urban devel-opment." Journal of urban economics, vol 67, May 2010, pp. 404–18.
926. Buchecker, Matthias, and Jacqueline Frick. "The implications of urbanization for inhabitants' rela-tionship to their residential environment." Sustainability, vol. 12, February 2020, p.1624.
927. S. S. Hiremath, "Impact of Urbanisation on Mental Health: A Critical Appraisal," in Urban Design and Mental Health, viewed on November 26, 2021, https://scientonline.org/open-access/impact-of-urbanisation-on-mental-health-a-critical-appraisal.pdf
928. Marston, Sallie A., Paul L. Knox, & Diana M. Liverman. World regions in global context: Peoples, places, and environments. Prentice Hall, 2002.

In some areas of the world, urban growth is happening at an explosive rate. Intense urban growth can result in greater poverty where local governments are unable to provide services for all people. Combined with climate change, this can make city life even more vulnerable for certain groups of people.[929] For example, in times where climate change more drastically leads to environmental shocks, coastal cities are at a very high risk of flash flooding and other extreme weather events.[930] The concentrated energy use in cities also leads to greater air pollution with a significant impact on human health. Some other environmental consequences of urbanization are growth promoting the loss of urban tree cover and animal populations losing their habitats and food sources.[931] While this may seem like a very daunting prospect for cities, technological developments shed some light at the end of the tunnel.

3.3 a roof over our heads?

In order to enjoy a high quality of life, the housing and living arrangements of people are important. In the current housing market, becoming a homeowner is becoming a more and more distant reality. Currently, housing prices are astronomically high. In the EU, rent prices rose by 16% and house prices rose by 34% compared to 2010. According to the International Monetary Fund (IMF), low interest rates, and policies by governments and workers' greater need to be able to work from home contributed to the housing-price boom. In many countries, online searches for homes reached record levels. This higher demand along with supply-chain disruptions, which raised the costs of several inputs required in the construction process, also contributed to rising housing prices.[932] In many countries, wages struggle to keep pace with these rising housing prices, which makes the prospect of ownership for aspiring homeowners even less likely.[933] As the graph 'Housing Affordability' illustrates, in many OECD countries, a larger proportion of people's income is taken up when buying a house compared to 1995.[934] Especially for Millennials and Gen Zs, who are less likely to already own a home compared to baby boomers, the prospects of being able to afford a home are diminishing.[935] +

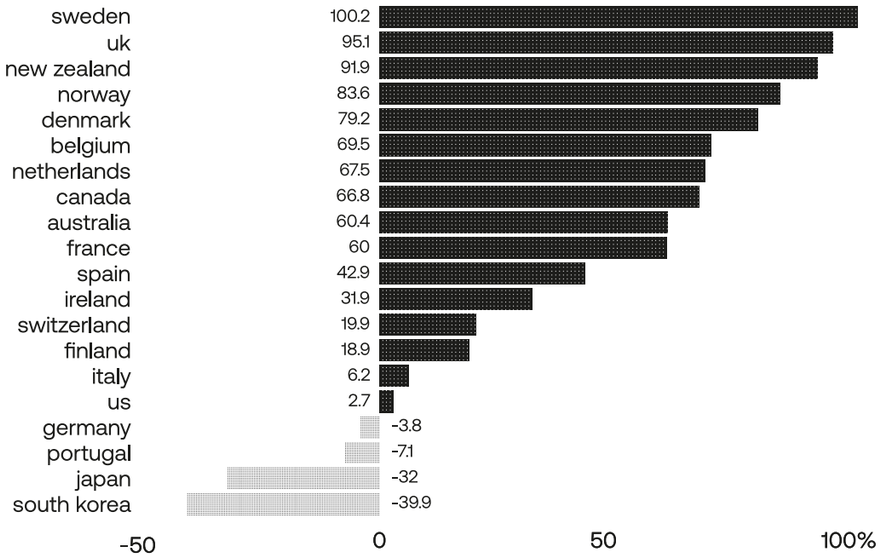
90% of cities around the world do not provide affordable or adequate quality housing, according to the World Economic Forum.[936] Especially, considering that more

+ Chia-Erh Kuo
Apart from rising demand and low-interest rates, there is also a cultural aspect behind the soaring housing prices. In Asia, people are more likely to desire to own a property as an asset, whilst western people may only want a house as a place to live. And this long-lasting mindset, to some extent, has led to speculations in the booming real estate market, making housing unaffordable for the younger generation in South Korea and Taiwan. In addition, some have warned that a global housing-market bubble could happen in the near future. Sources:

929. World Bank.
930. C. Quagliolo, C. Elena & A. Pezzoli. "Experimental flash floods assessment through Urban Flood Risk Mitigation (UFRM) model: the case study of Ligurian coastal cities." Frontiers in Water, vol. 3, May 2021, p.50.
931. National Geographic, "Urban Threats," in National Geographic, viewed on November 27, 2021, https://www.nationalgeographic.com/environment/article/urban-threats
932. World Economic Forum, "This is how much house prices have increased in countries around the world," in WeForum, January 10, 2021, https://www.weforum.org/agenda/2021/10/housing-prices-continue-increase-countries-europe-world/
933. E. Charlton, "This is how much house prices are outpacing rents across Europe," in WE Forum. October 22, 2021, viewed on January 2, 2022, https://www.weforum.org/agenda/2021/10/house-prices-outpacing-rental-prices-eu-europe/
934. A. Crawford, "The Global Housing Market Is Broken, and It's Dividing Entire Countries," in Bloomberg. September 19, 2021, viewed on January 2, 2022, https://www.bloomberg.com/news/features/2021-09-19/global-housing-markets-are-hurting-and-it-s-getting-political
935. Ibid.
936. E. Charlton, "This is how much house prices are outpacing rents across Europe," in WE Forum. October 22, 2021, viewed on January 2, 2022, https://www.weforum.org/agenda/2021/10/house-prices-outpacing-rental-prices-eu-europe/

housing affordability[934]

housing price to income ratio, percentage change from 1995 to 2020



people are projected to live in cities in the future, this is a daunting prospect for the average person, and calls for the need for policymakers to enable good and affordable housing for all.[937] Some cities around the world have begun implementing policies to combat the rise in housing prices and make housing more accessible. In January 2022, for example, the Dutch city of Rotterdam implemented a "purchase protection." This entails that when someone buys a house, they have to live in it. This prevents investors from snatching up homes to turn a profit. The goal of this measure is to enable young starters to have a better chance of finding a house to buy.[938]

By 2030, UN Habitat estimates that 3 billion people, about 40% of the world's population, will need access to adequate housing. This is equivalent to a demand of 96,000 new affordable and accessible housing units every day. According to UN Habitat, housing is "a precondition for access to employment, education, health, and social services. In order to address the current housing challenges, all levels of government should put housing at the center of urban policies by placing people and human rights at the forefront of urban sustainable development".[939] The growths in world population and urban population, specifically, are disproportionately centered in developing countries. This means that these countries will be under increased pressure to enable affordable housing for all.[940] Conventional methods of building houses have a significant environmental footprint. In today's world, sustainability is increasingly being emphasized.[941] In the decades to come, striking a balance between environmental sustainability on the one hand while also emphasizing social sustainability and making sure people have access to affordable housing will be vital.

3.4 cities of the future — smart and sustainable cities

In 1966, Arthur C. Clarke, futurist and writer of 2001: A Space Odyssey believed that the house of the future would be able to fly by 2020.[942] In 1957, Popular Mechanics published a series of predictions about 2020. By 2020, it was predicted that "roads and streets will be replaced by a network of pneumatic tubes."[943] While part of these predictions has not come true, they are not too far off of what reality could be like in the near future. Elon Musk has been interested in the hyperloop, a form of ground transportation in development by multiple companies where passengers float in pods alongside giant low-pressure tubes.[944] Just like people in the past have been trying to get a grasp on current times, people nowadays are interested in what the future has in store as well. While the future is exciting, there are some challenges unique to this generation, which have to be considered when planning for the future.

Within thirty years, an additional 2.5 billion people are set to live in cities.[945] Even though cities already have better infrastructure and facilities compared to rural areas, for many countries, it will be challenging to navigate the unprecedented growth of urban areas. Urban growth will impose pressure on current infrastructure as well as finance new infrastructure.[946] The way cities will develop in the coming years will be key in setting the conditions for the future. This will determine the quality of life in the increasingly populous cities around the world.[947] To address this challenge, the UN included "sustainable cities and communities" as one of the SDGs.[948] Some of the key features of the city of the future are that they are sustainable and "smart," this will be explored in the following section.

3.5 smart and sustainable cities

Urban centers currently occupy less than 5% of the world's landmass. Nevertheless, they account for around 70% of both global energy consumption and GHG emissions.[949] A sustainable city is a city that is designed with consideration for social, economic, and environmental impact. Sustainable cities enable a resilient habitat for existing populations, without compromising the ability of future generations to experience the same.[950] Sustainable cities promote opportunities for all and try to maintain sustainable economic growth. They aim to minimize required inputs of energy, water, and food, and drastically reduce waste, output of heat, air pollution, CO2, methane, and water pollution. These ambitions require the world to reimagine how almost all cities are designed.

Some cities are already putting these sustainable city ambitions into practice and leading the way in what might become the norm in the coming years. Paris is leading the way with the fifteen-minute neighborhood, where everything one might need can be found in a

937. E. Charlton, "This is how much house prices are outpacing rents across Europe," in WE Forum. October 22, 2021, viewed on January 2, 2022, https://www.weforum.org/agenda/2021/10/house-prices-outpacing-rental-prices-eu-europe/
938. G. Vermeulen & M.van der Beek, "Opkoopbescherming in Rotterdam is een feit: in 16 wijken krijgen beleggers geen kans op de woningmarkt," in Een Vandaag. November 16, 2021, viewed on January 2, 2022, https://eenvandaag.avrotros.nl/item/opkoopbescherming-in-rotterdam-is-een-feit-in-16-wijken-krijgen-beleggers-geen-kans-op-de-woningmarkt/
939. UN Habitat, "Housing," in UN Habitat, January 26, 2022, https://unhabitat.org/topic/housing#:~:text=By%202030%2C%20UN%2DHabitat%20estimates,accessible%20housing%20units%20every%20day.
940. Oxford Business Group, "Growing pressure on emerging markets to solve housing deficits," in Oxford Business Group, viewed on January 26, 2022, https://oxfordbusinessgroup.com/overview/urban-adaptation-rapid-urbanisation-and-young-growing-populations-put-pressure-emerging-2
941. UN Habitat, "The climate is changing, so must our homes & how we build them," in UN Habitat. September 23, 2019, viewed on January 26, 2022, https://unhabitat.org/the-climate-is-changing-so-must-our-homes-how-we-build-them
942. Classe, "Back to the Future" in Classe Training. January 17, 2020, viewed on November 24, 2021, https://classetraining.co.uk/back-to-the-future/
943. C. Lyman, "15 historical predictions on what life would be like in 2020," in Considerable. August 17, 2020, viewed on November 24, 2021, https://www.considerable.com/entertainment/history/historical-predictions-about-2020/
944. S. Ranger, "What is Hyperloop? Everything you need to know about the race for super-fast trav-el," in ZD Net. August 16, 2019, viewed on December 20, https://www.zdnet.com/article/what-is-hyperloop-everything-you-need-to-know-about-the-future-of-transport/
945. World Bank Group. "Demographic Trends and Urbanization," 2021.
946. Ibid.
947. Ibid.
948. SDGS, "The 17 Goals" in Sustainable Development Goals, viewed on November 23, 2021, https://sdgs.un.org/goals
949. GEF, "Sustainable Urbanization Policy Brief: Proliferation of Urban Centres, Their Impact on the World's Environment and the Potential Role of the GEF." June 2014.
950. ICLEI, "Sustainable City." in ICLEI viewed on November 26, 2021, http://old.iclei.org/index.php?id=35

fifteen-minute public-transport trip, bike ride, or walk from one's home. Many major cities have implemented tree-planting programs due to the environmental and social benefits of urban forests. Tree planting promotes local cooling, stormwater absorption, and health benefits for local residents.[951] In many cities across the world, sponge cities are popping up, which are concrete neighborhoods, interlaced with green spaces that can naturally detain and filter water. Moreover, mini urban forests are springing up on patches of land in urban areas around the world, using a method inspired by Japanese temples.[952]

To better meet current and future challenges, many cities are introducing the concept of smart cities. A smart city is a place where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business.[953] Many smart-city initiatives have sustainability practices at their roots. The fast pace of technological developments, therefore, allows for prospects for sustainable cities to become a widespread reality. Smart lighting is an example of both a sustainable and smart initiative. Around the world, more cities are increasingly planning to be smarter.

Currently, Singapore is considered the smartest smart city in the world. Singapore launched a Smart Nation program to address issues of mobility and made important investments in road sensors, phased traffic lights, smart parking, energy management, and green innovation. The city of Barcelona created the Urban Lab, a smart-cities initiative where companies propose sustainable ideas to improve life for the local population. The city has sensors to manage lighting, green spaces, and traffic lights, and focuses on smart waste collection. San Francisco's Connected City initiative enables residents to access data to make their lives easier and inform them about areas such as health, mobility, and biodiversity. The city is also committed to implementing 100% renewable electricity for all its municipal services.

The technologies described above have been implemented in existing and relatively wealthy cities. Nevertheless, to accommodate 2.5 billion additional people living in cities, some areas in the world have to make tremendous infrastructure investments. A smart technology that has the potential to disrupt the status

951. D. E. Pataki, M. Alberti, M.L. Cadenasso, A.J. Felson, M.J. McDonnell, S. Pincetl, R.V. Pouyat, H. Setälä, & T.H. Whitlow, "The benefits and limits of urban tree planting for environmental and human health." Frontiers in Ecology and Evolution, vol. 9, April 2021, pp. 155.
952. A. Dunn. "7 innovative projects making cities more sustainable," in Weforum. September 4, 2021, viewed on December 11, 2021, https://www.weforum.org/agenda/2020/09/cities-sustainability-innovation-global-goals/
953. European Commission, "Smart cities," in European Commission, viewed on November 26, 2021, https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en.

quo and bring about significant benefits is 3D printing. To address the housing crisis in many parts of Africa, houses can be printed in just twelve hours at a cost of $10,000.[954]

All in all, planning for sustainable cities is necessary given the current and future environmental and societal challenges the world is facing. Smart-city initiatives will be key in promoting sustainability, convenience, and safety in the increasingly populated cities of the future.

3.6 rural areas

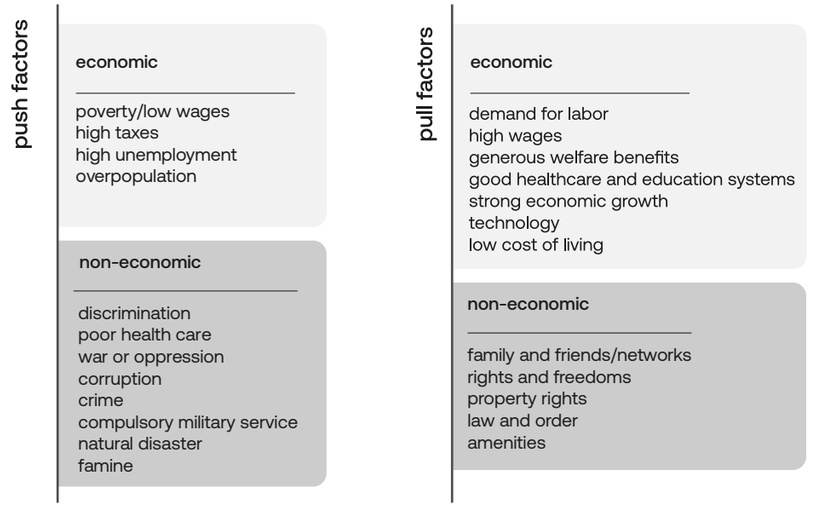
Even though the world is largely moving toward increased urbanization, one-third of the world will still live in rural areas, accounting for around 3 billion people in 2050.[955] This begs the question as to what the future prospects for rural areas will be. As cities are becoming smarter and more sustainable, and more resources are allocated toward the areas where most people live, there is a danger of the gap between rural and urban areas becoming even bigger.[956] During the Covid-19 pandemic, as more facets of life shifted to the online world, it became particularly evident that there was a growing digital divide between urban and rural areas. Worldwide, 3.6 billion people lack even the most basic Internet access.[957] Does this mean that the quality of life in rural areas will become increasingly worse in the decades and centuries to come? What can the world do to ensure a balance between rural and urban areas to level the playing field? As SDG 11: Sustainable Cities & Communities already suggests, the focus should not only be on smart cities but smart communities as well. To realize this, smart villages are becoming increasingly widespread. In smart villages, networks and services are enhanced through digital, telecommunication technologies, innovations, and the better use of knowledge for the benefit of inhabitants and businesses. This may support the quality of life of rural residents, improve the standard of living and public services, and allow for resources to be allocated more effectively thus reducing the impact on the environment.[958]

4. migration

In 2020, the IOM registered 281 million international migrants globally. There are more migrants than the

954. S. Fleming, "The affordable 3D-printed home that could transform African urbanization," in We Forum. June 30, 2021, viewed on November 27, 2021. https://www.weforum.org/agenda/2021/06/3d-printed-home-african-urbanization/
955. H. Ritchie & M. Roser, "Urbanization," in Our World in Data. November 2019, viewed on Novem-ber 25, 2021, https://ourworldindata.org/urbanization
956. T, Birr, "The future is more about smart communities than smart cities," in EON. November 20, 2019, viewed on November 26, 2021, https://www.eon.com/en/innovation/innovation-frontline/opinion/future-smart-communities-smart-cities.html
957. P. Lundmark, "Smart cities are great but we also need smart villages," in WEF. October 11, 2021, viewed on December 20, 2021, https://www.weforum.org/agenda/2021/10/smart-cities-we-also-need-smart-villages/
958. European Commission, "EU Action for Smart Villages," European Commission, April 2017, pp. 3.

why migrate? push and pull factors[858]



entire population of Indonesia, the 4th most populated country. Furthermore, it is a fact that migration induces social, political, and economic changes in the receiving societies and those of origin. Migration can be divided into national and international migration. In both cases, migration can occur for voluntary and involuntary reasons. Considering that migration is the movement of people from one part to another for 1 year or more, this section presents how involuntary and voluntary migration will change in the future. It analyzes the future factors of voluntary and involuntary migration. On one side, the push factors are the conditions that drive people to leave their homes or countries, such as political unrest or natural disasters. On the other hand, the pull factors are the conditions that attract people to a new home or country; for example, freedom and better quality of life. The interaction of these factors will represent dramatically different realities for involuntary and voluntary migrants.

4.1 the search for a better life — voluntary migration

It is likely that in the future of voluntary migration, more and more people will choose quality of life over their economic opportunities. That is to say, people will migrate to further enhance their quality of life, even if they do not gain — or even lose — a little in economic terms.[960] Current socio-economic conditions will determine who will have the chance to voluntarily migrate and further enhance their quality of life. Not everyone will have the best quality of life conditions such as food and climate change security, public services, and freedom. Voluntary migration refers to the individual's free will and initiative to move from one place to another. People, who are satisfied where they are, will not migrate.[961] In the future, voluntary migration is more directly connected with the labor market, internationally and nationally. Migration flows will remain similar as it has been.[962] However, pull and push factors will determine new policies.

In 2040, many developing countries will increase their middle class, causing an increase in their emigration.[963] As a result, the number of immigrants will increase. The trends will remain similar, from rural areas to cities, from developing countries to wealthy countries. The main goal of voluntary migration will be to pursue a better quality of life and socioeconomic opportunities.

959. G. Jusufi, 'Migration and economic development in Western Balkan Countries: Evidence from Kosovo'. June 2020. https://www.researchgate.net/publication/342277085_MIGRATION_AND_ECONOMIC_DEVELOPMENT_IN_WESTERN_BALKAN_COUNTRIES_EVIDENCE_FROM_KOSOVO
960. A. Szczepanikova & T. Van Criekinge, 'The Future of Migration in the European Union'. Joint Re-search Center, 2018, pp 12-14.
961. V. Ottenelli & T. Torresi, 'When is Migration Voluntary?'. International Migration Review, vol. 47, 2013, pp 783-813.
962. National Intelligence Council's Strategic Futures Group, 'The Future of Migration' in Office of the Director of National Intelligence. April 2021, viewed on 8 December 2021, https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02486--Future-of-Migration--Unsourced--14May21.pdf
963. Ibid.
964. The World Bank, 'GNI per capita, Atlas method (current US$)' in World Bank. 2020, viewed on 7 December 2021. https://data.worldbank.org/indicator/NY.GNP.PCAP.CD
965. National Intelligence Council's Strategic Futures Group, 'The Future of Migration' in Office of the Director of National Intelligence. April 2021, viewed on 8 December 2021, https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02486--Future-of-Migration--Unsourced--14May21.pdf
966. World Economic Forum, 'Migration and Its Impact on Cities' in World Economic Forum. 2017, viewed on 9 December 2021. https://www3.weforum.org/docs/Migration_Impact_Cities_report_2017_HR.pdf
967. J. Vespa, L. Medina & D. Armstrong, 'Demographic Turning Points for the United States: Popu-lation Projections for 2020 to 2060'. In United States Census Bureau, March 2018, pp 25-144. https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf; Euro-pean Strategy and Policy Analysis System, 'Global Trends to 2030: The Future of Migration and Integration'.ESPAS Ideas Paper Series, 2018, pp 1-10.
968. National Intelligence Council's Strategic Futures Group, 'DEMOGRAPHICS AND HUMAN DE-VELOPMENT' in Office of the Director of National Intelligence. 2021, viewed on 8 December 2021, https://www.dni.gov/index.php/gt2040-home/gt2040-structural-forces/demographics-and-human-development
969. World Economic Forum, 'Migration and Its Impact on Cities' in World Economic Forum. 2017, viewed on 9 December 2021. https://www3.weforum.org/docs/Migration_Impact_Cities_report_2017_HR.pdf

+ Diede Kok
The Canadian solution! Whereas near all countries of the world will face declining populations, Canada is one of the only countries to keep growing. The reason? Canada has historically been much more tolerant towards migration. An average of 300.000 people move to Canada every year from all over the world. That number is estimated to rise to over 450.000.

What does this mean? This means that Canada will be able to afford healthcare, public pensions, and stem the rise of the retirement age. Do these people fall into poverty and crime, as some stereotypes make us believe? Emphatically not, as proven by the data.

Canada is already dubbed 'the most cosmopolitan country in the world.' Issues that will plague the rest of the world in 2100 might be avoided by Canada. Let's be like the Canadians. Source: 'Empty Planet,' Darrell Bricker and John Ibbitson, p. 207-208.

Currently, the average income per-capita gap between high and low-income countries is over 60 times.[964] According to the World Bank, this gap will not disappear in at least 100 years.[965] This means that socioeconomic migration incentives will persist. Developed countries will also provide better and reliable health care, social security, civil rights, connectivity, access to technology, environmental safety, better urban planning, and public services. Most migrants with financial limitations will choose wealthier countries close to their region.[966]

Nevertheless, aging populations will shrink the workforce in developing countries. The natural population increase rates in developed countries, such as the US, Canada, and Europe, will be negative. From 2030, net international migration will become the most significant driver of population growth in the U.S., and Europe will follow the same trend.[967] The demand for foreign workers will increase in wealthier economies. Even if automation will fill a significant gap in some industries, it is less likely to do it in services provided by professionals and high-skill workers. Some countries, like Japan, will likely relax their immigration restrictions to be more attractive for foreign workers. More developed countries will need incentive policies for foreign workers to increase their economic growth. In particular, private actors, such as multinationals, will also promote the immigration of the workforce, especially high-skill professionals.[968] These private actors will influence and support the migration process from developing countries to their headquarters. Alternatively, other governments will encourage immigration restrictions and promote policies to delay retirements to deal with aging populations and the workforce. +

Above all, one of the main changes in the future of migration is technology. Technology will make adapting and integrating into a new society easier. Receiving societies will use new technologies to integrate immigrants. Understanding the language, customs, laws, and even finding job opportunities will be more accessible. On the other hand, governments will use technology to increase control and reduce unauthorized or irregular migration.[969] Therefore, people with higher education and socioeconomic conditions will have more opportunities to migrate and improve their quality of life than people with lower education and incomes. Will the people with many opportunities have the chance to have even more

opportunities, while the people with fewer opportunities will have even fewer opportunities?

At the same time, in developing countries, the panorama will be the opposite. In 2040, the world population will increase by 1.43 billion inhabitants. Most of the growth will be from developing countries. This rapid population growth will strain essential services, health, education, housing and increase unemployment and poverty. Informal employment will also increase in developing countries, especially in Latin America.[970] As a result, emigration rates will increase because of the economic conditions.

Furthermore, the fast urbanization and migration from rural areas to cities will limit the services and pressure, even more, the government capacity.[971] In addition, informal settlements, poverty, lack of essential services, and insecurity encourage emigration in developing countries. On top of that, most of the populations vulnerable for climate change will live in developing countries. This will increase national migration or migration to neighboring countries.[972]

High-skilled migration from developing to developed countries will cause a brain drain in the countries of origin. Brain drain could create skills gaps in the labor market and a decrease in unemployment and poverty.[973] At the same time, developing countries could increase their capital flows with remittances, which would improve socioeconomic conditions. In the receiving countries, migration flows will cause strained social services, more job competitions, and the diminution of wages in the short term. However, developed countries will have better economic outcomes and growth in the long term.[974]

However, voluntary migration flows will also increase between developed economies. The critical decision factor will be the quality of life in this case. Economic opportunities are fundamental; nevertheless, the labor market will demand more high-skilled people. Thus, high-trained workers will have fewer concerns about finding job opportunities in other developed countries. Even so, they will seek a better quality of life. Concerns such as climate change, circular economy, sustainability, public infrastructure, food security, access to water, safety, and others will be key pull factors for voluntary migration. In the future, countries, cities, and companies will compete to attract high-skill workers that prefer the quality of life over economic opportunities.[975]

970. National Intelligence Council's Strategic Futures Group, 'DEMOGRAPHICS AND HUMAN DE-VELOPMENT' in Office of the Director of National Intelligence. 2021, viewed on 8 December 2021, https://www.dni.gov/index.php/gt2040-home/gt2040-structural-forces/demographics-and-human-development
971. World Economic Forum, 'Migration and Its Impact on Cities' in the World Economic Forum. Oc-tober 2017, viewed on 9 December 2021, https://www3.weforum.org/docs/Migration_Impact_Cities_report_2017_HR.pdf
972. National Intelligence Council's Strategic Futures Group, 'The Future of Migration' in Office of the Director of National Intelligence. April 2021, viewed on 8 December 2021, https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02486--Future-of-Migration--Unsourced--14May21.pdf
973. V. Ottenelli & T. Torresi, 'When is Migration Voluntary?'. International Migration Review, vol. 47, 2013, pp 783-813.
974. National Intelligence Council's Strategic Futures Group, 'The Future of Migration' in Office of the Director of National Intelligence. April 2021, viewed on 8 December 2021, https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02486--Future-of-Migration--Unsourced--14May21.pdf
975. World Economic Forum, 'Migration and Its Impact on Cities' in World Economic Forum. 2017, viewed on 9 December 2021. https://www3.weforum.org/docs/Migration_Impact_Cities_report_2017_HR.pdf
976. United Nations High Commissioner for Refugees (UNHCR) (2018) Global Trends Forced Dis-placement in 2017. The UN Refugee Agency. Available online at: http://www.unhcr.org/globaltrends2017/
977. UNHCR, Global Trends: Forced Displacement in 2016 (Geneva: UNHCR, 2017). Viewed on December 9 2021 at: http://www.unhcr.org/globaltrends2016/
978. BBC, How many refugees have fled Ukraine and where are they going? March 15 2022, viewed on March 15 2022, https://www.bbc.com/news/world-60555472
979. United Nations High Commissioner for Refugees (UNHCR) (2020) Figures at a Glance. The UN Refugee Agency. Available online at: https://www.unhcr.org/uk/figures-at-a-glance.html

+ *Martin Bernal Dávila*
In the case of Ukraine, people have the opportunity to migrate because of their passports. On other continents, humans do not have the same chance or rights. In the future, hopefully, people will be able to migrate if their lives are at risk. Let's see humans, not nationalities.

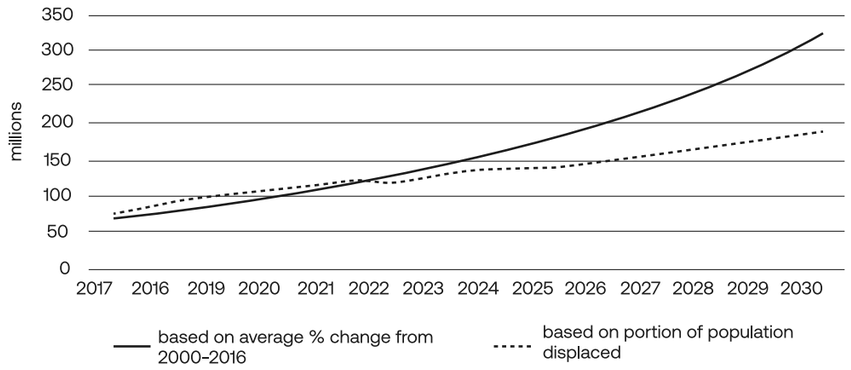
4.2 involuntary migration

The UNHCR (United Nations High Commissioner for Refu-gees) noticed that the global population of displaced people in 2017 surpassed the number of inhabitants in the United Kingdom.[976] "Forced Migrants" will be referred to asylum seekers, refugees, and other internally displaced people who have been involuntarily displaced due to reasons such as war, conflict, political uncertainty, poverty, human rights violations, and environmental factors. There is no indication that forced migration will decrease in the future.[977]

The 2018 UNHCR report on global patterns shows that around 44,000 individuals each day were displaced from their homes, an expansion of almost 30% over the numbers in 2015 and a shocking increase of 500% over the numbers in 2005. By the end of 2017, 68.5 million individuals wound up displaced due to a combining blend of persecution, oppression, war, violence, and denial of fundamental human rights, resulting in an increase of 75% in 20 years. At the time of writing, almost 3 million people have left their homes in Ukraine.[978] More than a third of the global refugee population (68%) come from five nations: the Syrian Arab Republic (6.6 million), Afghanistan (2.7 million), South Sudan (2.2 million), Myanmar (1.1 million), and Somalia (1 million). Currently, there are around 2 million refugees.[979] +

The UNHCR published a conservative estimation of future migration whereby two lines present the scenarios. One extracts the 2016 percentage of the global displaced population and presumes we will see the same percentage of displaced people in 2030, but with a higher population. The second line assumes the rate of change of displacement between 2000 and 2016 to continue at similar rates until 2030. Both scenarios — particularly the second — are propably far from what the future will look like. The world will face numerous conflicts, increasing size, number, and duration. For example, environmental changes can present direct (e.g., dry season) and indirect (e.g., resource-based crisis') reasons for the rate of change to stay at least constant, if not increase.

projected global displacement scenarios[977]



980. UNHCR, Global Trends: Forced Displacement in 2017.
981. U.S. Customs and Border Protection, "U.S. Border Patrol Nationwide Illegal Apps Fiscal Years 1925-2018," Department of Homeland Security, 2018, https://www.cbp.gov/sites/default/files/assets/documents/2019-Mar/ bp-total-apps-fy1925-fy2018.pdf.
982. "Southwest Border Migration FY 2019," Department of Homeland Security, 2019, https://www.cbp.gov/newsroom/stats/sw-border-migration.
983. Phillip Connor, "The most common Mediterranean migration paths into Europe have changed since 2009," Pew Research Center, September 18, 2018, https://www.pewresearch.org/fact-tank/2018/09/18/the-mostcommon-mediterranean-migration-paths-into-europe-have-changed-since- 2009/.
984. Phillip Connor, "The most common Mediterranean migration paths into Europe have changed since 2009," Pew Research Center, September 18, 2018, https://www.pewresearch.org/fact-tank/2018/09/18/the-mostcommon-mediterranean-migration-paths-into-europe-have-changed-since- 2009/.

+ Diede Kok
The writer of the book 'factfulness,' Hans Rosling, wrote about the human 'blame instinct.' Rosling concluded that to overcome the human blame instinct (i.e., our tendency to seek a person to blame when faced with adversity) can be overcome by 'looking for causes, not villains.'

When we look for causes instead of villains, we are more likely to look in the mirror, and ask ourselves 'what is my part in this?' When migrants drowned in the Mediterranean Sea in 2015, the outcry of the general public pointed to human traffickers as the cause of this misery. But European immigration laws are also a cause for migrants to enter frail boats to cross the sea. Let's look for causes, not for villains.

The current state of the global forced migration crisis has significant implications for security, economic, political, and human rights that could prompt further universal instability in the future. Moreover, media allow people to see diverse depictions of migrants, often illustrated as violent, malicious, or extremist individuals. At present, 52% of all refugees are children, and 50% are female — the two groups are vulnerable to sexual violence, exploitation, human trafficking, and slavery rather than acts of fueled extremism.[980] +

On the one hand, the number of displaced people has increased rapidly throughout the years. On the other hand, increased political attention to border restrictions has lowered the number of immigrants in some countries. For example, due to tighter border enforcements, higher risks of illegal border crossing, and increased deportations (among many more reasons), the number of irregular Mexican and Central American migrants crossing borders to the United States has gradually decreased since the early-2000s.[981] Nonetheless, increased border control in the U.S. has driven many to enter the United States irregularly out of panic of not having the option to do so in the future. As a result, the quantity of travelers detained at the U.S. border in the primary quarter of 2019 has been higher in comparison to the past 5 years.[982]

Policy changes in Europe are additionally influencing migration courses through the Mediterranean Sea. The "Eastern route" through Greece and the "Central route" through Italy had been the most traveled courses between 2009-2017.[983] In 2018, the "Western course" through Spain became the most traveled. Relatively, this was due to several factors, including stricter migration policies in Italy; more prominent coast guard presence in Libya; the EU-Turkey deal for Turkey to acknowledge displaced people coming from the European Union in return for monetary incentives; and Spain's choice to permit rescue boats to dock when different nations in Europe did not allow entry.[984] The United States and European nations have exceptional screening processes. Yet, countries are encouraged to investigate various avenues for safe, orderly, and regular migration in the short term to prevent irregular entry.

Since November 2019, the pandemic has added additional challenges to the previous weaknesses of

displaced individuals already living in fragile environments. Furthermore, displaced individuals lack adequate documentation and access to basic needs like insurance, lodging, food, clean water, wellbeing, and education. This makes displaced individuals even more vulnerable to the Covid-19 pandemic, compared to others. In addition, displaced people are often placed in hard-to-reach areas, making the provision of humanitarian assistance a great challenge. In 2020, an OECD report pointed out that the weaker health care and social protection systems made available to refugees, most of whom live in the global South, will experience a disproportionate impact of the pandemic.[985]

Cataclysmic events, environmental change, and ecological pressure further add to forced migration. Floods, windstorms, earthquakes, dry spells, and different disasters displace many individuals every year around the world. Due to climate change, these relocations are most likely to increase.[986]

5. demographic change — what's heading our way?

What has become clear from digging deeper into the four demographic trends is that they all somehow interact with each other. This chapter, dedicated to demographics, discussed the topics of aging, population growth, urbanization, and migration. For the aging section, the most important takeaways are that older people try not to let the effects of aging show, resulting in a growing anti-aging market. Furthermore, people's lifestyles, healthcare, and living arrangements all play an instrumental role in ensuring that older people maintain a good quality of life in their old days. The fact that people are getting older is an amazing feat in human progress. +

Regarding population growth, there is one underlying conclusion: whether the global population grows or shrinks, there are challenges ahead. A growing population brings environmental troubles with it, while degrowth affects the value of the future pensions system. Current projections state that the population is set to shrink in the majority of countries from the end of the twenty-first century onward. This chapter's summary of urbanization is twofold: more people living in cities brings about certain challenges as well as opportunities. To enable a good quality of life for everyone in cities, smart and sustainable cities can play an important role. Cities are unaffordable now, so policies have to be in place to make cities more inclusive. Even though the world is largely urbanizing, rural areas should not be left behind. On the topic of migration, the conclusion can be drawn that highly skilled people will have more opportunities in the labor market, making it easier to migrate. In addition, climate change, environmental and cataclysm events, quality of life will be significant push and pull factors for migration in the future.

+ Stefanie Sewotaroeno
Interesting food for thought to consider is the future evolution of humans. What is next for humanity? Is there a "next" at all? Some say that humans will develop higher consciousness. Others state that we have come to the end of human evolution.

An interesting read is this study by Jeff Morgan Stibel that says that our brain size is decreasing. Quoted from the pdf: "While more work is needed, the overall results of the various GWAS studies that have examined evolutionary changes to cognitive ability suggest that both general cognitive function and educational attainment are under negative selection pressure. While the genetic correlations and underlying relationships are still not fully understood, the data support a genetic decrease in cognitive ability consistent with an evolutionary decline in brain size"

985. Organisation for Economic Co-operation and Development (OECD) (2020) 'Tackling Coronavirus (COVID19) – Contributing to a Global Effort: The Impact of Coronavirus (COVID-19) on Forcibly Displaced Persons in Developing Countries', Available online at: https:// www.oecd.org/coronavirus/policy-responses/the-impact-of-coronavirus-covid-19-on-forcibly-displaced-persons-in-developingcountries-88ad26de/
986. G. Bakshi, "Super" El Nino Finally Comes to an End', in Global Citizen. 26 May 2016. Viewed on 8 December 2021. https:// www.globalcitizen.org/en/content/super-el-nino-finally-comes-to-an-end/

concerning population and displacement: who will make what kind of policymaking? how will societies balance local and global concerns, and who decides what's logical and human?

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change — what's next?

"The data is in. Frogs don't boil. But we might."
— Nick Obradovich and Frances C. Moore

Everything will change. As always. The key question is: in what direction do we want to go? Some of the looming changes scare the hell out of us. Changes like climate change, the decline of biodiversity, and the increase in the global population keep us awake at night. And although everybody is aware, it feels like society is the frog that's being boiled in a pan with water. We need to act. Now. Getting that urgency across is one of our core activities. Other changes also keep us awake because of the excitement they bring. The development of vaccines, new ways of food production, the future of solar and wind energy, generation Z leadership: they are very welcome. Because change is our reason of being, we felt the urge to create a thorough overview of what is coming our way. +

We believe we can change the future. That requires dreams, much more than a plan and a budget. Or, as Alan Clayton put it so beautifully: "Martin Luther King didn't get up 60 years ago and say: I have a budget and a plan". We need dreams of a sustainable future. Dreams of a sharing and caring world. Dreams of health and happiness. Dreams of safety and security. Making dreams come true may look hard, but the alternative is harder. We. Can. Realize. Change. The reason to found ftrprf.com in 2018 was simple: we don't need more marketing, strategy, technology, or even design; we need change. And if we mix these four elements with perseverance, influence, and collaboration, we can realize change for society, for our clients, and for ourselves. Together we can change the world. Call us naive, optimistic, opportunistic, see us as the crew of a yellow submarine ("all together now"): we fight for the world of our children and grandchildren. With our soul and heart, all energy and knowledge we have. The more we share, the better the future will be. That's why we created this project: 'change' with you. At https://change.ftrprf.com you find additional information, updates, and tools on how to develop and realize great dreams. Together, we can change the future. Shall we? +

"The future depends on what you do today."
— Mahatma Gandhi

+ Daphne Prieckaerts
Excellent article "The data is in. Frogs don't boil. But we might."

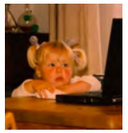
It is fascinating how we, as humans, have this great adaptability but also destructive behaviour patterns.

+ Scan the QR code bellow to see the change website:

about the authors

Adlan Hidayat
Adlan is investigative. Inspired to gain a holistic perspective on how society is constantly evolving, Adlan aspires to ‘connect the dots’ to transform the ideas of the future into the positive changes of today.

Camera Ford
Camera is adventurous. Inspired by the potential future trends across various industries, Camera aims to utilize the relevant knowledge to help individuals and companies prepare for a greener and more equitable future.



Cato Hemels
Cato is a learner. Seeing a sustainable future as a collaborative process, Cato aspires to transform unique ideas into impactful solutions to face future challenges.

Chadia Mouhdi
Chadia is thoughtful. By gaining a better understanding of the world and different perspectives of people, Chadia hopes to contribute to a more diverse and sustainable tomorrow.

Chia-Erh Kuo
Chia-Erh is multifaceted. Constantly aiming to maintain a fresh perspective, Chia-Erh keeps up to date with market trends in order to prepare societal leaders for the sustainability challenges ahead.

Daniella Espina
Daniella is curious. Navigating through the sea of research, Danie believes that the power of knowledge can contribute to a better future for the planet and the people who live on it.

Diede Kok
Diede is a communicator. Curious by the developments impacting society, Diede is dedicated to exploring solutions to solve future challenges in the hopes of making a better tomorrow.

Emma Datema
Emma is enthusiastic. Eager to understand market trends affecting individual companies, Emma hopes to contribute to the societal implementation of sustainable choices.

Kim Tan
Kim is fearless. Keeping an open mind to unfamiliar ideas, Kim explores the intricacies of different industries and external factors to inspire society to realize its current capabilities and future potential.

Lois van der Kroft
Lois is spirited. With the perspective of the present and future, Lois aims to translate lessons from today’s societal challenges to the sustainable practices of tomorrow.

Martin Bernal Davilla
Martin is empathetic. Open to new experiences and ideas, Martin believes that a collaborative effort is needed to make the world a better place; ‘every little action counts.’

Romy Grim
Romy is daring. Interested in the impact of societal trends, Romy is inspired by the implementation of sustainable practices to promote well-being and advancements in society.

Sam Slewe
Sam is ambitious. Evaluating current challenges and future trends, Sam strives to effect positive change to build a world that is future proof.

Tijmen Kroes
Tijmen is creative. Intrigued by advancements affecting technology, sustainability, and social welfare, Tijmen has the ambition to design an inclusive and sustainable future for all.

abbreviations

AI
Artificial Intelligence

AR
Augmented Reality

BEPS
Base Erosion and Profit Shifting

BLM
Black Lives Matter

BRI
Belt and Road Initiative

BRICS
Brazil, Russia, India, China, and South Africa

CBDC
Central Bank Digital Currency

COP
Conference of the Parties

CRO
Chief Risk Officer

CSR
Corporate Social Responsibility

DCEP
Digital Currency Electronic Payment

DDoS
Distributed Denial-of-Service

DeFi
Decentralized Finance

EDZ
Economic Development Zones

EEZ
Exclusive Economic Zone

EGS
Enhanced Geothermal Systems

EPS
Electrical Power System

ESA
European Space Agency

ESG
Environmental, Social en Governance

EU
European Union

FSVP
Floating Solar Photovoltaics

GG
Global Gateway

GHG
Greenhouse Gas

GVC
Global Value Chain

IIoT
Industrial Internet of Things

IMF
International Monetary Fund

IOM
International Organization for Migration

IoT
Internet of Things

IP
Intellectual Property

ISI
Import Substitution Industrialization

LGBT+
Lesbian, Gay, Bisexual, Transgender, + for Intersex and Queer groups

MAOUDC
Metropolitan Area Outer Underground Discharge Channel

ML
Machine Learning

NATO
North Atlantic Treaty Organization

NCAVP
National Coalition of Anti-Violence Programs

NFT
Non-fungible Tokens

NGFS
Network for Greening the Financial System

NGO
Non-governmental Organization

NREL
National Renewable Energy Laboratory

OECD
The Organisation of Economic and Corporate Development

P2P
Peer-to-peer

QE
Quantitative Easing

R&D
Research & Development

RPA
Robotic Process Automation

SDG
Sustainable Development Goal

U.K.
United Kingdom

U.S.
United States of America

UAV
Unmanned Aerial Vehicles

UN
United Nations

UNHCR
United Nations High Commissioner for Refugees

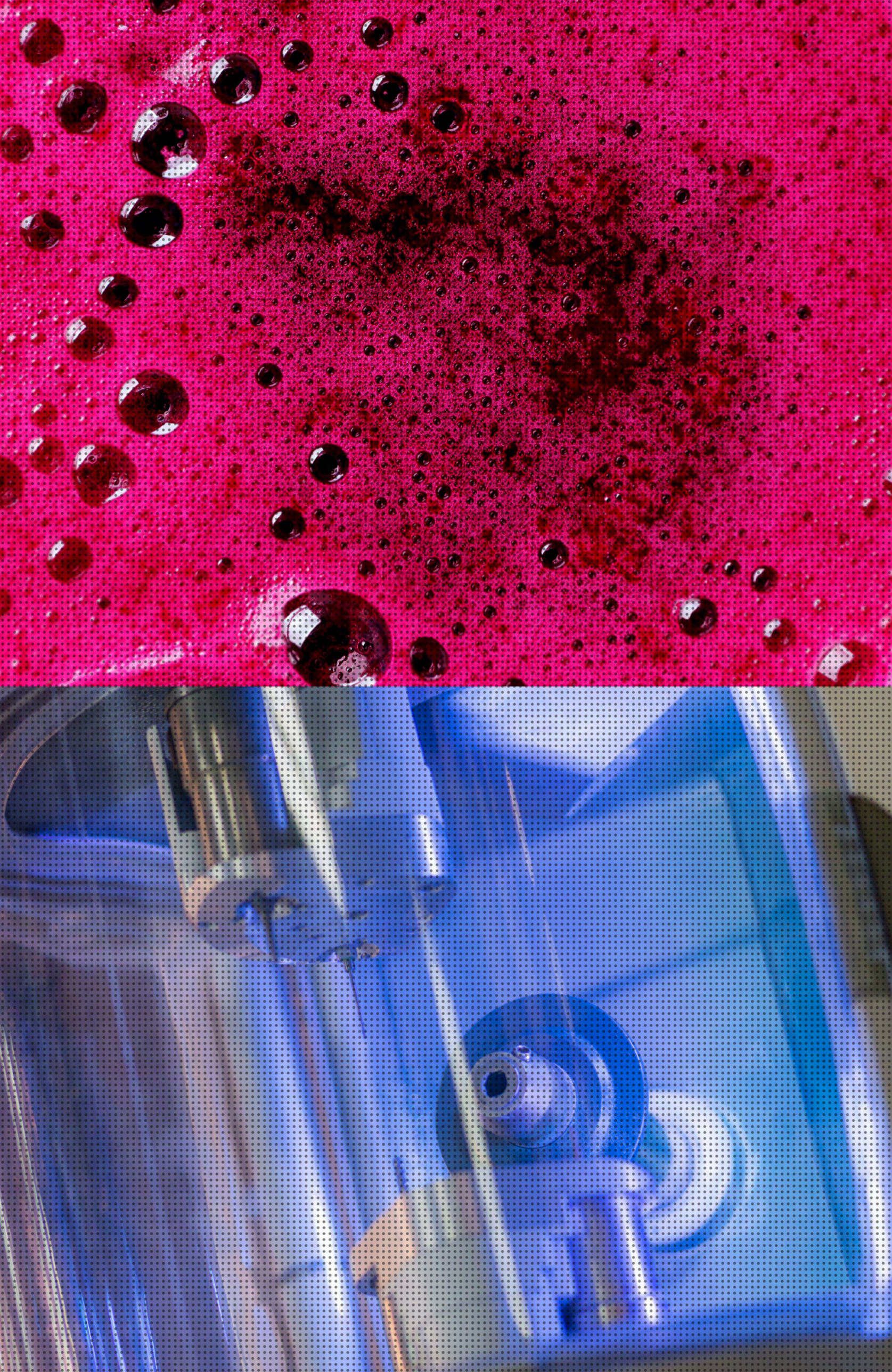
UNSC
United Nations Security Council

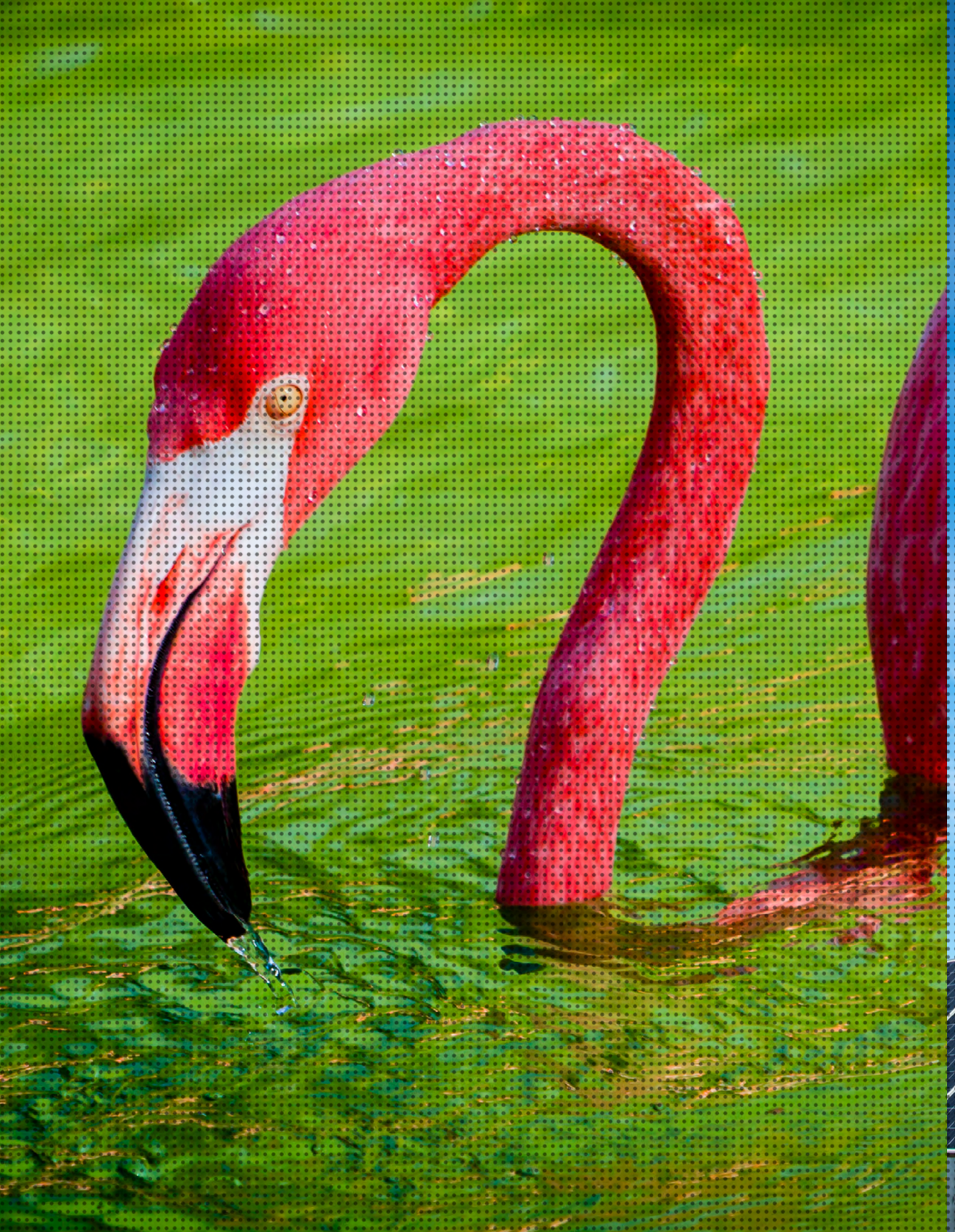
WANA
West Asia and North Africa

WFH
Work From Home

WHO
World Health Organization

WTO
World Trade Organization



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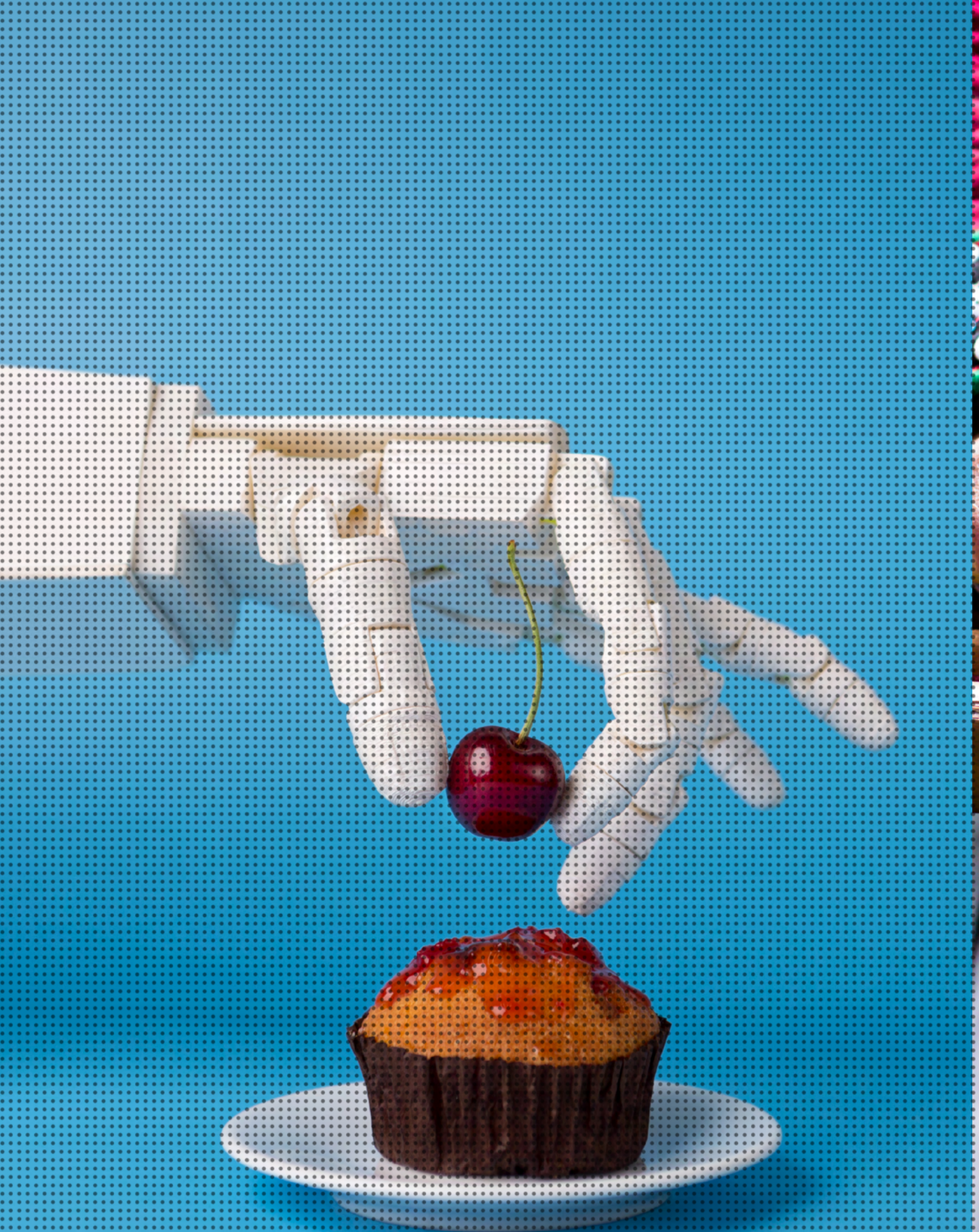

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suggestions:
We have looked at 'change' from as many sides as possible. We have used the SEPTED method as a basis to subsequently analyze, classify and structure thousands of articles, studies, interviews, and essays. We gathered colleagues for insights from all over the world. And we have certainly not escaped our collective biases, although we have fought hard against them. We are sure we missed or did not mention essential changes. So if you have suggestions or additions? Let us know at info@ftrprf.com, and we'll include it in the next version of 'change.'

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change
what's next?

Things will change. Imagine the effect of aging, blue zones, cybersecurity, democratic backsliding, emerging powers, food production, gender rights, health digitization, inclusivity, job changes, knowledge development, metaverse, new warfare, online retail, polarization, quality of city life, robots, societal well-being, trade policies, urbanization, voluntary migration, web 3.0, xenophobia, youth of Sub-Sahara and Africa, zero waste, to name a few.

To realize change for the better, it's pivotal to have an overview of things to come to create options. So we gathered some bright minds, started up our computers around the world, and got to work. Change. Shall we?