

# FAMILY 2040

How technology will affect  
the everyday life of Poles

## AUTHORS

---



**Katarzyna Dębska PhD**  
researcher  
Polityka Insight



**Jan Jęcz**  
digital economy analyst  
Polityka Insight

## WORKSHOP PARTICIPANTS - EXPERTS

---



**Joanna Erbel PhD**  
sociologist, urban activist



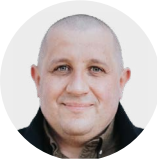
**Ada Florentyna Pawlak PhD**  
anthropologist of technology,  
lawyer and art historian



**Aleksandra Stanisławska**  
science reporter  
(CrazyNauka.pl)



**Piotr Stanisłowski**  
science and technology reporter  
(CrazyNauka.pl)



**Marcin Wicha**  
graphic artist, essayist,  
writer



**Michał A. Zieliński**  
screenwriter

## ILLUSTRATION DEVELOPMENT

**Zosia Dzierżawska**  
studio armadillo

## GRAPHIC DESIGN OF PUBLICATIONS

**Joanna Pamuła**  
Polityka Insight

## TRANSLATION

**Chris Borowski**

In the publication, content developed by the PLLuM family of generative artificial intelligence models has been used in marked places.

The publication was produced in cooperation with T-Mobile Polska. *Polityka Insight* has made every effort to ensure that the study is impartial and objective. All rights reserved.



For nearly 30 years, T-Mobile has been digitizing Poland and connecting people every day. T-Mobile provides advanced solutions that simplify life and business in all areas, but most importantly, connect over 13 million customers. The company builds a strong network of innovative technologies and services, including fiber optic infrastructure, convergent services, 5G network, entertainment services, cloud solutions, data centers, and cybersecurity services for individuals and businesses. It offers services and products tailored to customer needs. That is why, among other achievements, it was the first to introduce the BlueConnect data transmission service in 2005 and, in 2022, the first to offer customers a completely unlimited 5G subscription plan. In 2024, it launched the „5G Bardziej” network, offering speeds of over 1 gigabit per second and covering more than one-third of Poland’s population.

T-Mobile Polska is part of the Deutsche Telekom Group, which remains one of the global leaders in integrated telecommunications. The DT Group operates in over 50 countries, employing a total of 216,500 people who work daily to ensure that technology connects people without limits.  
[www.t-mobile.pl](http://www.t-mobile.pl)

**POLITYKA  
INSIGHT**

POLITYKA INSIGHT is a source of expertise on Polish and European politics and the economy for business leaders, policy makers and diplomats. For almost 12 years it has been providing its audience with subscription-based analytical services, preparing reports and presentations commissioned by Polish and international institutions and organising debates and conferences. Polityka Insight analysts can be heard in regularly published original podcast series, including *Chatter and Energy for change*.  
[www.politykainsight.pl/en](http://www.politykainsight.pl/en)

Warsaw, February 2025

# TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>6</b>
<b>CHAPTER 1.</b> Zosia's Morning	<b>7</b>
<b>CHAPTER 2.</b> Zosia's education	<b>9</b>
<b>CHAPTER 3.</b> Home-grown plants in the age of climate catastrophe	<b>11</b>
<b>CHAPTER 4.</b> Auntie traveller	<b>14</b>
<b>CHAPTER 5.</b> Everyday life of Karolina, Zosia's mother	<b>15</b>
<b>CHAPTER 6.</b> Łukasz's return home from work	<b>18</b>
<b>CHAPTER 7.</b> In Zosia's flat	<b>20</b>
<b>CHAPTER 8.</b> Uncle Michał and cousin Basia	<b>22</b>
<b>CHAPTER 9.</b> Alex, climate refugee	<b>25</b>
<b>CHAPTER 10.</b> Great-grandfather Zdzisław's active old age	<b>28</b>
<b>CHAPTER 11.</b> Grandfather Stefan at pre-retirement age	<b>32</b>
<b>CHAPTER 12.</b> Birthday party	<b>36</b>
<b>CHAPTER 13.</b> Letter from Grandma Krysia	<b>38</b>
<b>EPILOGUE.</b> In the evening	<b>46</b>
<b>EXPERT COMMENTS</b>	<b>54</b>
Artificial empathy	55
What education of the future will look like	57
<b>WHAT TOOLS DID WE USE TO PROJECT THE FUTURE?</b>	<b>58</b>
<b>ENDNOTES</b>	<b>64</b>



**LEGEND:**



SOCIAL TREND



TECHNOLOGICAL TREND



ECONOMIC TREND



ISSUE DEVELOPED BY PLLUM

# INTRODUCTION

Together with T-Mobile Polska, we are once again inviting you to the year 2040. We first tackled the vision of the Poland of the future three years ago - in a series of 'articles from the future' and podcasts we discussed the futuristic life of Poles divided into 10 daily activities. This time, we tried to guess what **a day in the life of an average Polish family AD 2040** would look like - together we relive Zosia's 16th birthday, get to know her family members, their worries, passions, joys and hopes, and sketch the reality around them.

Modelling the future is most often done by „scenarioising” it - from the most conservative to revolutionary options, from the extremely pessimistic to the hyper-optimistic. **The vision we have adopted is quite safe and rather optimistic.** Experience shows that it is the conservative scenarios that have the highest probability of success - as humanity we tend to overestimate the impact of technological innovations and events in the here and now on the future. In the final analysis, they are rarely as momentous as we attribute to them, and changes of a genuinely revolutionary nature, so-called black swans (wars, pandemics or accidental discoveries) are impossible to predict.

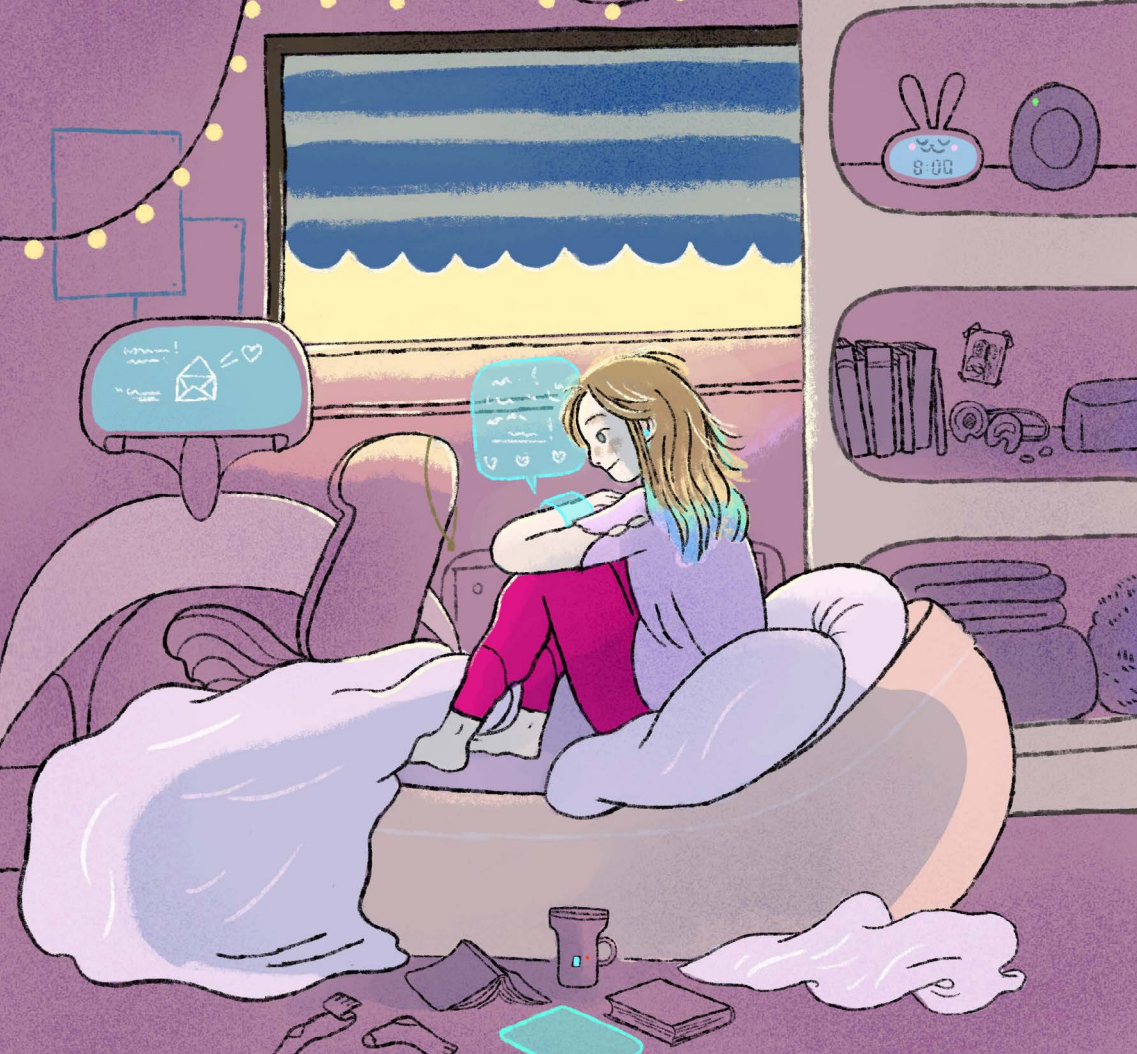
This publication is an intellectual game, **an exercise in imagination, although it is based on in-depth research work.** We have based our project on the available knowledge and predictions of renowned institutions and futurologists. We have dug through hundreds of reports on trends and innovations - the result of this work is hidden **in information boxes** with explanations of key hypotheses and assumptions, **and in a collected bibliography.**

We were not alone in our attempts to predict the future. **We invited experts, writers and science enthusiasts** to collaborate with us on the creation of the 2040 family, who in a workshop format created the framework of the world depicted in the story; and **artists who helped to visualise** the family we invented together.

Generative artificial intelligence tools were also given the chance to create a vision of the world in 2040. However, as it turned out, **in 2024, human creativity triumphed (still) over algorithms**, which were unable to propose a coherent and complex story based on the collected scientific and research material. For this reason, in a second step, with **the participation of the PLLuM consortium**, we tested how **Polish generative artificial intelligence models** would cope with predicting narrowed stimuli (prompts) on **specific issues of socio-economic life in the future.** This content was specifically labelled and presented in the course of telling Zosia's story.

Naturally, **we are not sure what the everyday life of the main character of the story and each of us will look like in 20 years.** We hope it will be closer to our predictions than to dystopian visions of a war-ridden and climate-crisis-ridden twilight of humanity. In 2021, however, we declared that the world is accelerating and that such predictions are becoming increasingly difficult. The experience of recent years shows that the nature and pace of change is only increasing.

**Nevertheless, we invite you to read on and to spin your own alternative visions for the future of Zosia, her family and ourselves.**





Zosia's 16<sup>th</sup> birthday - Warsaw, April 24, 2040

CHAPTER

1

## ZOSIA'S MORNING

Today is Zosia's birthday. The alarm clock rings at 8:00, Zosia rubs her eyes and checks her social media notifications. On the flexible screen of the smartwatch wrapped around her wrist, messages with wishes from friends, school and neighbourhood acquaintances appear. Zosia writes back to a few of them and will deal with the others later. She shakes her wrist to make the message notifications disappear from the screen for now. She could opt for automatic, personalised replies, but she and her friends don't usually do that. The obligatory indication that „the reply was generated by the AI” is embarrassing and everyone laughs at it.



Zosia turns on the DressUp app, which, based on her mood, the weather and home conditions, will suggest what to wear that day. Zosia doesn't intend to go out today, so she unchecks to browse through the wardrobes of friends who are lending their clothes. She chooses one of the five suggested outfits, and DressUp shows her where each piece of clothing is located. For the trousers, she has to go to the bathroom to take them out of the dryer.  



The flat is quiet. Łukasz, Zosia's dad, has already left the house; he probably has a shift at the stand-alone store today, where he does the cleaning. Karolina, Zosia's mother, has already locked herself in her home office. She is a bioengineer at the multinational corporation BioRoku, works according to her biological clock and starts at dawn. In the flat, she has a dedicated small work space, which is optically enlarged by a mirror-like screen that displays images tailored to Karolina's mood. Zosia has always known not to disturb her



**Hyper-personalisation of the user**

**experience** of digital products is one of the trends in technology and marketing<sup>1</sup>. Apps and other tools that make choices for the user, based on the data they collect about them, are a great convenience in everyday life, but come with various risks, especially regarding the protection of sensitive data and privacy. In addition, users may feel that they have lost agency and subjectivity, that algorithms – capable of analysing vast amounts of data in a very short time – are making decisions for them in a non-transparent manner<sup>2</sup>. Individualisation can also lead to the disappearance of social solidarity and community of experience, with extremely negative consequences in certain situations. An example is dealing with crises such as epidemics, the fight against which requires coordinated collective action<sup>3</sup>.

when her mother is working. It is mostly her salary that supports the whole family, including the dog Koko. Koko completely ignored this and demanded petting – regardless of the day and time – almost exclusively from Karolina. He ignored the rest of the family.  

Zosia picked out the final pieces of her outfit and wore shiny bracelets made of recycled metal. Now a sip of decaffeinated coffee and breakfast. The SlowCook app suggests what she can prepare from products available at home, and when she runs out of the most commonly used ones, she will order them from the grocery store. Unfortunately, not all of Zosia's favourite products can be bought on a regular basis due to their rising prices, and the app sets an acceptable range for the family. Chocolate, for example, has become extremely expensive, plus it is sometimes unavailable due to production cuts resulting from the climate crisis.  



### Greater concern for the health of em-

ployees, manifested among other things in the adaptation of working conditions to their needs, is a trend indicated among others by Deloitte reports<sup>4</sup> and Institute for the Future of Work<sup>5</sup>. These changes will not necessarily be driven by empathy towards employees. Greater freedom to organise one's own day, especially when working remotely, can significantly improve workers' productivity and extend years of healthy life, which is important from the perspective of an ageing population. The rise of teleworking has been enabled by the expanding reach of fast and stable internet (wireless, e.g. via 5G networks, and wired, e.g. fibre optic). This has made videoconferencing or downloading and uploading large files accessible to an increasing number of people.



According to the "Plate of the Future" report by the Interdisciplinary Analysis and Collaboration Centre Food for the Future<sup>6</sup> *The personalisation of diets will be one of the most important trends shaping dietetics*. Nutrigenetics, an interdisciplinary trend combining genetics, biotechnology and food technology, among others, even involves tailoring meals to an individual's needs based on genes. There is also a lot of talk about using and processing body signals from health monitoring devices (e.g. wearables) with artificial intelligence<sup>7</sup>. In turn, modern smart fridges already track what products are stored in them. The combination of these trends could result in the popularity of tools that develop tailored menus on the fly. In addition to health-driven dietary changes, tailoring menus to product availability may become increasingly common. The climate crisis is already driving up the price of goods such as chocolate<sup>8</sup> or coffee<sup>9</sup>. The need to reduce meat production is also an important topic. One can speculate that future diets will be richer in substitutes for products commonly used today (such as plant-based "meat" or acorn coffee).




CHAPTER  
2

## ZOSIA'S EDUCATION

Zosia goes down to the cellar to look in the plant cupboard. Growing plants is her passion and, at the same time, a project carried out at school as part of her individual work. Zosia attends a public high school where she has full-time classes for four days, with one day dedicated to project work and social activities. She likes her school, although she would prefer to go to a high school run by the company where her mother works. She would then learn things that are really useful and could quickly get a job in the corporation. At a corporate school, you can't use artificial intelligence, which Zosia finds very attractive, something that Karolina and Łukasz don't understand at all. True, Zosia would be working for the same company as her mother, but it's a very large corporation, so they wouldn't have to contact each other. Karolina didn't want to agree to this and keeps saying that work-life balance is important, that you shouldn't be tied to one company for many years, that maybe Zosia will want to change her career path in a few years. Zosia then replies to her mother that for years people have no longer been talking about work-life balance, but about work-life integration, that work and personal life do not have to be strictly separated, but should complement each other in such a way that one feels fulfilled. In addition, Zosia's parents wanted her to go to a school where she would have the chance to meet peers from different social backgrounds; they had been reading in the media for years about increasing social polarisation and people in families stop talking to each other because of political divisions. Karolina once read a book about how schools with children from different backgrounds are one way to prevent radicalisation. Zosia, on the other hand, enjoys the fact that there is time at her school to pursue her ideas, and the AI support really comes



According to the report "Polish education in the shadow of AI"<sup>10</sup>, from 2024 38% of secondary school teachers and as many as 60% of university lecturers are in favour of formally **integrating artificial intelligence into the education process**. Among pupils, the figure is 47% and among students 51%. These figures do not necessarily imply support for the technology, but, for example, a desire to normalise the situation, as AI is already being used in schools and universities anyway. Integrating new technology into the curriculum can also mean critical education. It could concern, for example, the dangers of disinformation using text and image generators. In the journal "AI and Ethics", a group of researchers even argued for mandatory teaching on the ethical aspects of using artificial intelligence<sup>11</sup>. Finally, there is no shortage of voices calling for a change in the status quo (shaped largely by pandemic remote education) and the eradication of technology from schools<sup>12</sup>. (Usually private) screen-free schools are also emerging, although their popularity is often overestimated<sup>13</sup>.

in handy, especially with homework in the subjects she likes least. There are different rules, restrictions, but at least they don't have to hide it. Two friends that Zosia met on her last holiday go to private, very expensive schools that prohibit the use of AI at school or for homework. Zosia's parents, while concerned about the impact of AI on their children's cognitive development, support the efforts of teachers and educators to develop in children and young people the ability to think critically and verify sources. How are kids supposed to learn this without exposure to the internet at school, wondered Karolina and Lukasz when they heard their friends discussing whether it was worth spending a lot of money to send their children to private „anti-AI” schools? 




## THE ROLE OF AI TOOLS IN EDUCATION OF THE FUTURE

In 2040, artificial intelligence (AI) will play a key role in Polish school education. Both teachers and students will use advanced AI tools to support the teaching and learning process.

Teachers will be able to use AI to individualise teaching. By analysing student progress data, AI will be able to tailor the curriculum to each student's needs and abilities. Teachers will be able to focus on developing creativity and critical thinking, while AI will take care of basic tasks such as checking tests or answering questions.

Students will have access to virtual assistants to help them with their learning. These virtual characters will be able to answer questions, explain difficult topics and help with homework. This will allow students to learn at their own pace and focus on the areas they find most difficult.

One risk is that students become dependent on technology and their independence in the learning process is reduced. Another risk is the possibility of errors in AI algorithms, which can lead to incorrect results or inappropriate adaptation of the curriculum.

In her gardening, Zosia uses artificial intelligence tools, but she happens to visit libraries and read paper books and magazines, which astonishes her cousins and most of her peers. Zosia belongs to a group of vintage enthusiasts, and going to the library is currently one of the most popular trends in this environment. Paper books have another major advantage – their content is not age-appropriate for readers. When Zosia reads an e-book or listens to an audiobook, the device selects an age-appropriate version (so far for minors, i.e. under 16). In the truncated versions, there are no plots about sex, violence or politics, because young people cannot judge what is appropriate for them. Zosia's mum thinks that censoring literature is a good thing because when she was a teenager, she herself read too many books inappropriate for her age and sensibilities. The traditional library is a way of getting around her mother's overprotectiveness. However, when it comes to growing plants, the internet and artificial intelligence are more useful than books from a few or a dozen years ago, and their content and advice is often inadequate for current condition. 



The discussion about the limits of intervening in cultural texts to adapt them to contemporary sensibilities or even specific audiences is alive today. Digital technologies allow works to be transformed easily and on a massive scale. The popularity of digitised books or films already makes it difficult to reach their original versions. A high-profile example was the case of Roald Dahl's children's books, from whose electronic versions disappeared wording that is now considered hurtful<sup>14</sup>. There was a similar discussion about old children's animations altered for distribution on the Disney+ streaming platform<sup>15</sup>. The operation of recommendation algorithms, which can lead to a homogenisation of the content received, can also be considered a form of interference in the cultural diet. This issue has already been the subject of several critical studies focusing, for example, on the Netflix algorithms<sup>16</sup> or the concept of *filterworld*<sup>17</sup> describing the "flattening" of the diversity of cultural social reality. In the future, on the one hand, we can expect the development of recommendation systems fed by more and more data and using more advanced artificial intelligence mechanisms. They will provide better tailored recommendations or even transform existing songs to suit individual tastes. On the other hand, we can expect opposition to such a content delivery model, the creation of clearer, more easily controlled algorithms and a renewed rise in the importance of human curators.




CHAPTER

3

## HOME-GROWN PLANTS IN THE AGE OF CLIMATE CATASTROPHE

The plant cupboard stands in the basement. When Zosia was younger, she kept her plants in pots on the window sill, but climatic conditions no longer allow this. Rapid temperature changes, heat alternating with downpours, mean that few species are able to survive. In the coming weeks, parliament will decide whether to order citizens to take home or donate to special stations endangered plants that cannot survive rapid climate change. When Karolina and Łukasz heard about this, they were shocked, as they had always been taught not to even touch protected plants, and now they would have to remove them from their natural sites...

Zosia, on the other hand, is looking forward to this law because she wants to protect nature. A few years ago, she became interested in hydroponics and other alternative forms of growing plants in homes. No one in her family had ever heard of hydroponics, but she found information on the internet about how to choose a substrate for plants, how to water them, fertilise them and provide them with the conditions they need to thrive. On social media, she met lots of people fascinated by growing plants; her age and quite a few older, from small towns and a few metropolitan areas. And growers from other parts of the world offered suggestions on how to deal with difficult conditions, including humidity.

Last year, her parents financed the creation of a digital twin – an installation that provides the plants with the right temperature, air humidity and soil fertilisation levels. Now it's easier for Zosia to look after the plants and make changes if necessary. 



A digital twin is a "virtual replica of a physical object, person or process that can be used to simulate its behaviour to better understand how it works in real life"<sup>18</sup>. Such twins can be created on a macro scale to visualise, for example, how a factory or farm works<sup>19</sup>, but also on a micro scale, creating, for example, copies of individual plants in home cultivation. More futuristic visions introduce the concept of digital employee twins. Personalised, AI-enabled digital copies could participate in parts of the business, reducing the need for the physical presence of the originals<sup>20</sup>.




## THE IDEA OF DIGITAL TWINS AND THEIR USE IN 2040

A digital twin is a virtual representation of a physical object that reflects its parameters and behaviour in real time or approximately. The idea of digital twins is to create virtual copies of real processes, products or systems that can be simulated, analysed and managed in the digital world.

Different types of digital twins may be popular in 2040, such as digital twins of people, cities, buildings, production processes or even entire ecosystems. For example, a human digital twin could be used for health monitoring, medical data analysis and personalisation of therapy. A city's digital twin can help manage traffic, energy and city services, and a building's digital twin can optimise its energy efficiency and occupant comfort.

In practice, digital twins can be used in various areas of life. At work, digital twins can help optimise production processes, manage supply chains and analyse business data. In science, digital twins can be used to simulate experiments, analyse scientific data and discover new phenomena.

Zosia sometimes thinks of her plant cupboard as a time capsule. She fears that the plants she so lovingly nurtures will soon only grow in basements and activist cupboards. She is reminded of a visit with her class to an arboretum where they looked at birches, pines and spruces; trees that were still common in Poland 20 years ago. They are becoming fewer and fewer, said the guide, and in 30-40 years they will probably be extinct. Trees that were a permanent feature of the landscape for Zosia's parents and grandparents, for her were becoming a curiosity from the botanical garden. An arboretum employee tried to show the positive aspect of the changes: „There will certainly be new plant species for which the current conditions will be ideal for growth.” 

When Zosia was young, her parents did not agree to a home aquarium with fish and tropical plants, explaining the high energy costs. Now the equipment in their flat (and basement) is powered by energy from the power cooperative that owns their building. Electricity from a nuclear power plant has also been available for a few years, but Poland's energy mix is based on diversification of energy sources, as Zosia recently learned in school. The electricity generated by the building's roof and walls of photovoltaic plastic is cheap, but the family still tries to save it to earn money by selling the surplus to the grid. 



## DOMESTIC PLANT CULTIVATION AND ITS IMPORTANCE FOR HUMANS

Thanks to technological advances and rising environmental awareness, growing plants at home can become not only a fashionable hobby, but also an important part of people's economy and well-being. One technology that can be applied to home plant growing is hydroponics. This is a method of growing plants without the use of soil, in which plant roots are submerged in water with dissolved nutrients.

Another technology that can be used in home plant breeding is aeroponics. This is a method of growing plants in which the plant roots are immersed in air and nutrients are sprayed in the form of a mist. Cultivating plants at home can be an important part of the economy, as it allows the production of fresh fruit and vegetables without the need for transport from distant locations. It can also help to reduce the carbon footprint associated with transporting food.

Growing plants at home can also have a positive impact on people's well-being. Growing plants can be a relaxing activity that allows people to connect with nature and improve their quality of life.




## Home-grown plants are presented not

only as an environmentally beneficial trend in interior design or a hobby with positive effects on the individual (especially the older adults<sup>21</sup>), but also as a method of combating the climate crisis<sup>22</sup>. It rose to prominence especially during the pandemic<sup>23</sup>, but its popularity is growing. According to various reports (e.g. Fact.MR, Emergent Research), over the next decade the annual growth of this market will be around 10%<sup>24</sup>. There are already many methods and tools available today for growing plants in limited domestic space. These include pot towers and wall-mounted pots, growbox-type devices or hydro- and aeroponic systems. In the future, we can expect to see an increase in the popularity of such devices using electronics, for example to monitor soil quality or plant hydration levels.



## The International Energy Agency, in its April 2024

report Batteries and Secure Energy Transitions, stated that 'in order to triple global renewable energy capacity by 2030, while maintaining energy security, **energy storage** must increase sixfold'<sup>25</sup>. On the other hand, there is a reason for optimism - a radical drop in battery prices, by around 90% within a decade, is pointed to as one of the potential breakthrough points in efforts to halt climate change<sup>26</sup>. The growth of the battery market is accompanied by efforts to use artificial intelligence algorithms to manage stored energy more efficiently. AI-supported, high-capacity, safe and relatively inexpensive energy storage is a technology that could soon be literally domesticated.

Nowadays Zosia no longer wants to have tropical plants, but only locally occurring ones that are also endangered. Her collection includes mosses and lichens, which are becoming increasingly rare in the wild, as wetlands in Poland are under serious threat from pollution and climate change. Zosia inhales the damp, earthy smell emanating from the aquarium. She also associates with the forest the strawberry bush she planted last year and only managed to pick a handful of fruits throughout the fruiting period. It is a pity that the few fruits already visible are still white-green and cannot be served at today's party. 



#### ENERGY GENERATION AND STORAGE IN POLAND IN 2040

In 2040, Polish households will be largely energy self-sufficient. Most of them will invest in their own RES installations, such as photovoltaic panels or household wind turbines. Energy generation will take place locally and surplus energy will be stored in smart batteries or fed back into the grid. Energy storage facilities will become a key component of the energy system, ensuring stability of supply and minimising losses. With the development of energy storage technologies, energy cooperatives will gain in popularity. These local initiatives will allow energy resources to be shared among community members.

Poland's energy future looks bright. Thanks to innovations in energy storage and the development of energy cooperatives, households will be able to enjoy greater energy independence while contributing to the protection of the environment.



The organisation of local communities to generate and distribute energy is an important trend linked to phenomena such as globalisation or social participation. The recent report "Energy cooperatives in Poland: social determinants of their emergence"<sup>27</sup> and "Electrifying Communities. Transforming the Polish Electricity Sector through Local Renewable Sources"<sup>28</sup> emphasise the optimism of those involved in civic energy. The main barriers are of a legal nature, and financing such initiatives remains a problem. There are already at least 30 energy cooperatives in Poland with almost 100 members (as of March 2024).




## CHAPTER

# 4

## AUNTIE TRAVELLER

Zosia wonders if she will hear from Aunt Marta, her mother's sister, today. Her aunt has been travelling all over the world for years in search of new and unusual smells. She says that smell is the last truly natural sense, no one has yet managed to digitise it and train any model capable of distinguishing patchouli from musk or aniseed from blackcurrant. Her aunt wanted to discover new scented notes, to learn about them, but also to capture them with the right equipment that allowed them to be stored in tiny boxes made of a novel plastic that did not react with the molecules of the scents. Zosia wanted to ask her aunt for help in capturing the scent of her plants as a culmination of her project work for school. The question was whether Marta, who is constantly travelling around the world and visiting areas depopulated by climate change, would have time to visit them in person before the end of the year.

Marta makes a living from her travels – on the internet she shows places that others will probably never get to again. On a couple of occasions, she found herself in trouble; then Karolina and Łukasz had to go to her grandfather and great-grandfather to distract them from Marta's exploits. They both track her on smartphones with augmented reality elements, which may have caused the elderly gentlemen to panic and a flood of alerts on their health monitoring devices. Today, Zosia will see them all – her grandfather and great-grandfather in person, her aunt on screen. She still has a few hours to transplant a selection of plants into new pots, feed the others with fertiliser, trim dried shoots. 



One of the main barriers to the growth of the market for devices that give access to **augmented reality (AR) and virtual reality (VR)** is considered to be the discomfort associated with wearing them. The trend of simplifying and miniaturising AR/VR glasses or goggles has been evident for years. A breakthrough in this process, which will enable further miniaturisation of devices, is hinted at by micro-OLED screens, which are used, for example, in the latest device from Apple - the Vision Pro<sup>29</sup>. The development of micro-OLED technology is now considered a priority, leaving the more futuristic vision of augmented reality lenses behind. Despite this, work is still underway to integrate AR into lenses in order to maximise access to this technology<sup>30</sup>. Continued access to the high-speed internet required to use multiple devices also remains a technological challenge. Technological difficulties are further accompanied by social challenges. One of the problems is the negative perception of people using reality-enhancing devices in public spaces. This is primarily related to the term *glass-hole* - a combination of the words *glass* and *asshole* - introduced into the debate with the launch of Google Glasses in 2013. It primarily refers to people using AR features in a way that may cause others discomfort, privacy concerns or, for example, a feeling of being ignored<sup>31</sup>. Users of AR devices also have privacy concerns. These include a lack of trust in some of the companies involved in the technology (e.g. Meta), the risk of camera data being used for public surveillance, and concerns about the appearance of personalised advertising in augmented reality<sup>32</sup>.




## CHAPTER

# 5


## EVERYDAY LIFE OF KAROLINA, ZOSIA'S MOTHER

No more work for today. Karolina sets the status to „unavailable” and switches the computer to home mode. It is only 11 o'clock and she has already worked more than five hours. She has almost a whole day ahead of her. And it's an important day. Zosia's sixteenth birthday. Karolina has recently started going through her collection of photos and videos captured since Zosia's birth. It turned out that they had accumulated an inexhaustible amount of material. How to choose something from it? Karolina used the option of having the artificial intelligence remove duplicate or very similar photos and those that were badly cropped, and leave the technically best and most expressive ones, but there were still too many. Without hesitation, she selected the appropriate option in the graphics programme and was able to view the finished document after a while. She made changes here and there, modifying the order of the photos or the shape of the letters. The programme even chose the right soundtrack for the presentation, based on Zosia's activity in the music application. Karolina looked at the finished presentation. Some elements were surprising to her, she did not remember some of the shots or situations. She did not know what kind of music her daughter was listening to. Karolina did her part. Now the app will send out requests to the people recognised in the photos to record short wishes for the jeweller, which can be played back when viewing the album. Done.

– I wonder if she herself will be surprised by anything, after all, it is no secret that digital devices know more about us than those closest to us or ourselves, Karolina thought with regret. 

She left her office. The flat was quiet. Łukasz had probably gone to work, while Zosia was supposed to be tending to her plants. Karolina looked around. It was necessary to tidy up before the meeting. She selected the smart home app on her phone and checked when it had last been cleaned. It was Łukasz's daily chore, but today he had a lot on his plate, so she offered to take care of it. She scheduled the vacuuming and cleaning. She gathered up the jackets scattered in the hallway and hung them in the wardrobe. From the bathroom came the hum of the self-cleaning shower and toilet. Her phone vibrated and a message from her friend Anka was displayed on the screen on the fridge.

*Dear, happy birthday to you and Zosia!*

The hologram display frame, standing on a shelf in the large room, beeped and displayed a hologram of a large bouquet of flowers. – *Thank you* – Karolina dictated a message to Anka. – *I can't believe so many years have already passed.* 





According to the study "Digital Consumer Trends 2023" by Deloitte, **personal goals are the most common reason for reaching for generative AI**<sup>33</sup>.

The trend of integrating AI into everyday tools is progressing - for example, Microsoft has introduced Copilot into its popular office suite to generate PowerPoint presentations. Many commentators point out that helping to process large amounts of data is the area where AI will have the greatest impact<sup>34</sup>. Critics point to the dangers to creativity or interpersonal relationships associated with delegating everyday tasks to algorithms<sup>35</sup>.



For a long time, the technology **for creating three-dimensional light images** was associated with science fiction. Its isolated uses, e.g. at concerts to display images of deceased artists, were merely curiosities. Nonetheless, some have heralded the advent of a 'hologram revolution', pointing to the intensification of experiments with these solutions<sup>36</sup>. They are being tested by hospitals for remote visits<sup>37</sup>, universities to organise remote lectures<sup>38</sup> and football clubs for practices<sup>39</sup>.

She has known Anka since high school. Together they were active in a feminist association, going to demonstrations and making up slogans for banners opposing restrictions on women's rights. Later, work absorbed them both and they began to lack time for social activities. On top of that, Karolina got married, had a baby and, together with Łukasz, adopted Alex. She only managed to meet up with Anka and a group of friends (one of whom broke off contact with them due to her different views on the vaccination of children) a few times a year, and usually not in full. The COVID-19 pandemic almost 20 years ago made them realise that they could be in regular contact without meeting in a physical space. After a few years, what once seemed like ultra-professional equipment for recording and conducting meetings has become standard equipment in most homes. Karolina and Łukasz also purchased a wide-angle camera and a microphone perfectly picking up their voice from anywhere in the living room, where they also installed a folding screen and projector. Karolina even enjoyed this form of meeting, she could sit with her bare feet in her favourite armchair, drink coffee prepared in her favourite way and chat with her friends, who could also take care of their wellbeing. 

Karolina made coffee and sat down at the kitchen table. She hooked her foot on something hard. Ah, it was a new part for Zosia's cabinet set that Łukasz had made for her for her birthday. He had to hide it here last night so that her daughter wouldn't see the gift he had been working on for several weeks in the creative space at the neighbourhood community centre. Karolina watched her husband's work with admiration. She was very pleased that Łukasz had discovered his passion for metalwork. She was proud that her husband, unlike their fathers, had no problem with his partner contributing more to the family. When he lost his job, Karolina feared that, like many men in this situation, he would become depressed. Fortunately, Łukasz found joy in taking care of the children, the home and developing his passions. Nowadays, his paid work takes up several hours a week, so it does not affect him excessively, even though it is far below his qualifications and experience. In addition to his salary, he receives a civic income, earmarked for people who have not been able to find adequately paid employment after their positions were eliminated due to the development of artificial intelligence. Civic income supplements Łukasz's salary to a level appropriate to his qualifications and experience. 

### Video calls between family members

have surged in popularity during lockdowns. Research firm Grand View Research forecasts an average annual growth rate of 9.4% for the video conferencing market through to 2030<sup>40</sup>. Some studies have indicated that video connections with relatives have a positive impact on mental health, particularly in the context of grandparents' relationships with grandchildren<sup>41</sup>. According to a report by Zoom, an average of 38% of respondents in the 10 countries surveyed predicted that family celebrations will take place offline and online in parallel in the future<sup>42</sup>. Currently, the speed and stability of the internet connection can be a barrier to video conversation. With the increase in Europe's 5G network coverage - expected to be 100% by 2030 according to the EU's Digital Decade targets - and the development of the sixth generation of networks, this problem may in principle disappear.



The automatising of more professions and the risk of increasing **technological unemployment** lead many people to reflect on the role of work in their lives. The decline in the importance of work has been pointed to as a potential source of existential crises in capitalist societies<sup>43</sup>. To the question "what are we going to do with our free time", researchers provide a number of answers<sup>44</sup>. For example, Nick Srnicek and Helen Hester in their book "After Work: A History of the Home and the Fight for Free Time"<sup>45</sup> argue that in the near future, thanks to technological developments, social or infrastructural changes, it will be possible to free up time not only from paid work, but also from unpaid domestic work. The chance that artificial intelligence will help reduce the burden of domestic chores is also pointed out by researchers from the Oxford Internet Institute<sup>46</sup>. In the context of the development of automation, the introduction of a universal basic income (UBI) is often proposed, which would provide a safety net for those affected by technological unemployment who are forced, for example, to change industries. Among AI industry leaders, Sam Altman of OpenAI is a proponent of such a solution. The results of a three-year study he initiated on UBI identified benefits, e.g. in terms of wellbeing for those receiving the money, but also limitations - for example, UBI does not improve access to health care<sup>47</sup>.



CHAPTER

6

## ŁUKASZ'S RETURN HOME FROM WORK

Łukasz works at a stand-alone store and is responsible for keeping the store clean. Thanks to automation, operating the cleaning machines has become crucial, but Łukasz sometimes likes to sweep the floor himself or look in places that the automatic vacuum cleaner can't reach. Karolina doesn't know it, he would probably be ashamed to admit it to her, but he gets a lot of satisfaction from the manual work. Of course, he is aware that the work he does now is much lighter than the effort required just a few or a dozen years ago, when he spent most of his working day at a desk in front of a computer. But it is nice to feel the fatigue in his body, the work of his muscles, the coordination of his movements, and finally – to see the effect of his actions in the material world. He felt the same way when he pursued his new passion – making objects out of recycled metal. Handywork with the tools, the transformed matter, the need to concentrate on his hands and the here and now, relaxed him and made him appreciate the pleasure of dealing with materials. He was bursting with pride when he finished the birthday project for Zosia.



Meanwhile, Karolina's husband comes out of the store and applies the card to close the door. He quickly tackles his task, as the store was surprisingly clean. He is glad to be able to get home early. Karolina had promised to help prepare for Zosia's birthday party, but he didn't know what time his wife would finish work.

Before leaving, Łukasz reapplies sunscreen to his skin. He drinks a lot of water to cool down before a bike ride in full sun. Pulling into the street, he looks around to see if a car is



In a telling way, the **effects of the climate crisis** are

shown in an interactive Guardian article from 2021<sup>48</sup>. It describes four ways in which the disaster will manifest itself: through heat waves, floods, fires and periods of crop failure. The newspaper's journalists produced a similar piece on the impact of the crisis on biodiversity by 2050<sup>49</sup>. Major changes in the environment, and consequently in lifestyles, also presuppose optimistic visions of the future, e.g. one in which Europe manages to meet its climate targets by 2040<sup>50</sup>. Conflicts around green transition programmes, in the EU above all *the European Green Deal*, referred to as the *green backlash*, make it difficult to mitigate the effects of climate change. There are strong indications that the rise in sentiment hostile to climate policies is not a bottom-up phenomenon, but driven by the fuel industry, among others<sup>51</sup>. At the same time, there is no shortage of voices saying that the scale of public opposition is overestimated and that politicians should not fear it and continue the fight to protect the planet<sup>52</sup>.

coming. Since electric cars have become commonplace, the streets are much quieter than the ones Łukasz remembered from his childhood. Electric cars made sounds to warn passers-by, but nothing like the noise of horns and squealing tyres. Łukasz drove through the city centre, where traffic was significantly limited. Only selected categories of cars were allowed to enter the zone regardless of the time of day: law enforcement services, ambulances, government cars, cars of people registered in the centre. Other drivers can buy tickets to enter for a certain number of hours, and as there are many more applicants than tickets available, the price is sky high.  

Łukasz recalls what the city was like 16 years ago when Zosia was born. Back then, he wouldn't have been able to drive so peacefully down the street through the city centre. Being in the city centre was far from pleasant, not only because of the car traffic, but also because of the high level of air pollution, the lack of greenery and places for residents to spend time.

More than 10 years ago, it was rare to find local stalls and small stores selling food and cosmetics by weight in the centres of large cities for packaging made available by a deposit system. Small businesses, providing everyday services such as leatherwork or tailoring, have also returned. Nowadays, the government is encouraging the repair of broken items and clothes, so crafts are slowly being revived, although the proliferation of 3D printers has been important for this industry. Today, many people have them in their homes, and if not, it is always possible to have an item printed according to a set of guidelines. Today, it takes much less time than it did a few or a dozen years ago, when it was just an expensive toy. Anyone can design an object for themselves according to their own needs. But there are also disadvantages to the proliferation of 3D printing, namely that it is not uncommon for such objects to quickly end up in the rubbish heap, which can be easily identified by their specific grooved surface.

He passed a shopping mall that was a perfect example of post-consumer spaces. Some were demolished and others were transformed for local community use. Sometimes they became libraries, schools, spaces for local activity, sometimes they served as anthropogenic open-air spaces for male and female art students. The one at the exit from the centre is to be transformed into a green space, the shopping centre structure will serve as a structure for a biophilic art gallery. For the time being, wild ivy was climbing up the façade of the building and thistle bushes had grown in front of the former entrance. It looked a bit like the landscape after the apocalypse, which only the plants had survived.



**Urban pollution** is a significant problem




already and is likely to grow in scale in the future if appropriate action is not taken. Changes in cities to combat the climate crisis affect many spheres. In some cities, restrictions are being placed on the use of internal combustion vehicles and the promotion of public transport. The concept of the 15-minute city and the sponge city is gaining popularity<sup>53</sup>. The latter is a response to the increasingly frequent droughts and the problem of access to water in cities. The aim of the measures taken is to prevent the rapid run-off and evaporation of water after a rainfall event. Solutions such as green infrastructure, green roofs and walls, rain gardens, retention systems, the use of permeable surfaces or the construction of retention basins are intended to counteract this. Examples of sponge cities include Shanghai and Jakarta; in Poland, solutions proposed by the creators of the sponge city concept are being introduced in cities such as Warsaw and Łódź<sup>54</sup>.



## CHAPTER

# 7

## IN ZOSIA'S FLAT

Karolina gazed at the reproduction of a Mark Rothko painting hanging just inside the front door of the flat. A mobile phone beeped, a message came in from the food and catering co-op to which their family belongs.   The cake and the rest of the food would be brought in an hour or so. And borrowed crockery so that everyone has the same forks and cups. „Family life requires a lot of space,” Karolina thought, looking around their small flat. By day, the larger of the two rooms served as a living room, a sitting room, a dining room and a place where they received friends and family, played board games and those with virtual reality technology, and watched films on a fold-out screen. At night, the table folded into a handy accordion and the sofa became a comfortable bed with a two-part mattress. In the footboard, always on Carolina's side, slept Koko. In the hallway, they tried to hide as much storage space as possible; usually visitors did not realise that when they leaned against the smooth white plane, the wardrobe door would automatically open. Zosia's room is on the opposite side of the corridor; there is a bed, a desk with books on it, a small table with a computer, a bookcase with books and trinkets and a swivel chair. On the windowsill, there are animal figurines that Zosia printed on a 3D printer during her classes at school. 

The kitchen, although without a window, is well ventilated and food can be prepared there without fear that the whole flat will smell of fried onions. The office where Karolina works is a small alcove separated by a thin wall from the kitchen. No one uses this space except Karolina and Koko. What Karolina misses most is the bathtub, which is generally considered a relic; additionally, in times of drought, the amount of water per household is





**3D printing** has firmly established itself in a wide range of industries, from aeronautics to footwear<sup>55</sup>. Printed materials are primarily used for prototyping, reducing time and costs, but they are also sold as parts of finished products, and it is in the integration with production that some analysts see their future<sup>56</sup>. Due to the variety of materials that can be used for "printing", projects such as printed housing estates<sup>57</sup> or even appliances that "create" meals<sup>58</sup> are emerging. 3D technology has still not become widespread among consumers, the main reasons being the complicated operation of the printers or concerns about the durability and safety of their creations. Within a decade or so, devices that print everyday objects or meals may become an increasingly common sight in schools, offices and homes.



### Food co-operatives

have been around for more than a century in Poland<sup>59</sup>. The degree of their development is evidenced by the fact that in 2024, the Umbrella of Co-operatives project was initiated, linking more than a dozen organisations in Poland<sup>60</sup>. Delveroo's "Snack to the Future" report identifies the growth of hyperlocal agriculture as one of the phenomena forecast for 2040<sup>61</sup>. Technology-enabled development of urban crops<sup>62</sup>, including vertical farming, can also enable people without space for traditional farming or gardening to produce food for their own and the local community's needs.

restricted, so bathing is not an option then. Łukasz has installed a meter that indicates how much water can be used for each household activity and how many litres are used for each family member. Karolina recalls how she used to enjoy pouring bath soap into the hot water and then lying down covered in foam. Nowadays, such pleasures can only be indulged in in exclusive spas.  



#### ACCESS TO CLEAN WATER IN POLISH CITIES

In 2040, the problem of lack of access to clean water in cities could be acute. With climate change and urban population growth, water management will become a key challenge. The answer to this challenge will be smart water management systems that enable efficient use of water resources.

Technologies such as soil moisture sensors, smart irrigation systems or advanced weather forecasting models will support urban water management decisions. These systems will be able to monitor and analyse data in real time to optimise water use and prevent water shortages.

Her gaze was again drawn to the Rothko reproduction: the uniform coloured stripes had always mesmerised her. It was Łukasz who first became fascinated by the American painter. After losing his job, he was looking for something to bring him peace of mind and ended up on social media with a group of Rothko admirers. By the way, it will be interesting to see what Łukasz comes back about.



In December 2023, Nature's own npj

Clean Water magazine published a collection of articles on **urban water management**<sup>63</sup>. In the introduction, the editors pointed out that new technologies will play a huge role in the development of this area: the internet of things to monitor water quality and levels, and artificial intelligence models to predict water demand, flood risk, etc. The re-use of so-called grey water (faecal-free waste water) is also of great importance. Technologies enabling its rapid purification and the creation of an appropriate legal framework could serve to close the water cycle in households in the next several years<sup>64</sup>.



## CHAPTER

# 8

## UNCLE MICHAŁ AND COUSIN BASIA

– Is Michał coming? – asked Karolina, opening the door for the autonomous courier with the intercom. Karolina took the shopping out of the robot's boot, checking that everything matched the list of items ordered. She had no comments, so she clicked the order acceptance button on the app and closed the door.

– He wrote that he would, but we'll see – Łukasz tucked the cold snacks into the fridge. – I hope he doesn't argue with anyone – he sighed.

– Surely not, everyone loves Zosia, and this is her day – said Karolina.

In recent years, Łukasz rarely spoke to his brother. Michał graduated from an art academy and was a graphic designer. Three years ago, he lost his job and since then has been consumed by anger and frustration that have not left him to this day. He blamed his employer, his former colleagues, even his brother, who became involved in activities outside of work. Łukasz and Karolina could not fathom why Michał continued to champion capitalism and competition in the market. To want is to be able to, he repeated when someone started complaining about difficulties at work. He found many new friends online, with whom he spent a lot of time, and they mostly shared a reluctance to change and a sense of frustration. When civic income was introduced, he protested loudly at family gatherings and in online discussions. Łukasz suspects that Michał is collecting it, although he doesn't admit it because he doesn't have a permanent job and has to pay the bills. Occasionally, Michał takes on various small jobs, but so far he has not been able to find a job with a regular salary that would allow him to look after his daughter at the same time.

– I hope Basia will come – sighs Łukasz. Basia is his niece, only six months younger than Zosia. Łukasz would like the girls to be closer and spend more time together, although he remembers very well how his parents used to annoy him when they pressured him to go out with his cousins more often or take his younger brother to hang out with his friends.

The girls have far more that divides them than unites them. It is not much of an exaggeration to say that the cousins are each other's opposites: Basia is at a remote school and is happy with it, and is not concerned about the poor standard of teaching; Zosia regularly returns to the subject of sending her to an elite school, which her parents cannot afford for financial reasons (but also do not like the almost military rigour that prevails there), or to a school funded by the company where Karolina works, where modern bioengineering techniques are taught, but the graduates have to work there for several years.

Basia spends most of her free time in virtual reality, rarely emerging from it and bestowing her attention on the material world. Michał is an independent father and sometimes worries that he is losing contact with her. Although they live together, the father rarely sees his daughter, who spends most of her time locked in her room. In fact, his daughter is sometimes even very talkative, only that it is through instant messaging, chat rooms or video calls. Despite his aversion to technology, which he felt made it impossible to have a normal conversation with his daughter, Michał eventually agreed to a mediated form of contact. Basia called when she needed to, and if she put it off, her urge to discuss it with her father would probably quickly disappear. 

Basia is a fan of the influencer Arona, created and constantly processed by artificial intelligence. When she was younger, she used to spend her pocket money on virtual gadgets sold by Arona: outfits used in the still technically imperfect metaverse, a special font for instant messaging or the opportunity to chat with Arona herself. If you are a gold member of the fan club, i.e. you support Arona financially above the highest tier set by her, you can meet Arona's hologram once a week, tell her your problems, sorrows or boast about your successes. Sometimes Arona will also tell something about herself, which the person can then share with other Arona fans. Sometimes fans declare that they will keep such information to themselves, but usually, in the end, they can't resist sharing it on one of the many fan groups. Basia has never yet been tempted to pay for the top tier because she fears she wouldn't know what to say at such a meeting. What Zosia finds obnoxious and unworthy of attention, Basia absorbs almost infinitely. Basia is probably one of Arona's oldest fans, but for some time now she has paid less attention to the clothes, cosmetics and music that Arona delights in than to this. Instead, she would like to understand how the algorithms that made Arona possible work.

Zosia has never been interested in lifestyle influencers. These days, she only follows experts on coping with climate change and experts on growing plants. The cousins sometimes talk about who they find interesting on the internet, but it soon becomes apparent that what absorbs one simply bores the other. Basia cannot understand that the cousins are not at all preoccupied with the question of what is human consciousness and artificial intelligence, where is the line between human mind and machine, what does it mean for something to be human? In her discussion with Basia, Zosia always says that artificial intelligence produces art, not creates it, and this is, in her opinion, a very important difference.



The NASK report "Teenagers 3.0" indicates that the



**time spent online by teenagers** is increasing and is now averaging around 5.5 hours per day<sup>65</sup>. According to the IPSOS report "What the future: teens", more than half of 13–17 year olds enjoy spending time with friends online as much as offline<sup>66</sup>. Gen Z are more likely than millennials to seek social contact by watching online streams. It is on streaming platforms that VTubers - virtual avatars playing the roles of online creators or influencers - are most intensely present<sup>67</sup>. The primary tool through which teenagers are present online is the smartphone. There is an intense debate about their impact on the health and daily life of children and adolescents, with many ideas being floated about limiting the use of these devices<sup>68</sup>. Innovations in the design of smartphones - making them more powerful and integrating artificial intelligence models into them, making the screens more flexible so that the hardware can be unfolded and folded, or improving the quality of the cameras - could affect the practices of their young users. Some companies, such as Meta, see the future in AR/VR glasses, which may replace smartphones for some people - but which will involve new social challenges<sup>69</sup>.

– I don't see much difference. The most important thing is whether people like it – replies Basia.

Michał gets annoyed when he hears similar arguments, because, after all, artificial intelligence is taking jobs away from people. Though then he begins to wonder aloud whether you should really pay lots of money to artists, people who, according to Michał, make a living out of making up ridiculous stories.

– Dad, but that's not what it's about – Basia usually replies. – Now more people can create things, there's a civic income, artificial intelligence is there to help us...

– It helps so much that my university degree is of no use. And you don't know what to do, how to plan, what to study in order to have a job in the future – Michał says resignedly.

– And before that all was clear? – interjected Łukasz once when he witnessed a similar conversation. – We too were given advice by our parents that made sense in their youth. And then everything changed and we had to reinvent our lives. And they probably had the same with their parents. And so it goes on and on. But the most important thing is to support each other within the family, with friends – Łukasz put his arm around Basia, who laid her head on his shoulder for a moment.  

What Basia and Michał have in common is a complete indifference to climate change. She is not interested in innovations that could slow down the consequences of rising average temperatures. Nor is she concerned about the energy intensity of artificial intelligence. Zosia suspects that her cousin has no idea how much energy it takes to operate all the AI-based tools. Uncle Michał, on the other hand, believes that the belief that climate catastrophe can be prevented is a pipe dream and therefore not worth pursuing. When Zosia hears such words, she starts to resist and sometimes even bursts into tears, so Łukasz plans to ask Michał and Basia not to bring up the subject at the party.



The spread in predictions of the


**impact of automation on the labour market** is wide. Researchers from the Oxford Internet Institute indicate that, depending on the research model, estimates of the percentage of the population at risk of technological unemployment range from 9% to 59%. They draw attention to the prevalence of the *'Luddite fallacy'*, i.e. the belief that technological development means unemployment rather than transformation and job creation<sup>70</sup>. At the same time, in the short term, the transformation of the world of work can come as a severe shock to many people. Without the involvement of the state and trade unions in mitigating the negative effects of automation, these processes may prove socially costly. However, they also create opportunities, as sociologist Aaron Benanav points out, for the positive transformation of the world of work<sup>71</sup>. These include the support of AI assistants in administrative tasks and work planning, which previously could only be hoped for by senior people employing human assistants. Tools using generative models can also shorten some routine tasks, such as writing repetitive pieces of code, transcribing audio recordings in journalism or academia, etc.



## CHAPTER

# 9



## ALEX, CLIMATE REFUGEE

However, there may be no need to silence anyone, as climate change and its consequences for many regions of the world was the reason for the arrival in Poland of Alex, who had to leave his home area as a 12-year-old due to unbearable droughts. Karolina and Łukasz adopted him thanks to the law on obtaining citizenship for climate refugees. Alex quickly became a beloved son, brother, cousin and grandson, and from the state's perspective, he is, above all, a young person ready to work in Poland, which like many other European countries is facing a demographic crisis and is trying with all its might to save the pension system from collapse. 

Twenty-year-old Alex works for a cooperative called ProteinX, which produces ready meals rich in protein whose source is not insects. Insect protein has recently been considered increasingly controversial, just as it was with animal meat a dozen years ago. Today, it is difficult to imagine the industrial breeding of chickens or pigs for human food. Alex is studying bioengineering at the same time, inspired by Karolina's career and the opportunities the industry offers to produce food that does not harm the environment. The cooperative, which Alex co-founded, is improving cellular meat production solutions to make it cheaper, as well as supporting the development of laboratories to produce such meat in the less affluent and more climate change-ravaged regions of Europe. Co-operatives are the dominant business model in the alternative protein industry, which is very much in keeping with Alex, who firmly believes in the power of community as an answer to global challenges. Insects, on the other hand, hold a special place in his heart and in his spare



The World Bank estimates that more than 200 million people could be in a **climate change refugee situation** by 2050<sup>72</sup>. Gaia Vince, author of "Nomad Century: How to Survive the Climate Upheaval" points to International Organisation for Migration figures of up to one billion at risk of this fate in the next 30 years<sup>73</sup>. At the same time, for many countries around the world, accepting migrants may be a remedy to the demographic crisis and increased demand for workers. According to some experts, such countries include Poland, where the projected decline in population by 2050 could be as high as 15%<sup>74</sup>.


time he practices digital entomology. Thanks to the tools created by digital entomology enthusiasts, there has been an opportunity to capture the multidimensionality of the insect world digitally.  



#### SOURCES OF PROTEIN IN THE DIET OF POLES IN 2040

The main source of protein in the diet of Poles in 2040 is likely to be plant-based protein. This is due to the public's growing environmental awareness and the increasing popularity of plant-based diets. Technologies that are likely to influence protein production in Europe include microbial fermentation, which allows the production of protein from various raw materials such as agricultural waste or biomass. Another example is the breeding of insects, which are rich in protein and can be used as a source of protein in the diet.

Social phenomena that may affect protein production in Europe include the growing population of vegetarians and vegans, which will require alternative sources of protein. Another example is the growing environmental awareness of society, which will require protein production in a more sustainable and environmentally friendly way.

Although Basia is not interested in climate change, which has contributed to the digital variety of entomology, she is fascinated by what Alex is doing. Her cousin has shown her the insect world he is creating with friends from all over the world, copying the complex structures of insect communities, behaviours and habitats in virtual space. Basia wonders if this world is really „real”, since many insect species have already disappeared and many more will disappear from the face of the earth as a result of a process that the press is alarmistically calling the sixth great extinction? Real or not, it is certainly better – Basia remembers trips to the forest and meadows with her parents and much prefers the virtual version of the animal world, where nothing can sting her. 



A February 2024

report commis-



sioned by the European Parliament indicates that by 2035, so-called alternative proteins (primarily plant-based) will account for 11% of the market<sup>75</sup>. New sources of protein are needed to meet the growing demand for food, which could increase by more than 50% by 2050<sup>76</sup>. At the same time, meat production is damaging to the climate, hence projects such as the EU's NextGenProteins for marketing proteins from yeast cells, microalgae and insects<sup>77</sup>.



In 2016, an article ap-


peared in the newsletter

of the UK's Royal Entomological Society on **"digital entomology" as one vision for the future of the discipline**<sup>78</sup>. Currently, digitisation of collections in the form of, for example, 3D models is standard practice for those involved in insect research<sup>79</sup>. Technologies related to the conservation of animal and plant species are developing rapidly, bringing together the scientific community and amateurs to digitise environmental data (not just images)<sup>80</sup>. The knowledge generated this way helps to monitor the state of nature or interference with it.

Karolina jokes that even the trade union Alex belongs to is named after insects („The Hive”), but she is very proud of her son and warmly supports his social activities. But she did regret it when he moved out of the house to live in co-living with others with a background of climate refugees.  

The co-living that Alex has joined is composed of families and single people, sometimes very young, who have ended up in Poland often as a result of very dramatic experiences. Karolina was concerned about whether Alex could cope with the stress of being surrounded by people with traumatic experiences. She gave him a subscription to sessions with a psychotherapist who supports people with climate-related depression and those who have had to leave their hometowns because of a climate disaster. Alex gladly accepted the gift and assured his mother that all co-living people benefit from various forms of support.

- It’s normal nowadays – he reassured Karolina, who kept forgetting that psychological and psychiatric help was no longer seen as something to be ashamed of.
- I must give back to others what I received from you – he explained to Łukasz and Karolina when they tried to convince him to postpone moving out for a few months.
- Besides, I have a great tram connection to us, I’ll be dropping by often.

And indeed he did, visiting Karolina, Łukasz and Zosia’s house at least once a week. Zosia talked passionately to Alex about her plants, although in their case the presence of insects in their environment was a threat, not an opportunity. 



**Trade unions**, which have been in decline in most European countries, **could experience a renaissance over the next 15 years**. At the beginning of 2023, ETUI showed a huge increase in strike activity in Europe - in the UK, for example, the highest since 1989<sup>81</sup>. Sociologist Jelle Visser identifies revitalisation as one of four scenarios<sup>82</sup>. The arguments for this are, on the one hand, historical regularities (an increase in activism every few decades) and, on the other hand, the activation of under-represented groups (young people, migrants, the self-employed), many of whom have begun to organise themselves in protest of platform workers (e.g. food vendors, taxi drivers)<sup>83</sup>. Trade union activism can also be seen in industries heavily influenced by the development of generative artificial intelligence for workers - such as the gaming and film industries. However, Visser’s other scenarios are not so optimistic for the trade union movement. In Poland, perceptions of trade unions are on the rise - in the last survey, according to the latest CBOS survey of 2021, they were the highest in more than 20 years<sup>84</sup>.



**In 2023, a project described as the first co-living in Poland was created in Warsaw<sup>85</sup>**. It is based on a combination of private spaces - micro-apartments equipped with a kitchenette or private bathroom - and shared spaces for relaxation, entertainment, cooking or laundry. This concept is usually presented as a solution for young people in big cities. However, it sometimes appears in the context of families<sup>86</sup>, who may care about a supportive local community or people who want to live in the countryside<sup>87</sup>, who are unwilling or unable to move into the single-family housing that is prevalent there. Critics, on the other hand, argue that it is a substitute for housing that does not address the problems of the housing crisis, and an attempt to sell the old idea of dormitories anew and at a higher price<sup>88</sup>.



CHAPTER

10


## GREAT-GRANDFATHER ZDZISŁAW'S ACTIVE OLD AGE

Grandpa Zdzisław – the intercom announced the visitor – Open, open – shouted Karolina. After a moment, the door to the flat opened and Zosia's great-grandfather stepped inside.

– Did you take the lift? – Łukasz asks, taking Zdzisław's hat that protects him from the sun. – It was broken this morning.

– I haven't checked, but I don't have a problem climbing the stairs – Zdzisław said with a laugh.

Łukasz smiled under his breath as he looked at the plastic-made components of the bionic exoskeleton supporting Zdzisław's knee joints.

– Who knows – thought Łukasz – how soon I will need such support myself. Since the advent of affordable bionic motor support devices, an increasing number of older people could be found cycling around town or hiking at times when temperatures allowed them to be safely outdoors. 



### EXOSKELETONS AND THEIR IMPORTANCE IN THE DAILY LIVES OF POLES IN 2040

Exoskeletons are devices that support muscle function and allow for increased strength and endurance. They are particularly useful for the elderly or people with disabilities who may have difficulty performing everyday activities. In 2040, exoskeletons may be widely used in Poland, both for medical purposes and in everyday life.



**The exoskeleton**, or external skeleton, is a technology that has been developed


for years for people with disabilities, as well as those who need motor support due to their work. At Berlin's Charité Hospital, for example, employees have been testing German Bionics' back-supported devices that make it easier to lift patients or heavy objects, while Skip has teamed up with clothing brand Arc'teryx to develop knee-supported trousers that reduce pressure on the knees<sup>89</sup>. These types of exoskeletons could improve the lives of many people in the future. At the same time, potential problems with this technology can already be seen, such as the danger of malfunctions or the refusal of their manufacturers to service the devices<sup>90</sup>.

In the medical context, exoskeletons can be used for rehabilitation of people after injuries or with musculoskeletal diseases. In addition, exoskeletons can be used to assist people with disabilities, enabling them to perform activities that were previously inaccessible to them.

In everyday life, exoskeletons can be used to make everyday activities such as shopping, cleaning or gardening easier. They can also help to increase productivity by enabling workers to perform tasks that require great strength or endurance.

- Hi, Grandpa! - Zosia runs into the hallway and embraces her great-grandfather.
- I'm already so old to have such a big granddaughter - Zdzisław hugs Zosia and shakes hands with Łukasz. He hates to be referred to as 'great-grandfather', he says it makes him feel old, so in the family a proper name is always added to the word 'grandfather' to make it clear exactly who is being referred to. Karolina shouts from the kitchen that she is about to come over to say hello.
- Am I first? - asks Zdzisław.
- Yes, but the rest will be joining us soon - Karolina leads her grandfather into the room. - How are you, how are you feeling? Everything okay? - she sits down next to her grandfather.


Grandpa Zdzislaw was an important person for Karolina; she spent a lot of time with him as a little girl. When her parents left her with her grandparents, her grandmother was usually in charge of preparing food and feeding her granddaughter, while her grandfather was in charge of organising playtime and spoiling her. Grandpa was first an engineer and then a director in a car factory. He always said that cars were forever and he would produce them for the rest of his life. Cars did not interest little Karolina, but travelling with her grandfather did. Perhaps this is the source of the fondness Karolina still has for cars, even though today's vehicles bear little resemblance to those from her grandfather's factory days. The grandfather was very keen for his son, Karolina's father, to continue his path in the company, or at least in the car business. - People will always need cars! - he repeated every time Stefan said he wanted to study geodesy at the polytechnic.

As a result of the environmental transition, Zdzisław's company had to switch to the production of electric cars, so he sold most of his shares at a large profit, leaving himself a stake, the dividends of which allowed him to live comfortably. In his seventies, Zdzisław moved from the city centre to a villa neighbourhood a little out of the way, by the river. He was prompted to choose his new location by a virtual assistant from ApartmentAI, a company that helps match properties to the needs and financial capabilities of male and female clients. Firstly, in Zdzisław's current neighbourhood, all the important services (a specialist clinic, a sports centre with a wide range of activities for people 65+, cafés and more) were within 10-12 minutes of his residence. He used to think that ideas such as the 15-minute city or the smart-city were nonsense. You could get everywhere by car; sometimes, admittedly, it was difficult to find a free place to park, but eventually you always managed to leave your car somewhere. The district also saw the opening of the city's first power plant based on a system for recovering heat generated by a data centre located in the district by the river. Thanks to this solution, the heat used to heat homes does not adversely affect the environment and heating bills remain low. 



The term **"15-minute city"** entered the public debate in 2020, mainly thanks to Paris Mayor Anne Hidalgo and urban planner Carlos Moreno<sup>91</sup>. The very concept of designing urban space in a way that allows people to reach key retail and service points on foot from anywhere is much older. It has gained prominence due to the pandemic, which has significantly changed the perception of cities as areas to serve people rather than cars, and the climate crisis, as pedestrian-friendly cities are considered environmentally friendly as well. Despite the numerous conspiracy theories circulating around this topic, the vision of 15-minute cities is in line with the expectations of metropolitan development for the next 15 years presented by the respondents of many surveys<sup>92</sup>.

Second, one was allowed to drive one's car around this district, although free public transport also operated here. For years, cars were not allowed into the city centre. You had to leave your car in an underground car park and transfer to a hydrogen or electric bus or tram, unless you bought a pass, which few could afford. Another option remained the use of bicycles with electric power, so that even people with low levels of fitness were able to do well on them. Third, it turned out that a neighbourhood designed to meet the needs of 65+ people does not resemble a hospital or a sanatorium but is free of the disadvantages that its previous location had. No one is partying at night, children are not shouting outside the window, the most popular cinema screenings and theatre performances are shown during the day and not late in the evening, when Zdzisław would already like to relax and go to bed earlier. Not all pensioners, however, had the opportunity to live in the comfort Zdzisław enjoyed. A few weeks ago, he bumped into a friend from high school before entering a newly opened restaurant serving steaks made from cellular meat that tasted like the best entrecôte. He thought Janusz had also decided to go for dinner, but, as it turned out, he was just finishing his shift as a waiter. Despite reaching retirement age, he still had to work because his pension was not enough to support himself. After five years of working in a day care centre for young people during his pre-retirement period, he had to face the fact that he had to return to the labour market, as he would not have been able to manage financially without the additional income. He was not entitled to civic income because his pension exceeded the statutory level. Zdzisław was surprised to hear about all this. It seemed to him that it was only the young who were struggling economically now, while the elderly could finally relax, as he rarely saw people outside his circle of friends and neighbours taking time out to pursue their hobbies, meet their families and undergo physiotherapy, which was supposed to prolong the physical and mental fitness of the elderly.



The latter was positively influenced by visits from Tomasz, a support person in old age. He came to see Zdzisław three times a week. This type of care service has become more widespread in recent years as the number of older people has started to increase rapidly. Access to hospitals and health centres has improved somewhat in the last decade, as large numbers of doctors and doctors from Asia and Africa have come to Poland. Health monitoring wearables play an important role. Should Zdzisław's health deteriorate significantly, the notification would reach the nearby hospital and ambulance service. Zdzisław resisted at first when granddaughter Karolina and son Stefan insisted on hiring someone to support him regularly. However, it soon became apparent that Tomasz's visits were quite enjoyable; they talked about various topics, sometimes played chess, and when Zdzisław was unable to cope with some new feature on his phone, Tomasz usually solved the problem and taught Zdzisław how to use it. Some of Zdzisław's friends opted for an automated old-age assistant based on generative AI, but Zdzisław still couldn't get used to talking to 'talking machines', as he called all sorts of apps, chats and bots. 

Zdzisław can no longer drive his car on his favourite streets in the historic part of the city, which is a large part of the centre that has been set aside as a space for autonomous cars, but he still has his beloved electric Fiat 750. Combustion-powered vehicles are still only used in less urban areas. Zdzisław was almost pulling his hair out of his already severely balding head when he had to return it to the factory to have it converted to electric. Inside, he had a system fitted that made the noises characteristic of an internal combustion car; he always thought it was the most beautiful sound to the ears. The volume automatically adjusted according to the hearing level readings from the device measuring his grandfather's biological parameters. One day the car wouldn't start because Zdzisław's



**63% of respondents to the study "Digital Consumer Trends 2023" by Deloitte say they own a wearable device<sup>93</sup>.** This

market segment has been growing for years. The most popular devices are smartwatches, followed by activity-monitoring wristbands. The currently niche quantify self movement, which is based on measuring and optimising various parameters of one's life, may become a widespread phenomenon in the near future, also due to the proliferation of AI tools supporting this type of activity<sup>94</sup>. At the same time, experts point out that the popularity of wearables, both targeted at a wide range of consumers and luxury wearables (e.g. miniature wedding rings), creates risks related to the security of health data that such equipment collects and shares<sup>95</sup>. Experts from the US National Heart, Lung, and Blood Institute also point out that, until a few years ago, there was clearly a class nature to having such devices, which do not necessarily go to those who need their support, e.g. due to heart disease<sup>96</sup>. However, with the development of the market, the price barrier will come down and the possibilities of wearables for health monitoring or even disease prevention will grow.

hearing level was found to be too low. Great-grandfather first got very upset, tried to force the car to start, and when banging on the control panel and reinstalling the app failed, he called his granddaughter to rescue him. Karolina ordered her grandfather a remote taxi, and the next day went with him to the clinic, where he was fitted with almost invisible hearing aids.  

Although he had avoided remote taxis, he now relishes the opportunity to drive and look around without having to react to what is happening around him. – I never understood before how comfortable it was to be a passenger – he once confided to Łukasz. Zdzisław also started ordering rides with a driver, something he had always shunned before. He found pleasure in talking to strangers, usually younger than him, often coming from places he had visited on holiday many years ago. – Do you know how much you can learn about the world by taking a taxi? – he used to tell his colleagues at Thursday lunches and Saturday dinners, which they ate at a different restaurant. The family knows nothing about these gatherings, Zdzisław wants to have a life of his own, not like his father, who at his age was already just sitting at home with a carer and watching TV. No way!

- Is Stefan here already? – Zdzisław looked into the living room. – He’s not here? Well, he’s always late.
- But we did agree on 5pm, it’s only 4:30! – Karolina defended the grandfather.
- It’s always better to be earlier – Zdzisław quipped.

Łukasz looked wistfully at Karolina. It always stressed him out that her grandfather would arrive at least a quarter of an hour before the agreed time, which meant that you had to finish cleaning the flat and preparing the food much earlier than planned, and you were never sure whether you would be surprised in an old sweatshirt while getting ready. Zosia, seeing that not everything is ready for the party yet, suggests:

- Grandpa, why don’t I show you my plants? – Zosia took Zdzisław by the arm.
- Oh, the ones in the basement? Well, all right, let’s go.



Reports on **the future of urban mobility**

(e.g. by Ray Hammond for Allianz<sup>97</sup>, McKinsey<sup>98</sup> and Futurice<sup>99</sup>) agree on the importance in the next 10–15 years of several processes. The first is to make transport – both public and private – zero-emission. This means promoting travel on foot or by bicycle and vehicles using clean fuels (e.g. hydrogen, electricity). The second process is to reduce the number of cars in cities, even electric or hybrid vehicles. The aim is to make cities safer for pedestrians and to eliminate pollution associated with vehicular traffic itself. The third process is replacing vehicles that require driver control with autonomous vehicles. The main arguments for this are safety and the possibility of smoother organisation of traffic<sup>100</sup>. Multimodality of getting around the city will also be an important trend. It means using different modes of transport at different stages of the journey – for example, getting to a buffer car park on the outskirts of the city by car, changing to a commuter train and walking, public transport or a rented bicycle around the city centre. Digital solutions facilitate the coordination of these services, enabling in-app viewing of live timetables and ticket purchasing or unlocking access to shared vehicles. In the future, it can be expected that these services will be integrated into single applications, that they will be more reliable, and that they will be integrated into wearables. In a negative scenario, the dispersion of the market of service providers and the lack of regulation may cause chaos in urban space (as we see today, for example, in the case of electric scooters), while the emergence of monopolies/oligopolies may limit innovation.





CHAPTER  
**11**

## GRANDFATHER STEFAN AT A PRE-RETIREMENT AGE

Lukasz was finishing setting out the teaspoons when Alex appeared at the flat door with grandfather Stefan, Karolina and Marta's father. The intercom still recognised Alex's face as a resident, so it let him in without notifying anyone in the flat.

- Oh, you came together? - said Karolina surprised, greeting her father and son.
- Yes, Alex offered to pick me up so I wouldn't take a taxi separately - Stefan took off his coat, while trying not to drop his mobile phone, which has constantly accompanied him since Stefan discovered self-recording.



The most well-known populariser of this activity recommended recording at least 70% of the time of one's life, in order to obtain exhaustive material for later reconstruction of a hologram of the person. You also need to collect haptic data regularly, so Stefan touched a set of sensors connected wirelessly to an app on his phone. Grandpa will soon turn 75 and will then retire.  

When he turned 70, he left the company where he had worked for the past 15 years. When he was looking for a new job in his fifties, he had a lot of difficulty finding one. There were times when he would browse job postings on the internet and send out CVs, while keeping an eye on a sleeping Zosia so that Karolina could get some rest. But in the following years, he noticed an increased interest in older workers. There were fewer and fewer young workers on the market and, at the same time, there was a growing appreciation for



The idea of **digital immortality** has

been discussed in science for a long time<sup>101</sup>. With the development of generative artificial intelligence enabling the cloning of people's voice, image or even motor skills, theoretical problems have become practical challenges<sup>102</sup>. There is a growing number of companies offering, for example, to create a digital avatar after a person's death. This raises huge issues - primarily ethical, with the security of the data collected for such projects or the technical aspects of self-digitisation. In the next few years or so, this topic may become the subject of public debate, and social norms and lines of conflict will clarify around the practice of digitising the self - especially if the promises of start-ups are verified by people who are ready for this type of experimentation.

mature people, capable of greater focus and precision in their tasks. When he started at his last company, he had the impression that everyone expected him – and his peers – to adapt to the young. He himself was surprised at how nervous this made him at first. Later, at training courses organised by the HR department, they increasingly discussed not only how to respond to the needs of 20-year-olds, but also started to ask what employees approaching retirement age needed.  

Having reached the age of 70, Stefan entered pre-retirement and therefore became eligible for a civic income benefit. The condition for receiving it was to be actively involved in local community activities and civic initiatives. However, the pre-retirement benefit would not have been enough to solely support him. Stefan was, however, able to rely on a fund established for him many years ago by his father. Stefan's friends, who did not have such a financial cushion, had to work gainfully until they reached retirement age. The media reported on a growing group of people forced to continue working almost until their health no longer allowed them to perform their professional duties.

With his free time, Stefan became involved in initiatives to promote social dialogue institutions, such as citizens' panels. For most of his life he was not interested in politics, believing that 'those at the top' would decide in any case. He always told Karolina that he had never sent anyone to parliament because the candidates he was voting for were not popular enough. When he started looking for a pre-retirement initiative, he saw a notice for a community consultation on the estate's current information board. A group of new residents wanted to turn the community garden into a playground where only parents with children could hang out. Meanwhile, there were more and more elderly people in the local neighbourhood and fewer and fewer children, so the proposal was not practical. Stefan was most upset by the attempt to segregate and exclude those who had put their hand into creating a shared space.


- I don't agree with something like that – Stefan said to himself, and later that day he went for a walk in the garden to look for allies.

When he got there, he realised how long it had been since he had been here. So much had changed. The concrete that had dominated before had disappeared, the paths were lined with netting through which plants poked freely. The treetops provided pleasant shade, the pond, bird and insect drinkers made the air pleasantly moist. The lawn was abandoned in favour of a flower meadow, which brought back memories of the wild fields and woodland glades he remembered from his childhood spent in the countryside with his grandparents. Sitting on one of the benches were the neighbours from the apartment block next door. He remembered that they had moved in at about the same time as he had; they were struggling with renovations in what seemed at the time to be a hot summer. In the evenings they would sit outside the house with a beer and relax. He hadn't seen them for a long time. They were slim and seemed fit, but he noticed the passage of time on their faces. It was probably showing on his too.



**The ageing of societies** is one of

the challenges of civilisation for the next decades. Digital inclusion initiatives are identified as one way of prolonging the physical and mental fitness of older people<sup>103</sup>. Increasing the digital skills of older people serves their self-development, with positive effects on health, improved access to culture or better communication with relatives. It also reduces seniors' vulnerability to digital fraud or radicalisation via the internet. Lifelong learning will also play a growing role, which can benefit not only the seniors themselves, but also the communities (family, neighbourhood) in which they operate<sup>104</sup>. This education can serve the purpose of staying in the labour market, since automation, which requires retraining and re-training, is a potential threat to older people<sup>105</sup>. However, it can also be a way to actively spend retirement through self-development or social engagement.


- Hi - he greeted them. - Did you hear that they want to do away with this? - He spread his arms and pointed to the space around him.
- Not abolish, but restrict access - the neighbour folded her arms. - I don't know who came up with this.
- Maybe we should do something? - Stefan asked. - But what can be done?
- There is a hearing on this tomorrow - the neighbour looked at his smartwatch.
- At 12, hybrid. 

Stefan had never been to the estate management board before, but at 12 he turned up at the designated location along with representation from other houses and blocks on the estate. The opposing side was a group of men and women, roughly between 30 and 40. An official from the estate management board asked the applicants for the restriction of access to the community garden to justify their position.

- We have recently moved into a newly built house and we see that there is very little space for our children to play - began a man in a colourful shirt and jeans.
- There is even a playground for adults, and the children have nowhere to play, run around and so on.
- But the community garden was established by our joint efforts some fifteen years ago - Stefan's neighbour interrupted him. - You can't take away someone's access.
- After all, your children can go there too - remarked Stefan. - Right?
- Well, sure, of course - those who sat on the side occupied by Stefan spoke up.
- But there is no infrastructure there, plus the children are screaming, they will disturb the elderly - began a young woman holding an infant in a shawl.
- And what can the estate board offer us? - Stefan turned to the board representative, so far mostly silent. - A new playground, something for the children, now that there are new residents with children?
- Ladies and gentlemen, after all, we have a participatory budget - the official began. - But you have to submit a project, collect a sufficient number of votes in the application, in which case you will have to demonstrate that there is no conflict of interest between the two stakeholder groups.
- What do you think? - a woman in her sixties, dressed in office attire as if she had just left work, spoke up from the back of the room. - For us, the presence of the children will be pleasant, and they may also gain something from it. Do you have your parents or grandparents close by?
- That's true, we don't - sighed one of the mothers, whose face was displayed on the screen next to other people attending the meeting over the internet.



The term **smart city** has long ceased to be a futuristic vision. The term is defined differently, in simple terms it means the use of digital infrastructure to collect data for city management. Key for smart cities technologies are the internet of things<sup>106</sup>, data centres<sup>107</sup> and wireless networks. Each of these has grown rapidly in recent decades, through the semiconductor industry boom as well as efforts to eliminate "white spaces" on maps of urban coverage of high-speed internet. This has created good conditions for the digital transformation of cities. At the same time, the concept of smart cities itself has received serious and sweeping criticism<sup>108</sup>. Arguments put forward include the privacy risks of covering the metropolis with systems of cameras, sensors and activity monitors, or the risk of overlooking important social problems by focusing on quantitative data analysis instead of qualitative assessment of the needs of city dwellers.

On his way out of the neighbourhood board building, Stefan scanned with his smartwatch the code underneath the information about public consultations and participatory decision-making mechanisms. He updated his civic app, which he hadn't looked at in years; at one time he had even turned off the notifications that reminded him not only of national and local elections, but also of the opportunity to express his opinion on a topic, submit an idea and similar things. Stefan had never been interested in such things, and since he also started recording himself and his life for the purpose of creating his own hologram, other matters had receded into the background. He was unaware of how many issues he could have influenced if he had wanted to. 

As he was getting ready for Zosia's birthday, he was thinking about the fact that starting today, his granddaughter would be able to vote in elections, elect MPs and MEPs to the national and European parliaments, give opinions to proposals for legislation voted on by parliament, take part in public consultations and citizens' panels that made binding decisions, and even stand for election. Over the past three years, he has occasionally taken his granddaughter to rallies with local politicians and to consultation meetings; she was not allowed to speak herself, but there were times when he made a remark on her behalf at the forum. On a few occasions he offered to take Basia with him as well, but the girl did not seem interested in politics and social issues. He always encouraged Zosia to share her knowledge with her cousin, but Zosia's only reply was that she wouldn't be a smart Alec in front of her cousin or make a fool of herself in front of Basia – and here she always burst out laughing.



#### Visions of what **civil society** will look like in 2040

necessarily take into account the impact of new technologies on its development, as the division of the world into offline and online (so-called digital dualism) is seen today as rather artificial<sup>109</sup>. Digital activism is already a widespread phenomenon, especially among young people, but in the future it may include social groups not yet engaged in this way, such as seniors. Social participation can take place through general community platforms, such as neighbourhood groups, and there are also solutions dedicated to local communities, such as the Local Resources Platform app<sup>110</sup>. Efforts have also been underway for years to enable the collection of electronic signatures for petitions or civic bills<sup>111</sup>. The phenomenon of digital public participation may be one of the responses to the crisis of empowerment and trust in the state in democratic societies<sup>112</sup>.



CHAPTER

12

## BIRTHDAY PARTY

Karolina opens the door to the next guests: it's Michał and Basia.

– Łukasz, call Zosia, have her come back upstairs with Grandpa Zdzisław! – Karolina shouted to her husband. – We're about to start!

After a moment, the lift with Zosia and Zdzisław arrives.

– Oh, you're all here now, at last! – Zdzisław looks around at those who have arrived.

Łukasz directs everyone to the table, where the snacks and cake are already waiting.

– Zosia, happy birthday! – from the side of the room rings out the voice of Aunt Marta, whose face is projected on the wall by a ceiling-mounted projector. Zosia and Zdzisław wave their hands to greet her.

– Hi, Dad, Grandpa! – Marta can see the whole room thanks to the 360-degree camera the family uses for video conversation. – Basia, Michał! Hi! Where's Koko?


– Koko! – calls out Karolina. – Show yourself! – The dog comes running from the kitchen, where it was probably trying to get at the food standing on the counter.

– I wish you were here with us, I would have shown you my garden. You wouldn't believe how beautiful it smells! Oh, how I envy you for your travels!

– Zosia, we have an unusual surprise for you – Karolina begins. – We know that you hardly remember your grandmother Krysia, you were very small when she passed away. But your grandmother wrote you a letter on the day you were born. She wanted to share her thoughts and predictions with you, probably also her fears and hopes. She had always been very involved socially, read a lot, was interested in politics and had at heart that the world of the future would be a good place to live for her children, grandchildren, great-grandchildren.



The discussion on **lowering the age limit for acquiring the right to vote** is ongoing in many countries. In some, such as Brazil, 16-year-olds can already vote. Recently, the right to vote in European Parliament elections was granted to them by Germany<sup>113</sup>. According to a UNICEF analysis<sup>114</sup> the most common arguments in favour of such changes are the lack of significant differences in cognitive development between 16-year-olds and 18-year-olds and the development of a sense of responsibility for the country, civic attitudes that participation in elections entails. The main argument of critics, on the other hand, is that teenagers are more susceptible to manipulation.

Grandma wanted us to read it when you are eighteen, which means you will be of legal age, – added Łukasz. Nowadays, the age of legal maturity is sixteen, so you are already an adult from the perspective of our society, you can vote in elections. 

– And do many other important things – Grandpa Stefan interjected quickly. – I'd be happy to talk to you about that right away....

– Dad – Karolina interrupted him. – First a letter from mum – she turned back to her daughter.

Łukasz got up from the table and handed Zosia an envelope. Zosia opened it and took out two A4 sheets of paper, folded into four.

– Zosia, Basia, surely you've never received a letter like this? – Łukasz asked.

– And you seem to have received one? – laughed Marta. – I'm older than you and I didn't get one either. Only postcards from holidays from my cousins.

– True, I didn't either – smiled Łukasz. – I never wrote letters with my friends, but I did send Christmas cards to my grandparents. But actually because mum told us to.

– Still letters from the office. And the bank. Terrible – Marta shuddered. – I always lost them before I could read them. It's a good thing that for many years now they've been arriving by email or in an app, so I don't have to worry about missing something when I'm not in one place for a while.

– Oh, there's something else here – Zosia takes a two hundred zloty note out of the envelope.

Grandma left you pocket money – Karolina remarks.

– How cool – Zosia looks at the note. I don't think she has ever seen one like it; since she started using money herself, cash circulation is almost non-existent.

– You can deposit it in your account – Karolina takes the note in her hand and looks at it against the light. – I don't think any stores accept banknotes anymore.

– Maybe I will keep it as a souvenir – Zosia folded the note and put it in the envelope that contained the letter from her grandmother.

– Someone read the letter out loud! – Zdzisław said.  

– It's not true what Karolina said, that Grandma can't read it herself – smiled Łukasz and winked at Basia, who got up from the table and walked over to the frame displaying the holograms. She touched the screen of her phone a few times and the figure of her grandmother appeared inside the frame.

– Oh – exclaimed Stefan. – How is that possible?

– Basia had been working on creating a hologram of her grandmother for many weeks – Łukasz put his arm around his niece's shoulder. We wanted Zosia to have a real birthday surprise.

– Oh wow, thank you – Zosia threw herself into Basia's arms. She seemed slightly embarrassed by her cousin's outburst of emotion.

– You know, it's not a perfect hologram, the data we had is a bit insufficient – Basia started to explain. – So something might be stuttering, something might be interrupting.

– Stop it, Basia, it's wonderful – Karolina looked at the hologram depicting her mother with tears in her eyes.

– All right, let's give grandma the floor – Łukasz smiled, and Grandma Krysia began to read.



Nearly one in three millennials

or Generation Z members polled by Klarna in 2023 said that in five years' time all **payments would be cashless**<sup>115</sup>. "Cash as a means of payment has been waning for more than a decade, and the COVID-19 pandemic has accelerated this trend by three to five years," wrote analysts at Deutsche Bank Research report *Bye-bye cash, hello digital payments*<sup>116</sup>. At the same time, its authors note that cash will probably never disappear completely because of its importance for the economy as a whole, as well as for consumers in certain situations, e.g. as a way to improve their sense of security. An interesting case in the context of the future of cashless payments is Poland. According to the IBRI report *Payment Preferences of Poles 2024* commissioned by Fiserv Poland, 75 per cent of Poles regularly opt for cashless payments<sup>117</sup>. Mobile payments with phones or wearables, i.e. clothing or accessories worn on the body and equipped with advanced technological solutions, play a major role in the development of this trend. According to the *cashless.pl* report, in Q1 2024, Poles made contactless payments with mobile devices more than 385 million times, an increase of around 100 million compared to the same period in 2023<sup>118</sup>. So, it can be expected that by 2040, cashless payments will be the default form of payment in Poland, and there will be a number of operators of such services on the market.



CHAPTER

13

## LETTER FROM GRANDMA KRYSIA

*Dear Granddaughter, Dear Zosia,*

*This is my message to you on your eighteenth birthday. This is an especially important day because today you are coming of age.*


*Sometimes the young ask how the much older ones imagined the future many years ago. The truth is that few of us older ones remember what we thought back then. If they claim otherwise, they are either simply making things up, fantasising or putting modern filters on a former state of mind. It is much safer to simply make a note of one's thoughts.*

*I hope you are together today, in some beautiful place. I am probably no longer with you, so only you can now verify whether my reflections – written down a few hours after you were born – have anything to do with the everyday reality of spring 2042.*

*We recently had a pandemic. At first, we were quite frightened, then came the mobilisation of almost the entire world, but in the end it somehow went away. It seemed that in such circumstances – a great many people died – it was not right to dream. All the more so as the climate catastrophe unfolds, black visions are widespread, against this background the mood of the younger generations in particular is deteriorating. Things are getting serious. Forecasts of the phenomena that will accompany rising temperatures – droughts, floods and fires – are coming true.*

*And yet, we still know how to dream. Those who try to look ahead usually think about technological possibilities. I just read in today's Polityka (is it still being published?)...*

The grandmother's voice dropped off. Zdzisław quickly took advantage of this to interject:

- It comes out, it comes out, but it's not what it used to be.
- Times are changing, so the press must change too, - Łukasz looked critically at Zdzisław.
- After all, they are no longer able to read long texts - he nodded towards his children and their cousins.
- And what have you been reading lately, Dad? - Zosia was offended. - Because I've been alternating between reading 'Game of Thrones' and 'The Saga of the Future Life' and they're both a few hundred pages long.
- And what is it about? I've never heard of such a book - Karolina was interested.
- Nowadays we don't really live in information bubbles, but in cells with thick, impermeable walls. People only get what interests them on their feed, they don't know what others think, what th ical life, added Gra ey read, watch....
- Ekhm - caughed Łukasz, interrupting his wife. - Letter. 

*I just read in today's Polityka (is it still being published?) that „with any new high-profile technology, we tend to overestimate its short-term impact and don't always see how it will change the more distant future”. Now, there is a lot of talk over and over again about so-called artificial intelligence, or AI for short. Is it still considered artificial? Does it have the status of intelligence? Is its presence even recognised?*

- Intelligencia was there before the war, maybe there was still some left over from the communist era,' sighed Zdzisław.
- But what do you know about that!
- Don't interrupt, Dad! - Łukasz said.
- Relax - Basia said. - I've programmed it so that the voice stops when we speak.
- And today there is no intelligence? - Basia was puzzled. - No one is intelligent anymore, apparently?
- That's not the point, Basia, - replied Zdzisław. - The term intelligencia used to describe people with higher education, doctors, lawyers, scientists.
- They were often deeply involved in social and politndpa Stefan. - But that's no longer the case.

Grandma's avatar read on:

*All this AI is supposed to enable very extensive automation and, for example, reduce the working time of almost 90 per cent of employees by at least 10 per cent. Do nine out of 10 people really work less than our generation in your time? At the beginning of the century, one worked eight hours a day five days a week. Is it going faster for you with housework? There are calculations that you gain up to 40 per cent extra time for leisure, art and pursuing passions. Provided you have them. Probably the quickest would be to simply do nothing.*



**Cyberbalcanisation**, a term coined


in the late 1990s to describe the potential process of "fencing" the internet along national or political interest lines, can also describe the disintegration of an online, mass society into smaller communities<sup>119</sup>. The social, bonding functions of large online platforms will be taken over by smaller, lesser associations - group chats or servers on platforms such as Discord, or even within large platforms. This process could have positive effects, helping people to gradually become less dependent on social networks<sup>120</sup>. However, it can lead to the strengthening of filter bubbles - the phenomenon of views being reinforced by exposure to content matched by recommendation algorithms<sup>121</sup>. The rise of social polarisation in democratic states and the radicalisation of citizens through digital platforms have been linked to this phenomenon.

– Eh, it used to be that the only thing that mattered was working behind a desk for eight hours, that this was the only thing that mattered – Łukasz stopped reading the letter and looked thoughtfully over the heads of the guests – I find my passions more fulfilling than my professional work. And when I worked in a corporation, I didn't even notice how the seasons were changing. But back to the letter...

*Not so long ago, some believed that augmented reality technologies would reach their golden age. For now, those helmets and glasses of ours are ghastly; this is set to change with miniaturisation, which will finally make AR/VR devices convenient to use. Miniaturisation is also promised in the field of smart - the term is vastly overused - lenses, which can fine-tune vision to current needs and thus help, for example, many professions. The miniaturisation of satellites, on the other hand, is expected to intensify space exploration and enable, for example, our return to the moon. The mRNA vaccines helped us defeat COVID-19 and are said to open up a new chapter of bionics and biotechnology, encouraged to draw the prospect of another breakthrough, for example in cancer therapies. There are also hopes for bionic eyes or brain implants, allowing even people with paralysed limbs to regain physical mobility.*

*The pandemic was meant to be a costly but important lesson. And an example of succeeding in transcending rampant individualism - for this was a sign of our times. In the pandemic, societies with a less individualistic mindset fared better. There are now those who believe that the challenges of the global crises will accelerate the return of communitarianism and the rise of collectivist values.*

Yes, that's right, thought Zosia. At school we talk a lot about community and about supporting each other in difficult situations.

– And grandma predicted it very well – Alex spoke up. – You need to do things together, to support each other, not just in families like we do here, but in different communities, and not, as it used to be thought, that everyone is the maker of their own fate. 

– It's true - Łukasz sighed. – That's what our parents thought.

– And they were wrong? – interrupted Michał.

– Well, I don't know, I don't know – Łukasz replied.

*Every era has its economic prophets. We also have those who predict fundamental economic changes in the near future. Including adjustments to still inflexible production and supply chains, which is expected to stabilise global exchanges and start benefiting local economies. Glocality, in your new times, is probably already the standard? Has it really proved to be the answer to the crisis of small and medium-sized cities? Do you live in a 15-minute city? Oh, what a tempting concept!*



In the context of the pandemic, there has been a great deal of research on how **communities that appreciate higher values associated with individualism or collectivism** cope with

crises. Many of these suggest that community thinking helps to better cope with such challenges<sup>122</sup>.

Organising oneself, coordinating collective action, can be facilitated by new technologies. As recently as the beginning of the second decade of the 21st century, numerous voices suggested that digital activism - sometimes referred to as *slacktivism*, or lazy activism - poses a threat to social movements, as it discourages engagement in the material world. Today, creating divisions between online and offline activism is being challenged<sup>123</sup>.

Activities in these areas are seen as complementary and activists use a wide, digital-material range of practices to mobilise societies. At the same time, technological developments can pose a threat to collective action when digital tools are used against social movements. Examples include the surveillance of protests and the automation of face detection. This threat to privacy, and thus security, is already faced by protesters today, primarily in authoritarian countries<sup>124</sup>.


– And I have to drive half an hour to the farmers’ market to buy fresh apples – laughed grandpa Zdzisław.

– Because you don’t want to take out a subscription to vegetables and fruit from a local farmer – Karolina quipped. – It’s really no more expensive than when you shop on your own.

– But then I can’t choose what I want to buy.

– And that’s what’s great! You get what is just ready to be picked. There is no loss either for the farmers nor for the environment – Karolina remained firm.

– Well really, we are going backwards in our development as humanity! – Zdzisław sighed deeply and shook his head disapprovingly.

– Okay, okay, quiet, I want to keep listening – Zosia silenced her mother by waving her hand in her direction. 


*We have made a lot of promises to ourselves in Europe, pledging to cut greenhouse gas emissions by 90 per cent by 2040. The green transition is to happen in line with climate justice. Climate issues have driven much of the debate in 2024: about saving forests, gutting Europe’s nature, giving respite to overfished oceans and polluted seas.*

– It’s a shame it didn’t work out - Zdzisław mused. – It used to be possible to go peacefully to southern Europe on holiday, we even happened to go to North Africa, but now it’s virtually impossible. Not just because I’m too old.

– Maybe you went there too often – sighed Alex quietly, for which Karolina felt like rebuking him with her eyes, but she restrained herself because Alex had a right like few others to criticise the elders for over-consumption and its effects on the environment locally and globally.

– I think you can still do a lot, you just have to go to the right school – here Zosia looked meaningfully at her mother. - If I had already studied bioengineering, I could have come up with some solutions in a few years’ time....

– Yes, and work for the rest of my life eight hours a day, with no possibility of a change of profession, career, idea of life. Over my dead body! – Karolina almost leapt up in her chair.

– All right, all right, mum – Zosia did not want to argue with her mum again. – I want to keep listening. 



### Fruit and vegetable subscription services have


been available in Poland for many years<sup>125</sup>. Their emergence is linked to the growing popularity of the "Community Supported Agriculture" model<sup>126</sup>. It consists of direct cooperation between consumers and small farms, usually in an urban-rural partnership model. There are also initiatives emerging around the world that specialise in rescuing and delivering to consumers fruit and vegetables that cannot go on sale in shops due to deformation, wrong size, etc.<sup>127</sup>.



### Many predictions for 2040 point to **the circular economy as an important trend**

that will shape various spheres of life<sup>128</sup>. In this economic model, the costs associated with production and services are minimised by reusing materials. Despite efforts to mitigate the damage of consumption in this way, there is a serious risk that shortages of basic resources such as water, sand or rare metals could become a problem by 2040<sup>129</sup>. Without education to reduce the use of non-environmental goods and services, waste management or scientific breakthroughs to reduce the consumption of natural goods requiring costly, dangerous and ecosystem-damaging extraction, the scale of pollution will increase.

*The scale of all these changes suggests that we are at the threshold of a major social transformation. In Europe, Asia and North America, we are ageing rapidly. Technologies are making it possible to prolong the active life of the older adults, but by 2040 will we really have equal rights between men and women across the globe? When you enter adulthood, will the distribution of power no longer be distributed according to a patriarchal model?*


– I'm not complaining – Karolina held out her hand to Łukasz and smiled. Although things were different, she thought of the relationships of some of her female friends, where it was still the women who did most of the housework while also working professionally. 

*Will the importance of paid work really decline, a four-day week implemented, with a guaranteed civic income?*

– Hah, if Krysia knew that there is now talk of a 3.5-day working week and an increase in civic income! It used to seem completely unbelievable – Grandpa Stefan mused.

Gliding his finger across the screen of his electronic watch, which reminded him every half hour to change his position to avoid back problems, Grandpa Zdzisław replied:

– Well, yes, it's best not to work at all. It used to be that you even went to work and school on Saturdays. I have been thinking about work all my life.

– Yes, yes, grandpa, we know – Karolina stroked her grandfather's hand. She was always able to placate him, even though she usually strongly disagreed with him. He was, however, her beloved grandfather. 



#### WORKING TIME IN THE POLAND OF THE FUTURE

In 2040, the average worker in Poland will work approximately four days a week. The shortening of the working week will be caused by several factors. Firstly, increasing automation and the development of artificial intelligence will mean that many tasks can be performed by machines and computer programmes. This, in turn, will mean that employers will be able to reduce the number of working hours for their employees without adversely affecting company productivity.

The second factor influencing the length of the working week will be the desire for work-life balance. As public awareness of mental and physical health increases, employees will expect employers to be more flexible with their working hours. An extra day off will allow for better time management and enable people to pursue passions and spend time with family and friends.





According to a Pew Research Center study, **the future of gender equality looks optimistic**<sup>130</sup>. But at the same time, there are concerns that emancipation will not progress evenly across the globe and that crises of various kinds may result in reversals of this process. Social researcher Alice Evans points out that, although we are already seeing such phenomena today, in the long term they need not threaten progress at all<sup>131</sup>. In predictions for 2040 from the Journal of Future Studies, author Stephanie Kwan considers scenarios for the future of women's work, including one in which the patriarchal model is replaced by a more matriarchal one, with men more likely to choose to step out of their role as "heads of household"<sup>132</sup>.



Experiments with the four-day working week, e.g. through the **"4 Day Week Global"** initiative, have been conducted in more than a dozen countries (such as Germany, Canada, Sweden and India) in recent years. A report by the British think-tank Autonomy indicates that productivity gains through the use of generative AI at work could result in the introduction of a 4-day week for 28% of employees in the UK by 2033<sup>133</sup>. Nobel laureate in economics Christopher Pissarides also talks about the possibility of reducing working time through productivity gains associated with automation<sup>134</sup>.

*I wish you this with all my heart and try to be optimistic, but sometimes it is difficult not to succumb to gloomy visions of the future. In the bigger picture, if things go badly, scenarios that speak of a shift in the global balance of power, leading to the increasing isolation of states and the occurrence of conflicts replacing cooperation, will come true. The world may be in a state of constant cyber warfare, with systems using artificial intelligence being used for surveillance and social control. Under the pretext of optimising productivity, there will be an increase in the intensity of tracking in workplaces or during work. There are increasing warnings that the digital world needs to be regulated. Hopefully, this social reluctance will make algorithmic personalisation sharply regulated. For now, more than half of those questioned in Germany, the UK or the US are fed up with it.*

- They keep changing things there, regulating things, they're about to ban self-recording - Grandpa corrected the positioning of the camera, which he used to record himself almost constantly, including when he was sleeping.
- Oh, Dad, when they introduced cars, you didn't have to wear a seatbelt at the beginning either, and you soon found out how that ends - Karolina sighed in exasperation. - Aren't you sometimes worried whether those cloud recordings of yours are really safe? Do you have any good security?  
- But I don't want them to be secure - the grandfather shook his head disapprovingly. - I want you to have easy access to them when, as they say, I'm gone. You will be able to create a hologram of me from them and letters like this will no longer be necessary - Grandpa stirred his tea with a spoon with satisfaction.
- Well, that's what I'm not sure about, Grandpa - Karolina took the envelope in her hand and stroked it, studying its structure. - Have you heard about the recent collapse of one of those smaller self-recording storage companies? I can't remember its name... There were media reports that cyber criminals were blackmailing people with these recordings.
- And wasn't it the case that these recordings just somehow disappeared and could not be recovered? Maybe I'm getting something wrong, there are so many stories like that - Zdzislaw mused. - Either way, it may ultimately turn out that paper will be more durable than digital files.
- Grandpa, do you remember floppy disks? When we were kids, we used to write everything on them, then on CD-ROMs, but now, even if I found them, I wouldn't be able to play it back - Lukasz pointed to the letter. - And we will always read.
- Grandpa, how does this relate to the civic control that you are such a great supporter of? - Karolina asked. - Who controls the big corporations?
- But I don't use the services of large corporations - Stefan turned off the recording for a moment and displayed the security certificate of the data storage company on his phone screen. - Oh, you see, here is a European certificate. This is what we have won as a European society, that we can feel safe.
- I don't know - added Michał. - Only years will tell what the consequences of all this will be.
- But now maybe we should find out what else Zosia's grandmother has written - Basia, who has been silent so far, interjected. - I don't know about you, but I'm curious.



In an era of intensifying **cyber attacks**,

**civilian infrastructure** - such as that used to organise remote working or store data in the cloud - **may increasingly become a target for criminals**<sup>135</sup>. The problem with digital data can also be its vulnerability to error by companies providing collection services. In May 2024, there was a high-profile story about an Australian company whose Google accidentally deleted resources from the cloud<sup>136</sup>. The risks increase when sensitive data is involved. At the same time, this challenge must be dealt with in order to unlock the potential of big data for the development of many sciences, such as medicine<sup>137</sup>.

Grandma's hologram returned to continue reading:

*Some warn that the winding back of globalisation could disrupt international cooperation, and that the glocalisation of work, above all the rise of platform work, will affect the condition of workers. There are also predictions of technological unemployment, for now it is comforting to see a wide range in forecasts, with between 9% and nearly 60% of the population reportedly at risk.*

– I already know something about that! – Michał said.

*But I am most concerned about increasing loneliness: the proportion of people with mental health problems experiencing loneliness is growing exponentially in our time.*

– Exactly right, mum was right – Karolina interrupts the reading of the letter. – Mental health has always been neglected, and now it's no better. People don't want to talk about their emotions, they get help too late.

– Mum – Zosia looked at Alex in agreement. – We talk to you about feelings all the time.

– No! I'm worried, you're at a difficult age, you need support and you tell us so little....

– Quiet, let us finish – irritated grandfather shushed the women.

– 'Oh no, something's wrong, Granny's getting stuck – Zosia points to the flashing image of grandma with her hand.

– Oh, unfortunately, with previous attempts this has happened too – Basia trying to change something using the app on her phone.

*Finally, I have no wise counsel for you... – the grandmother's voice became so low that no one heard the last words spoken by her.*

– I think someone needs to read that last bit - Basia said to the family. –

Maybe I will – Karolina took the second sheet of paper from her daughter's hands and began to read it aloud:

*Because I honestly have no idea what kind of world you're going to live in. Though overall, I have one from the perspective of my surviving years: to cherish relationships with others. In good times they provide happiness, in the worse ones the opportunity to survive.*

*Grandma*

Karolina, reading out the last words of the letter, rubbed her cheeks, wet with tears.

– It's very touching what Grandma wrote - grandpa mused. – And she was right. I am very happy to see you here today.

– And you, Zosia? Are you happy with your birthday? – Auntie asked. – It's your day, we should do what you feel like doing.

– Of course, but first the cake – Karolina entered the room, carrying a cake with sixteen candles in her hands.

The family stood up and started singing „Happy Birthday”, and Zosia covered her face with her hair out of embarrassment.

The cake was cut into pieces, the burnt candles lay on the side on a plate, the same set will serve at least a few more times at future celebrations. The conversations around the table went on in an unhurried manner. Stefan showed Zosia all the functionalities of the civic app; Zosia, more out of sympathy for her grandfather than out of her own need, asked numerous questions and listened patiently to his explanations. Grandpa described in detail to her the „zero trust” approach to security in the civic app. – You know, it’s crucial that everything is very, very secure so that we can be sure that no one is going to use our votes. Here you have this indication that the connection is secure – he pointed his finger at a little icon in the corner of the screen. – Yes, sure, Grandpa, I agree it’s very important – Zosia hid a smile, snuggling her face into Grandpa’s shoulder, not wanting to show that none of what Grandpa was saying was new to her. Alex was showing Basia and Karolina the new digital insects. Łukasz and Zdzisław talked about ski jumping, which was now taking place on an artificial surface, as the chances of snow were getting slimmer every year. Aunt Marta was listening to the conversation from the sidelines. At one point she took the floor, and the technological level of the image transmission made Łukasz and Zdzisław, who were sitting next to her, feel for a moment that Marta was almost leaning out of the screen.

- Dear everyone, we should somehow capture this day for Zosia, immortalise it – she exclaimed. – But how can we do that when we don’t know what will survive? – she mused.
- Maybe we should do everything that is available to us today – Karolina remarked. – We can’t be sure what will survive, which is a bit scary....
- But there are also things that are still going on, for centuries, even though they are sometimes in danger – added Grandpa Stefan.
- What do you mean, grandpa? – Zosia asked.
- Democracy, politics, nature, which is still struggling and persisting despite these terrible consequences of the climate catastrophe – Stefan mused. – Finally – our family, all of you – he embraced Zosia.
- That’s true – Łukasz said. – We can write a letter, take a photo, make a film or whatever, but the most important thing is that we are all together. It is too bad that without Krysia, but she is also with us through her letter - Stefan’s voice cracked.
- You said it very beautifully, Dad - Karolina embraced her father by the neck.
- I really want us all to remember this moment and always have it in our memories.



## CHAPTER

# 14

## EPILOGUE. IN THE EVENING

Zosia showered, threw her dirty clothes into the washing machine, which will turn on by itself when its drum fills up, and returned to her room, which was surprisingly quiet after today's chatty day. In the evening, her smartwatch muted itself, showing no incoming notifications. This is part of Zosia's cyber hygiene that she has been following since the workshop trip, during which she had no access to her phone or smartwatch at all. She was terrified at first, but after a few days she began to appreciate the benefits of falling asleep without wake-up notifications. Her parents applauded the idea, as they had insisted for a long time that Zosia would not fall asleep while watching videos on social media.

The presents she had received for her birthday were lying on Zosia's bed: a book on civic participation from her grandfather Stefan, a mini-kit allowing her to digitally record selected plants from her aunt Marta, a book on the symbiosis between insects and plants from Alex. Grandpa Zdzisław topped up her pocket money account so she could buy her own present. Dad made a new piece for her for the cellar plant culture; a metal shelf stood leaning against the bed frame. Uncle Michał and Basia brought a self-grown avocado seedling. They had to put a lot of work into it, as they didn't have many flowers at home and weren't familiar with growing them. Basia also added a hologram of the plant. Thinking about everything she got for her birthday, Zosia felt grateful not only for the presents, but for the attention and time her family had put into thinking up and preparing them. Each gift had something of the gift-giver in it, but was tailored to what she could enjoy herself. From her mum, she received a bracelet that had previously belonged to her grandmother.

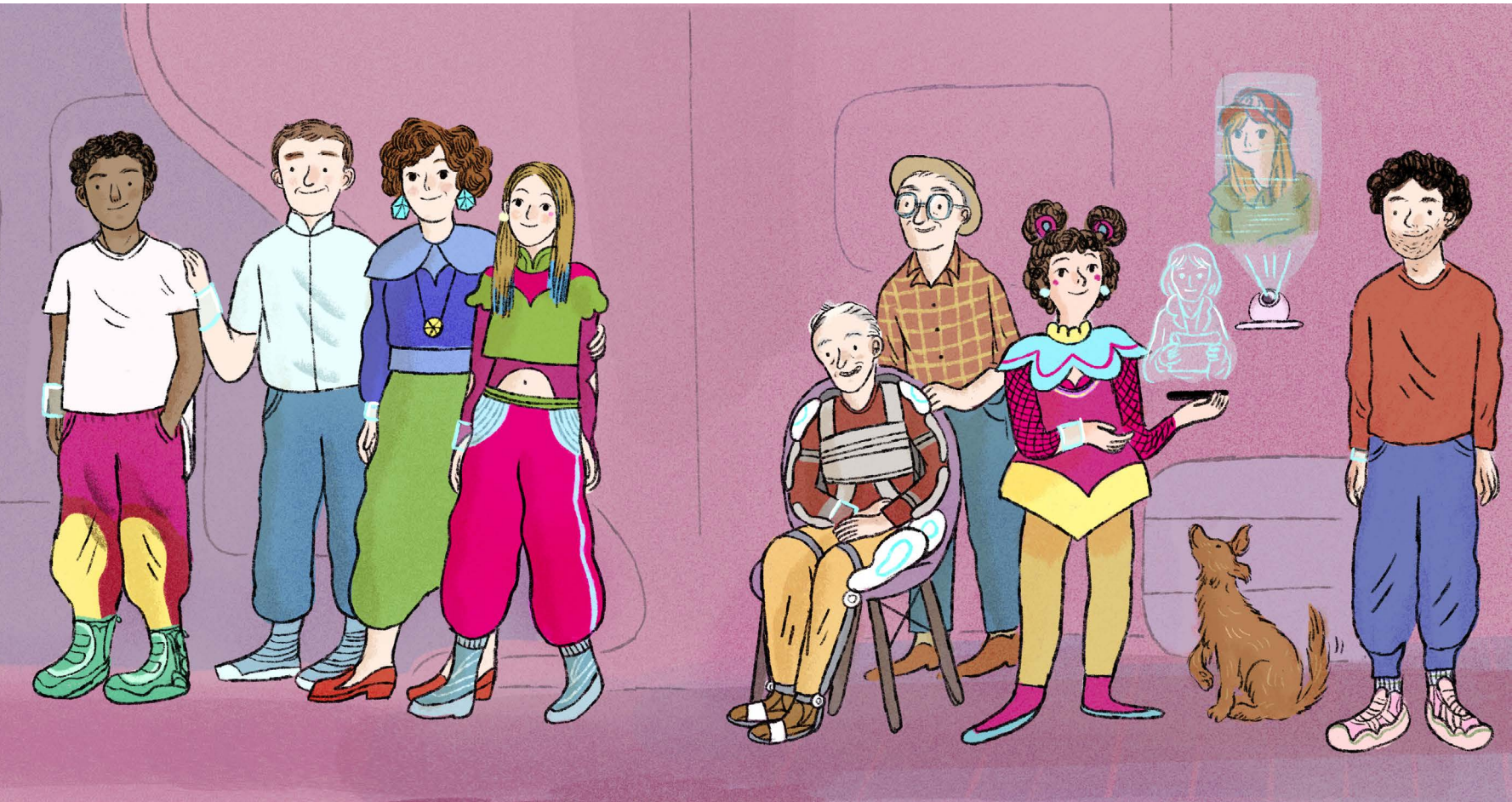
She added it to the set of bracelets she had on her hand today. I wonder if she will one day pass this bracelet on to someone. There is no telling what the future will bring.

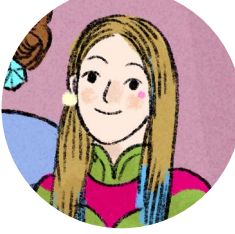
As she fell asleep, Zosia thought about what her birthday would be like in another 16 years, and then in another... What would happen in her life? In the lives of her loved ones? What new people will appear in it? Who will she invite to her birthday party? What will the world look like then? Will it resemble the one she knows? Many questions swirled around Zosia's head as she moved ever closer to the boundary between waking and dreaming.


Suddenly, she heard the quiet creaking of the door and the voices of her parents, who, peering through a crack, whispered to each other:


- It's unbelievable that she is already an adult.
- Until recently, she would not fall asleep without a goodnight kiss - Lukasz reminisced.
- Well, not for a good few years now - laughed Karolina.


Through the slightly ajar door, Koko ran into the room, jumped onto Zosia's bed and snuggled into her side.





<b>NAME</b>	ZOSIA	
<b>YEAR OF BIRTH, AGE</b>	2024, 16 years old	
<b>EDUCATION</b>	Attends high school	
<b>FAMILY POSITION</b>	Daughter of Karolina and Łukasz, sister of Alex	
<b>INTERESTS</b>	Home-grown plants, reading books (especially original editions, not subject to modifications adapting their content to the reader's age). Enthusiast of all things vintage.	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	She uses new technologies, but is also enthusiastic about such "traditional" forms of spending time as going to the library; she has created a digital twin of the installation that keeps her plants grown in the basement alive. When communicating with friends, she does not use AI-generated prompts. She uses the DressUp app to suggest an outfit for the day; home-related apps and websites; smart home devices installed in her home (including the SlowCook app).	


<b>NAME</b>	KAROLINA	
<b>YEAR OF BIRTH, AGE</b>	1990, 50 years old	
<b>EDUCATION</b>	Higher, biology	
<b>WORKPLACE</b>	International cooperation BioRoku	
<b>FAMILY POSITION</b>	Stefan's daughter, Zdzisław's granddaughter, Łukasz's wife, Zosia's mother, Marta's sister	
<b>INTERESTS</b>	A feminist activist in the past, she keeps in touch with her friends with whom she was active in a feminist organisation	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	She has a positive attitude towards new technologies, which enable her to work remotely and perform most of her household chores. However, they also raise concerns for her due to their potentially negative impact on her mental health. When her husband lost his corporate job as a result of his position being replaced by AI, she was concerned that this would affect his mental health.	


<b>NAME</b>	ŁUKASZ	
<b>YEAR OF BIRTH, AGE</b>	1988, 52 years old	
<b>EDUCATION</b>	Higher	
<b>WORKPLACE/ SOURCE OF INCOME</b>	Autonomous grocery store, civil income	
<b>FAMILY POSITION</b>	Karoline's husband, Zosia's father, Michał's brother	
<b>INTERESTS</b>	He uses new technologies at home (smart home) and at work. However, he has fallen victim to the redundancies associated with the displacement of certain groups of workers by AI.	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	He uses new technologies at home (smart home) and at work. However, he has fallen victim to the redundancies associated with the displacement of certain groups of workers by AI.	


<b>NAME</b>	STEFAN	
<b>YEAR OF BIRTH, AGE</b>	1970, 70 years old	
<b>EDUCATION</b>	Higher	
<b>FAMILY POSITION</b>	Karolina's and Marta's father, Zosia's and Alex's grandfather	
<b>INTERESTS</b>	Since he entered retirement age, he has become an ardent advocate of civic participation, self-recording (he records himself so that after his death his family can create a hologram of him from his recordings).	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	Since he entered retirement age, he has become an ardent advocate of civic participation, self-recording (he records himself so that after his death his family can create a hologram of him from his recordings).	

<b>NAME</b>	ZDZISŁAW	
<b>YEAR OF BIRTH, AGE</b>	1951, 89 years old	
<b>EDUCATION</b>	Secondary	
<b>FAMILY POSITION</b>	Stefan's father, Karolina's and Marta's grandfather, Zosia's and Alex's great-grandfather	
<b>INTERESTS</b>	Cars, in the past trips to other continents	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	Rather positive, he has used the ApartamentAI service, choosing his new place to live, and uses a number of wearables that measure his health on an ongoing basis.	

<b>NAME</b>	MARTA	
<b>YEAR OF BIRTH, AGE</b>	1995, 45 years old	
<b>EDUCATION</b>	Higher education, degree in philosophy	
<b>SOURCE OF INCOME</b>	Social media channels, in which she shows her trips to places that are difficult to access due to climate change, seeks out unique scents and captures them with new technology.	
<b>FAMILY POSITION</b>	Karolina's sister, Zosia and Alex's aunt	
<b>INTERESTS</b>	Travelling, discovering unusual fragrances	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	Enthusiastic about new technologies, it allows her to act as an online creator.	

<b>NAME</b>	ALEX	
<b>YEAR OF BIRTH, AGE</b>	2020, 20 years old	
<b>EDUCATION</b>	secondary	
<b>FAMILY POSITION</b>	Karolina's and Łukasz's foster son, Zosia's brother	
<b>INTERESTS</b>	Digital entomology, ecology, cooperatives	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	He has a positive attitude towards new technologies and uses them in a project based on digital entomology, through which information on insects, including species that have become extinct due to climate change, is digitised.	

<b>NAME</b>	MICHAŁ	
<b>YEAR OF BIRTH, AGE</b>	1986, 54 years old	
<b>EDUCATION</b>	Higher, graphics	
<b>SOURCE OF INCOME</b>	Without a permanent job, likely receiving a civic income	
<b>FAMILY POSITION</b>	Łukasz's brother, Basia's father	
<b>INTERESTS</b>	Graphics, animation, politics	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	He declares a negative attitude towards new technologies such as 9G, but uses the internet and IoT solutions freely. He is a member of various social media groups for neo-Luddites and 9G opponents.	

<b>NAME</b>	BASIA	
<b>YEAR OF BIRTH, AGE</b>	2025, 15 years old	
<b>EDUCATION</b>	Remote high school	
<b>FAMILY POSITION</b>	Michał's daughter, Zosia's cousin	
<b>INTERESTS</b>	Spending time on the internet, online games, AI, boundaries between humans and AI and machines, quantum computers	
<b>ATTITUDE TOWARDS NEW TECHNOLOGIES</b>	An enthusiast of new technologies, internet is the content and space of her life, she prefers virtual reality to the offline one, she wants to develop her relationship with her family primarily through the internet, as it is easier for her to communicate this way.	



# EXPERT COMMENTS

# ARTIFICIAL EMPATHY



**dr Ada Florentyna Pawlak**  
anthropologist of technology, lawyer  
and art historian

While it has never been easier in history to connect with another human being, we feel lonelier than ever before. We are facing a **global crisis of loneliness** - paradoxically, in a social media culture, both singles and people living in relationships experience a sense of isolation. Synthetic media are images produced by advanced information technologies such as artificial intelligence, generative neural network models or virtual reality. They contain content that does not mediate reality, but, created or processed by computer algorithms, invites a parallel reality full of interactive characters simulating humans. Thanks to deluding systems, digital reality is filled with characters that do not exist in the physical world, and yet relationships with them appear to many lonely users as deeply authentic. This raises the pressing need for technologies to distinguish online between humans and AI-generated human replicas.

A growing number of companies are popularising attractive images simulating a human being with an AI-generated voice enabling advanced emotional interpersonal communication with Generation Z and Alpha. *Eva AI*<sup>1</sup>, *GPT Girlfriend*<sup>2</sup>, *Romantic AI*<sup>3</sup>, *Muah*<sup>4</sup> and *Replika*<sup>5</sup> belong to the social chatbots that engage people in natural interactions - it is a conversational system that offers the opportunity to establish a subjective, deep relationship with the user. Artificial humans can play the role of friend, confidant or mentor; a lover who simulates deep feelings of love and attachment. One of the incentives motivating emotional interactions with artificial intelligence is to advertise it as friendly and empathic (*artificial empathy*).

The theory of para-social relationships (original: *para-social relationship*; now: *parasocial relationship*), based on parasocial interaction, was presented by D. Horton and R. Wohl in 1956 - the same year in which the term „artificial intelligence” was coined. The term „parasocial interaction” originally referred to the relationship formed between characters on television and their viewers: one that involves audience reactions beyond mere observation, in which viewers are drawn into a staging that is a „simulacrum of conversational give-and-take” (Horton & Wohl, 1956, p. 215). If the spectator becomes involved in one such parasocial relation that is presented to them for choice, much can be added to it by means of fantasy (e.g. imagining uncommunicated details). On the other hand, if they do not like the relationship, all they can do is leave it.

---

1 <https://evaapp.ai/app> [accessed: 25.4.2024]

2 <https://www.gptgirlfriend.online/blog/download> [accessed: 25.4.2024]

3 <https://romanticai.com> [accessed: 25.4.2024]

4 <https://muah.ai> [accessed: 25.4.2024]

5 <https://replika.com> [accessed: 25.4.2024]

Can „**artificial intimacy**“ replace real human relationships? Establishing an attachment relationship that provides a sense of security is one of the key factors in preventing feelings of loneliness. Meanwhile, AI is always available, non-judgmental and adapts to our interests. Research into the implications of parasocial relationships indicates that they can have both positive and negative effects - depending on the user and the ways in which they interact. On the one hand, they provide emotional support and a sense of companionship, which can contribute to wellbeing and reduce feelings of loneliness. On the other hand - over-involvement in such relationships can lead to social isolation and reduced interaction with real people. Participating in conversations with AI can create the illusion of connection and temporarily satisfy our need for interaction. Additionally, the parasocial relationship is cost-free. There is no need to engage in sustaining the relationship, no responsibility for the other party arises. It is therefore a relationship that one can engage in very comfortably; it will not typically provide the negative affect associated with either the need to fit in and care for the other party.

**As I understand it, technointimacy is a grand social experiment with consequences that are difficult to predict.** The solutions of digital transhumanisation raise concerns that not only the techniques of knowledge transfer and personality formation will gradually be taken over by artificial intelligence applications. Interactive artificial agents can exert a powerful emotional influence while convincing the user that a close relationship with an artificial system is a good choice. For the Beta generation arriving in 2025, this will be a natural relationship, part of the world and probably impossible to remove.

# WHAT EDUCATION OF THE FUTURE WILL BE LIKE



**Aleksandra Stanisławska**  
science reporter  
(CrazyNauka.pl)



**Piotr Stanisławski**  
science and technology reporter  
(CrazyNauka.pl)

Everyone is talking about how bad education is. And, unfortunately, they mostly talk, because the last decade or so has not brought systemic changes for the better.

The vision of schools in 2040 seems to highlight just the direction we are currently seeing: the stratification of schools. This is worrying because it usually stems from the fact that public schools do not meet the expectations of a significant proportion of people. This is, incidentally, a trend that is now prevalent in Poland, where, in 2023, 7.8% of students already attended private schools<sup>1</sup>. And in all likelihood a significant proportion of the remainder would have chosen such schools if they had only had the opportunity to do so. A 2021 poll<sup>2</sup> revealed that 55% of Poles would send their children to a private school.

In the 2040 prediction, we learn about several types of schools - public, openly using AI systems, private, where AI is not used, corporate, also not using AI and preparing for work in a specific company, and unspecified schools with remote education, unspecified here. So, we have an even greater stratification than at present - especially as there may be other types of institutions: if only those that will develop from democratic schools, which currently formalise and organise home education.

It is interesting to note that it is the public (and therefore state-funded) schools that use a solution that we now recognise as cutting-edge - artificial intelligence. The „better” ones, paid or funded by corporations, are consciously opting out.

What might this mean? We don't know if the opt-out applies only to students, or if teachers are also not using AI to prepare lessons. But there are many indications that such systems are considered detrimental to the educational process. This is very pessimistic, because it suggests that there has been a failure to move beyond what happened in Polish schools during the first two years of the generative AI boom, i.e. a game of cops and robbers between students using AI to do their homework and teachers trying to forbid it. Just as badly, it looks like teachers have failed to implement AI as a valuable tool that makes their job easier and faster. This is a very pessimistic vision, hopefully not true.

The vision of corporate schools evokes mixed feelings. On the one hand, it gives the student a concrete goal and guarantees for the future, something that is sorely lacking in the current system, in which many people feel the futility of a now heavily outdated system of general education. On the other is, of course, locking a person into a specific career path at a time when they themselves are not yet in a position to make a properly informed decision.

1 <https://www.edziecko.pl/rodzice/7,79361,31588455,nauczyciel-o-szkolach-prywatnych-sam-wyslalbym-tam-swoich-synow.html> (accessed: 10.01.2025).

2 <https://oko.press/polki-i-polacy-nie-ufaja-publicznej-oswiacie-sondaz> (accessed: 10.01.2025).

# WHAT TOOLS DID WE USE TO PROJECT THE FUTURE?

The work on the Family 2040 project was divided into three main phases.

## PHASE 1 – Desk research

The aim of the first stage of the „Family 2040” project was to gather the broadest and most up-to-date database of reports, data, articles and research papers on societies, families and individuals in the future and the changes and trends that will shape our reality in the next several years. In the first quarter of 2024, desk research was conducted and the results were categorised due to the **10 key activities of everyday life** identified earlier in the brainstorming process - (1) I communicate, (2) I live, (3) I move around, (4) I gain knowledge, (5) I work, (6) I shop, (7) I use, (8) I take care of myself, (9) I spend leisure time, (10) I organise myself; and the **10 most important technological, economic and social macrotrends** - (1) automation, (2) extending reality, (3) miniaturisation, (4) bionics and biotechnology, (5) individualisation, (6) glocalisation, (7) caring for the environment, (8) declining sense of security, (9) changing perceptions of freedom and privacy, (10) transformation of social roles.

The more than 200 sources collected in this way formed the basis for the preparation of the **workshop** carried out in the second phase of the project and **the contextual information** that formed part of the third phase.

## PHASE 2 – Workshop

The aim of the second of the project was to **create the titular „family” living in 2040** - the people who comprise it, their characteristics and the everyday situations they face in life. The Training Games Workshop was invited to collaborate on this stage of the project, and on the basis of its own ‘Time Machine’ concept, designed and carried out a workshop on April 24, 2024, during which participants „travelled back in time” to April 24, 2040 and, through a variety of creative exercises and support materials, made a description of reality from the future „in the present tense”.

Those involved in the project from Polityka Insight and T-Mobile Poland were invited to participate in the workshop, but also **analysts and experts, as well as representatives of the creative professions** - such a diverse group made it possible to come up with non-obvious solutions and embed them in factual and scientific reality at the same time. Participants in the workshop included:

## EXTERNAL EXPERTS

**Joanna Erbel PhD** - sociologist, urban activist, expert on housing and building urban resilience, Director of Protopia at CoopTech Hub, founder of the Near Foundation, author of *Leaning into the Future. How to change the world for the better* (2022).

**Ada Florentyna Pawlak PhD** - technology anthropologist, lawyer, and art historian. She specializes in the social implications of artificial intelligence and transhumanism. She is a university lecturer, teaching courses such as Psychology and Informatics at SWPS University, Trendwatching & Future Studies at AGH University of Science and Technology, Human-Machine Collaboration and Business Process Automation at the Faculty of Management, University of Łódź, as well as Business AI at Kozminski University in Warsaw. She is a researcher at the Center for Artificial Intelligence and Cybercommunication Research at the University of Łódź, an Associate Researcher at Collegium Civitas in Warsaw, and a speaker on emerging technologies. Additionally, she is the program director of the postgraduate studies “Artificial Intelligence in Business” at Collegium Da Vinci and a founding member of the Polish Transhumanist Association.

**Aleksandra Stanisławska** - co-founder and co-manager of Poland’s largest popular science blog CrazyNauka.pl, science journalist (*Rzeczpospolita, Przekrój, Wiedza i Życie, Tok.fm*).

**Piotr Stanisławski** - Science and technology journalist connected with *Przekrój, Gazeta Wyborcza, Gazeta.pl* and *Tok.fm*, where he hosts, together with Aleksandra Stanisławska, the podcast Homo Science. Co-founder of the largest popular science blog in Poland, Crazy Nauka.

**Marcin Wicha** - graphic artist, essayist, author of books (including ‘How I stopped loving design’, ‘The direction of travel’), winner of the Nike Literary Award for the book ‘Things I did not throw away’, as a graphic artist he collaborated with *Tygodnik Powszechny, Charakter, Gazeta Wyborcza*.

**Michał A. Zieliński** - screenwriter (‘Kos’ directed by Paweł Maślona), former journalist (*Gazeta Wyborcza, Rzeczpospolita, TVN24, Polityka Insight*).

## POLITYKA INSIGHT

**Julia Cydejko** - Energy analyst at PI Energy. She specialises in international topics and climate policy. She has conducted research on natural resource exploitation on the Indonesian island of Celebes and in Iceland, and has worked as a copywriter, translator and journalist. She holds a degree in cultural studies and liberal arts from the University of Warsaw.

**prof. Adam Czerniak** - former Research Director and Chief Economist at Polityka Insight, Head of the Department of Institutional and Political Economics at the Warsaw School of Economics. Founding member of the Lease Market Laboratory. Author of scientific publications on economic sociology, institutional economics and real estate market functioning. Polish representative in the council of the European Master in Official Statistics operating at Eurostat in the term 2024–2026.

**Katarzyna Dębska PhD** - Sociologist, researcher in the Polityka Insight team, assistant professor at the Faculty of Sociology, University of Warsaw, lecturer in Gender Studies at the Institute of Literary Research, Polish Academy of Sciences. She specialises in social research methodology, research ethics, social inequalities, sociology of social structure and sociology of family life. Author of scientific articles published in Polish and international scientific journals.

**Jan Jęcz** – Sociologist, graduate of the Adam Mickiewicz University in Poznań, currently studying at the Doctoral School of Social Sciences at the Adam Mickiewicz University. In the past, he worked as a communication specialist and UX researcher, and also co-created educational projects on climate and media. As a freelance journalist, he has published in *Magazyn Kontakt*, *Kultura Liberalna*, *Krytyka Polityczna*, the monthly *Znak* and the *OKO.press*. Winner of the Leopold Unger Scholarship for young journalists.

**Maciej Michalik** – coordinates commissioned projects carried out by the PI Research department. He oversees the process of preparing reports, presentations and other analytical products and supports the day-to-day work of the department from the formal, organisational and legal side. He has been with Polityka Insight since 2016, first as an intern in the legal department and then as a research assistant and project manager. Graduate of law and European diplomacy at the University of Wrocław.

## T-MOBILE POLSKA

**dr Agnieszka Jankowska** - director of Corporate Affairs and Public Affairs, T-Mobile Poland, graduate of the Warsaw School of Economics (SGH), where she received her doctorate in economics, and the National School of Public Administration, member of the board of directors of the American Chamber of Commerce in Poland, vice-president of the board of directors of the Digital Poland Foundation, member of the Council of the Polish Chamber of Information Technology and Telecommunications and the 5th-term Council for Digitisation at the Ministry of Digitisation;

**Katarzyna Rosińska** - manager in the Public Policy Department at T-Mobile Polska, specializing in economic diplomacy and public affairs. Previously, she worked at the Polish Information and Foreign Investment Agency (PFR Group) and LOT Polish Airlines. She was involved in the preparation of the World Expos in Shanghai and Milan, gaining experience in organizing international events.

**Lidia Stępińska-Ustasiak** - sociologist, public affairs expert for T-Mobile Poland, European representative in the Group on Capacity Building Initiatives at the International Telecommunications Union (ITU), member of the Global Business and Human Rights Scholars Association. She analyses the impact of technology on institutions and individuals and disseminates knowledge on the subject through publications and lectures.

## TRAINING GAMES WORKSHOP

**Joanna Średnicka PhD** - co-founder of the Training Games Workshop, originator of the Competence Game online game venture and initiator of the Game Changers Academy. Entrepreneur, managing partner of three companies in the area of consultancy, game-based training, development and e-commerce business. Member and certified designer of NASAGA (North American Simulation and Gaming Association). Expert in research and development of organisations in the field of culture, processes and operating models. As a lecturer, she cooperates with the SWPS University, the Warsaw School of Economics, the University of Warsaw, Collegium Civitas, TU Delft (the Netherlands).

**Jagoda Gandziarowska-Ziotecka** - expert in game and simulation methods in training processes. Managing partner and co-founder of the Training Games Studio. Specialises in the use of simulation games in the processes of building new teams, improving communication in organisations, implementing the principles of co-operation based on trust and oriented towards achieving goals. Lecturer of the game method at the Warsaw School of Economics, Warsaw University, Koźmiński University, Academy of Evaluation. From 2010 to 2014 she was a member of the management board of the International Simulation and Gaming Association (ISAGA).

The workshop resulted in profiles of individual family members with their characteristics and a description of the relationships between them.

### PHASE 3 – Development of the publication

The aim of the third stage of the project was to develop a publication - story, consisting of the following parts: an introduction, a description of the methodology and the actual text of the publication (a narrative description of Zosia's 16th birthday with contextual information included in the boxes). In the first step, based on the results of the workshop work, the **actual text of the publication** - i.e. a description of the 16th birthday of the 16-year-old Zosia - was developed. In the second step, based on the desk research carried out in the first stage, the text was supplemented with **contextual information** (infoboxes), which justify the description of reality created in the narrative layer and refer to source materials that deepen knowledge in a given area. As part of the final stage of the project, Zosia Dzierżawska was invited to collaborate on the graphic layer of the publication, visualising the image of Family 2040 and its individual members in the form of illustrations.

After the development of the actual content and infoboxes, **in a third step**, a collaboration was established with the **PLLuM consortium**, to which a number of prompts were sent for use in the generative AI models being developed within the consortium. The boxes presented in the body of the report are responses to the following prompts:

<b>The role of AI tools in the future education</b>	Characterise what the use of artificial intelligence tools in school education might look like in Poland in 2040. Include both teacher and student perspectives. Indicate the potential benefits and risks of using artificial intelligence in teaching. Cite examples to illustrate the phenomenon, if available. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.
<b>The idea of digital twins and their use in 2040</b>	Briefly describe the premise of the idea of digital twins. Then outline what types of twins might be popular in 2040 in Poland and what their use might look like in practice. Point out the potential benefits and risks of digital twins. Consider different areas of life: work, study, hobbies. Cite examples to illustrate the phenomenon if available. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.
<b>Domestic plant cultivation and its importance for humans</b>	Describe what domestic plant cultivation might look like in Poland in 2040. Try to assess how important this method of plant cultivation will be for the economy and the well-being of people. Point out specific technologies that could be applied to this activity. Cite examples to illustrate the phenomenon, if available. Adopt a popular scientific writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.
<b>Energy generation and storage in Poland in 2040</b>	Characterise what energy generation and storage might look like in Poland in 2040. Focus on the perspective of households, also include the phenomenon of energy cooperatives. Point out specific technologies that can be used to create and store energy. Cite examples to illustrate the phenomenon, if available. Adopt a popular scientific writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.
<b>Access to clean water in Polish cities</b>	Answer the question of whether lack of access to clean water in cities will be a problem in Poland in 2040. Describe what urban water management might look like then. Indicate the technologies that will be used for this task. Cite examples to illustrate the phenomenon, if available. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.
<b>Protein sources in the diet of Poles in 2040</b>	Write what will be the main source of protein in the diet of Poles in 2040. Indicate which technologies and social phenomena are likely to affect protein production in Europe. Cite examples to illustrate the argument, if available. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.

<p><b>Exoskeletons and their significance in the everyday life of Poles in 2040</b></p>	<p>Briefly describe what exoskeletons are and evaluate their significance in the everyday life of Poles in 2040. Consider their use in different areas of everyday life. Cite examples to illustrate the argument, if available. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.</p>
<p><b>Working time in the Poland of the future</b></p>	<p>Answer the question how many days per week the average worker in Poland will work in 2040. Justify your answer by indicating what will affect the length of the working week. Adopt a popular science writing style. Do not create lists or headings for paragraphs, avoid incomplete sentences.</p>

**The PLLuM (Polish Large Language Model)** project is an initiative to create an open Polish language model. The established consortium is a unique combination of the forces of leading Polish scientific institutions, experts in various fields, to create a groundbreaking Polish language model. The project involves: Wrocław University of Technology (project leader), NASK National Research Institute, Institute of Computer Science of the Polish Academy of Sciences, Information Processing Centre of the National Research Institute, University of Łódź, Institute of Slavic Studies of the Polish Academy of Sciences.

# ENDNOTES

- 1 Elad Natanson, "Hyper-Personalization Is Already Here — Its Future Is Even More Cutting-Edge", Forbes, June 1, 2023, <https://www.forbes.com/sites/eladnatanson/2023/06/01/hyper-personalization-is-already-here---its-future-is-even-more-cutting-edge/>.
- 2 Jon Yablonski, "The Cost of Personalization", Humane by Design, January 9, 2023, <https://humanebydesign.com/garden/the-cost-of-personalization/>.
- 3 Jakub Bodziony, "JACYNO: Cult of individualism kills vaccine solidarity", Kultura Liberalna, August 2, 2021, <https://kulturaliberalna.pl/2021/08/03/kult-indywidualizmu-zabija-szczepionkowa-solidarnosc-jacyno/>.
- 4 Andy Davis et al., "How Employers Can Spark a Movement to Help Us Live Longer and Healthier Lives", Deloitte Insights, June 20, 2023, <https://www2.deloitte.com/us/en/insights/industry/health-care/employers-aging-and-health.html>.
- 5 "Introducing the Pissarides Review into the Future of Work and Wellbeing" (London: Institute for the Future of Work, 2022).
- 6 Ewelina Hallmann, et al., "Plate of the future - Think Tank's opening report" (Interdyscyplinarne Centrum Analiz i Współpracy Żywność dla Przyszłości, April 2023), [https://danone.pl/assets/interdyscyplinarne/Raport\\_Talerz\\_Przyszlosci\\_2023.pdf](https://danone.pl/assets/interdyscyplinarne/Raport_Talerz_Przyszlosci_2023.pdf).
- 7 Sandeep Ravindran, "Here Come the Artificial Intelligence Nutritionists", The New York Times, March 14, 2022, sect. Well, <https://www.nytimes.com/2022/03/14/well/eat/ai-diet-personalized.html>.
- 8 Michon Scott, "Climate & Chocolate", NOAA Climate.gov, February 10, 2016, <http://www.climate.gov/news-features/climate-and/climate-chocolate>.
- 9 Michon Scott, "Climate & Coffee | NOAA Climate.Gov", June 19, 2015, <http://www.climate.gov/news-features/climate-and/climate-coffee>.
- 10 Klaudia Bączyk-Lesiuk, Krzysztof Patkowski, and Marek Zieliński, "Polish education in the shadow of AI" (Poznań: Polskie Towarzystwo Ekonomiczne Oddział w Poznaniu, 2024).
- 11 Hossein Dabbagh et al., "AI Ethics Should Be Mandatory for Schoolchildren", AI and Ethics, April 4, 2024, <https://doi.org/10.1007/s43681-024-00462-1>.
- 12 Jessica Grose, "Opinion | Get Tech Out of the Classroom Before It's Too Late", The New York Times, April 10, 2024, sect. Opinion, <https://www.nytimes.com/2024/04/10/opinion/schools-technology.html>.
- 13 Damien Leloup, "No, Tech Bosses Don't Ban Their Kids from Using Screens", Le Monde.Fr, March 25, 2024, [https://www.lemonde.fr/en/pixels/article/2024/03/25/no-tech-bosses-don-t-ban-their-kids-from-using-screens\\_6653457\\_13.html](https://www.lemonde.fr/en/pixels/article/2024/03/25/no-tech-bosses-don-t-ban-their-kids-from-using-screens_6653457_13.html).
- 14 Associated Press, "Roald Dahl Rewrites: Edited Language in Books Criticised as 'Absurd Censorship'", The Guardian, February 20, 2023, sect. Books, <https://www.theguardian.com/books/2023/feb/20/roald-dahl-books-rewrites-criticism-language-altered>.
- 15 Chloe James, "Disney Accused of Censoring Old Content, Rewriting Cinematic History", Inside the Magic, June 7, 2023, <https://insidethemagic.net/2023/06/disney-accused-censoring-old-content-rewriting-cinematic-history-cj1/>.
- 16 Mattias Frey, Netflix Recommends: Algorithms, Film Choice, and the History of Taste (Univ of California Press, 2021).
- 17 Kyle Chayka, Filterworld: How Algorithms Flattened Culture (Heligo Books, 2024).
- 18 McKinsey, "What is digital-twin technology?", mckinsey.com, July 12, 2023, <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-digital-twin-technology>.
- 19 Cor Verdouw et al., "Digital twins in smart farming", Agricultural Systems 189 (April 1, 2021): 103046, <https://doi.org/10.1016/j.agry.2020.103046>.
- 20 Rob Enderle, "Merlynn and the Promise of Human 'Digital Twins'", Computerworld, June 15, 2022, <https://www.computerworld.com/article/3664048/merlynn-and-the-promise-of-human-digital-twins.html>; Nicola Berti et al., "Towards Human Digital Twins to Enhance Workers' Safety and Production System Resilience", IFAC-PapersOnLine 56, nr 2 (2023): 11062–67, <https://doi.org/10.1016/j.ifacol.2023.10.809>.
- 21 Mimi Mun Yee Tse, "Therapeutic Effects of an Indoor Gardening Programme for Older People Living in Nursing Homes", Journal of Clinical Nursing 19, nr 7–8 (2010): 949–58, <https://doi.org/10.1111/j.1365-2702.2009.02803.x>.

- 22 Camilo Cerro, "Future of dwelling: indoor plants and produce" (SUSTAINABLE CITY 2022, Rome, Italy, 2022), 493–502, <https://doi.org/10.2495/SC220401>.
- 23 Jonathan Kingsley et al., "Pandemic gardening: A narrative review, vignettes and implications for future research", *Urban Forestry & Urban Greening* 87 (September 1, 2023): 128062, <https://doi.org/10.1016/j.ufug.2023.128062>.
- 24 Emergen Research <https://www.emergenresearch.com>, „Indoor Farming Market Size, Trend, Demand Analysis Till 2032”, accessed July 12, 2024, <https://www.emergenresearch.com/industry-report/indoor-farming-market>; "Fact.MR – Indoor Farming Market Analysis by Glass or Poly Greenhouses, Indoor Vertical Farms, and Container Farms for Aeroponics, Hydroponics, Aquaponics, Soil-Based, and Hybrid Growing from 2023 to 2033", accessed July 12, 2024, <https://www.factmr.com/report/indoor-farming-market>.
- 25 Apostolos Petropoulos i Brent Wanner, "Batteries and Secure Energy Transitions" (International Energy Association, April 2024).
- 26 Katarina Zimmer, "How Positive Climate Tipping Points Could Save Our Planet", November 2, 2023, <https://www.noemamag.com/how-positive-climate-tipping-points-could-save-our-planet>.
- 27 Justyna Orłowska and Łukasz Trembaczowski, "Energy cooperatives in Poland: social determinants of their formation" (Stowarzyszenie BoMiasto, 2023).
- 28 Michał Zabłocki, Justyna Orłowska, and Piotr Chałubiński, "Electrifying communities. Transforming the Polish Electricity Sector through Local Renewable Sources" (Polska Zielona Sieć, Beyond Fossil Fuels, 2024).
- 29 Matthew S. Smith, "These Minuscule Pixels Are Poised to Take Augmented Reality by Storm", *MIT Technology Review*, December 20, 2023, <https://www.technologyreview.com/2023/12/20/1084518/micro-leds-micro-oleds-augmented-reality-ar/>.
- 30 Mark Sullivan, "The Making of Mojo, AR Contact Lenses That Give Your Eyes Superpowers", *Fast Company*, January 16, 2020, <https://www.fastcompany.com/90441928/the-making-of-mojo-ar-contact-lenses-that-give-your-eyes-superpowers>; Nathan Efron, "Augmented reality contact lenses – so near yet so far", *Clinical and Experimental Optometry* 106, nr 4 (19 maj 2023): 349–50, <https://doi.org/10.1080/08164622.2023.2188176>.
- 31 Sean Hollister, "Ready or Not, the Glassholes Are Coming Back", *The Verge*, July 25, 2022, <https://www.theverge.com/2022/7/25/23054367/google-ar-glasses-glassholes-coming-back>.
- 32 Andrea Gallardo et al., "Speculative privacy attitudes and concerns about AR glasses data collection", *Proceedings on Privacy Enhancing Technologies* 2023, nr 4 (July 2023), <https://www.ece.cmu.edu/~lbauer/papers/2023/pets2023-ar-glasses.pdf>.
- 33 „Digital Consumer Trends 2023" (Deloitte, November 2023), <https://www2.deloitte.com/pl/pl/pages/technology-media-and-telecommunications/articles/Raport-Digital-Consumer-Trends-2023-cz-ll.html>.
- 34 Aaron Benanav, "The Revolution Will Not Be Brought to You by ChatGPT", *New Statesman* (blog), April 11, 2023, <https://www.newstatesman.com/ideas/2023/04/revolution-brought-chatgpt-artificial-intelligence>; Brian X. Chen, Nico Grant, i Karen Weise, „How Siri, Alexa and Google Assistant Lost the A.I. Race", *The New York Times*, March 15, 2023, sect. Technology, <https://www.nytimes.com/2023/03/15/technology/siri-alexa-google-assistant-artificial-intelligence.html>.
- 35 John Herrman, "The AI Chatbot Assistants Are Here. Do We Actually Want Them?", *Intelligencer*, September 23, 2023, <https://nymag.com/intelligencer/2023/09/the-ai-chatbot-assistants-are-here-do-we-want-them.html>.
- 36 Phil Mercer, "Why a «hologram Revolution» Could Be on the Way", October 19, 2023, <https://www.bbc.com/news/business-67080941>.
- 37 Hank Sanders, "Your Hologram Doctor Will See You Now", *The New York Times*, June 29, 2024, sect. Health, <https://www.nytimes.com/2024/06/29/health/texas-telehealth-hologram-doctor.html>.
- 38 Rachel Hall, "Hologram Lecturers Thrill Students at Trailblazing UK University", *The Guardian*, January 21, 2024, sect. Technology, <https://www.theguardian.com/technology/2024/jan/21/hologram-lecturers-thrill-students-at-trailblazing-uk-university>.
- 39 Martin Petty, "With Holograms, AI and Big Data, Football Front and Centre in Tech Race", *Reuters*, July 5, 2024, sect. Soccer, <https://www.reuters.com/sports/soccer/with-holograms-ai-big-data-football-front-centre-tech-race-2024-07-05/>.
- 40 „Video Conferencing Market" (Grand View Research, 2023), <https://www.grandviewresearch.com/industry-analysis/video-conferencing-market>.
- 41 Brittne Kakulla, "Boomers and Zoomers: Grandparents Using Video Chat to Connect With Young Grandchildren During the Pandemic" (Washington, DC: AARP Research, June 3, 2021), <https://doi.org/10.26419/res.00468.001>.
- 42 "Global report: to what extent do we want our future to be virtual?" (Zoom, 2021), <https://explore.zoom.us/docs/pl-pl/future-of-video-conferencing.html>.

- 43 Sergio C. Fanjul, "How Will We Construct Our Identity When Machines Do Our Work for Us?", EL PAÍS English, February 18, 2023, <https://english.elpais.com/society/2023-02-18/how-will-we-construct-our-identity-when-machines-do-our-work-for-us.html>.
- 44 Daniel Soufi, "What Will We Do after the End of Work?", EL PAÍS English, December 17, 2023, <https://english.elpais.com/technology/2023-12-17/what-will-we-do-after-the-end-of-work.html>.
- 45 Helen Hester and Nick Srnicek, *After Work: A History of the Home and the Fight for Free Time* (Verso Books, 2023).
- 46 Vili Lehdonvirta et al., "The Future(s) of Unpaid Work: How Susceptible Do Experts from Different Backgrounds Think the Domestic Sphere Is to Automation?", PLOS ONE 18, nr 2 (February 22, 2023): e0281282, <https://doi.org/10.1371/journal.pone.0281282>.
- 47 Brandon Vigliarolo, "Sam Altman's UBI Study Finds That Money Can Buy Happiness", The Register, July 23, 2024, [https://www.theregister.com/2024/07/23/sam\\_altman\\_basic\\_income/](https://www.theregister.com/2024/07/23/sam_altman_basic_income/).
- 48 Oliver Milman et al., "The climate disaster is here – this is what the future looks like", the Guardian, October 14, 2021, <https://www.theguardian.com/environment/ng-interactive/2021/oct/14/climate-change-happening-now-stats-graphs-maps-cop26>.
- 49 Patrick Greenfield, Phoebe Weston and Ajit Niranjana, "A Biodiversity Catastrophe: How the World Could Look in 2050 – Unless We Act Now", The Guardian, November 29, 2023, sect. Environment, <https://www.theguardian.com/environment/2023/nov/29/a-biodiversity-catastrophe-how-the-world-could-look-in-2050-unless-we-act-now-aoe>.
- 50 Zia Weise and Giovanna Coi, "Here's Your Life in 2040 — If the EU's Climate Plan Works", POLITICO, February 7, 2024, <https://www.politico.eu/article/your-life-2040-if-eu-climate-plan-work/>.
- 51 Fiona Harvey, "Massive Disinformation Campaign' Is Slowing Global Transition to Green Energy", The Guardian, August 8, 2024, sect. Environment, <https://www.theguardian.com/environment/article/2024/aug/08/fossil-fuel-industry-using-disinformation-campaign-to-slow-green-transition-says-un>.
- 52 Ajit Niranjana, "Why Are Green Parties Polling Badly for the European Elections?", The Guardian, June 4, 2024, sect. Environment, <https://www.theguardian.com/environment/article/2024/jun/04/why-green-parties-polling-badly-european-elections>.
- 53 Amanda Winkler, "Can Sponge Cities Help Us Prepare for More Floods?", Freethink (blog), October 7, 2021, <https://www.freethink.com/energy/can-sponge-cities-help-us-prepare-for-more-floods>.
- 54 "Miasto - gąbka", City of Łódź, accessed July 17, 2024, <https://uml.lodz.pl/ekoportal/klimat/woda/przeciwdzialamy-suszy/miasto-gabka/>.
- 55 Tim Lewis, "Has the 3D Printing Revolution Finally Arrived?", The Observer, March 12, 2023, sect. Technology, <https://www.theguardian.com/technology/2023/mar/12/3d-printing-the-new-technology-comes-into-its-own>.
- 56 Jörg Bromberger, Julian Ilg, and Ana Maria Miranda, "Future now: 3D printing moves from prototyping to production", mckinsey.com, March 15, 2022, <https://www.mckinsey.com/capabilities/operations/our-insights/the-mainstreaming-of-additive-manufacturing>.
- 57 Evan Garcia, "World's Largest 3D-Printed Neighborhood Nears Completion in Texas", Reuters, August 8, 2024, sect. United States, <https://www.reuters.com/world/us/worlds-largest-3d-printed-neighborhood-nears-completion-texas-2024-08-08/>.
- 58 Sue Quinn, "Why 3D Printed Food Is Set to Go Mainstream", BBC Food, April 2023, [https://www.bbc.co.uk/food/articles/3d\\_printed\\_food](https://www.bbc.co.uk/food/articles/3d_printed_food).
- 59 Aneta Suchoń, "Agricultural Producers Cooperatives in the Years 1918–2022 – Selected Legal Issues", Studia Prawnicze KUL, September 27, 2022, <https://doi.org/10.31743/sp.13676>.
- 60 "Umbrella of Co-operatives - Co-operative Well", accessed 12 July 2024, <https://dobrze.waw.pl/parasol-kooperatyw/>.
- 61 Deliveroo, "Snack to the Future: 2040" (Deliveroo PLC, June 2023).
- 62 Andy van den Dobbelen, Chrisna du Plessis and Jan Hugo, "Farms in Cities: New Study Offers Planners and Growers Food for Thought", The Conversation, March 14, 2023, <http://theconversation.com/farms-in-cities-new-study-offers-planners-and-growers-food-for-thought-198166>.
- 63 Vahid Nourani et al., "Sustainable Water Management in Urban Areas", Nature, December 21, 2023, <https://www.nature.com/collections/ifdgfabcaa>.
- 64 Arjen Van de Walle et al., "Greywater reuse as a key enabler for improving urban wastewater management", Environmental Science and Ecotechnology 16 (October 1, 2023): 100277, <https://doi.org/10.1016/j.ese.2023.100277>.
- 65 K Rosłaniec et al., "Teenagers 3.0" (Warszawa: NASK PIB, 2023).

- 66 "What the Future: Teens", What the Future (Ipsos Trends & Foresight Lab, 2023), <https://www.ipsos.com/sites/default/files/What-The-Future-Gender.pdf>.
- 67 „VTubers – Anonymous Superstars”, dw.com, October 5, 2024, <https://www.dw.com/en/vtubers-anonymous-superstars/video-66895405>.
- 68 Jonathan Haidt, "End the Phone-Based Childhood Now", The Atlantic (blog), March 13, 2024, <https://www.theatlantic.com/technology/archive/2024/03/teen-childhood-smartphone-use-mental-health-effects/677722/>; Candice L. Odgers, "The Panic Over Smartphones Doesn't Help Teens", The Atlantic (blog), May 21, 2024, <https://www.theatlantic.com/technology/archive/2024/05/candice-odgers-teens-smartphones/678433/>.
- 69 Martie-Louise Verreyne, "Meta Has Launched the World's 'Most Advanced' Glasses. Will They Replace Smartphones?", The Conversation, September 30, 2024, <http://theconversation.com/meta-has-launched-the-worlds-most-advanced-glasses-will-they-replace-smartphones-240023>.
- 70 Hanno Lorenz, Fabian Stephany and Jan Kluge, "The Future of Employment Revisited: How Model Selection Affects Digitization Risks", *Empirica* 50, nr 2 (May 2023): 323–50, <https://doi.org/10.1007/s10663-023-09571-2>.
- 71 Aaron Benanav, *Automation and the Future of Work* (Verso Books, 2020).
- 72 Viviane Clement et al., *Groundswell part 2: Acting on internal climate migration* (World Bank, 2021).
- 73 Gaia Vince, "The Century of Climate Migration: Why We Need to Plan for the Great Upheaval", The Guardian, August 18, 2022, sect. News, <https://www.theguardian.com/news/2022/aug/18/century-climate-crisis-migration-why-we-need-plan-great-upheaval>.
- 74 Przemysław Śleszyński, "Can refugees be the remedy for Poland's demographic implosion?", *Idee dla Polski: obywatelski thinkletter*, September 22, 2022.
- 75 Directorate General for Parliamentary Research Services, European Parliament, *Alternative Protein Sources for Food and Feed*. (LU: Publications Office of the European Union, 2024), <https://data.europa.eu/doi/10.2861/999488>.
- 76 Michiel van Dijk et al., "A Meta-Analysis of Projected Global Food Demand and Population at Risk of Hunger for the Period 2010–2050", *Nature Food* 2, nr 7 (July 2021): 494–501, <https://doi.org/10.1038/s43016-021-00322-9>.
- 77 "New proteins can meet our food security needs", *CORDIS | European Commission*, accessed July 12, 2024, <https://cordis.europa.eu/article/id/449249-novel-proteins-could-meet-our-food-security-needs/pl>.
- 78 Ray Cannon, "Butterflying in the digital age!", *Antenna: Bulletin of the Royal Entomological Society*, nr 40 (3) (2016): 106–15.
- 79 Christian Felsner, "Insects in 3D", *Insects in 3D | Biocommunication Group*, July 13, 2023, <https://biocommunication.org/en/insects360/3d-scans/>.
- 80 Talia Speaker et al., "A Global Community-Sourced Assessment of the State of Conservation Technology", *Conservation Biology* 36, nr 3 (2022): e13871, <https://doi.org/10.1111/cobi.13871>.
- 81 Wouter Zwysen, Kurt Vandaele and Torsten Müller, "Benchmarking Working Europe 2023" (ETUI, The European Trade Union Institute, 2023), <https://www.etui.org/fr/publications/benchmarking-working-europe-2023>.
- 82 Jelle Visser, "Will they rise again? Four scenarios for the future of the trade unions" (Luxemburg, April 25, 2023), <https://statistiques.public.lu/dam-assets/fr/actualites/semeco/will-they-rise-again.pdf>.
- 83 Kurt Vandaele et al., *Are Platform Workers Willing to Unionize?: Exploring Survey Evidence from 14 European Countries* (Geneva: ILO, 2023), <https://doi.org/10.54394/QWUL5553>.
- 84 Michał Feliksiak, "Trade unions in Poland" (CBOS, November 2021), [https://www.cbos.pl/SPISKOM.POL/2021/K\\_140\\_21.PDF](https://www.cbos.pl/SPISKOM.POL/2021/K_140_21.PDF).
- 85 Piotr Wróblewski, "Noli Studios in Warsaw. This is the first co-living in Poland. Private flats, but a shared living room or kitchen. Will it work?", *Warszawa Nasze Miasto*, October 28, 2023, <https://warszawa.naszemiasto.pl/noli-studios-w-warszawie-to-pierwszy-w-polsce-co-living/ar/c1-9502477>.
- 86 Judith Shulevitz, "Opinion | Does Co-Housing Provide a Path to Happiness for Modern Parents?", *The New York Times*, October 22, 2021, sect. Opinion, <https://www.nytimes.com/2021/10/22/opinion/cohousing-mothers-pandemic-community.html>.
- 87 "Could co-living ease the UK countryside's housing crisis?", accessed July 18, 2024, <https://www.ft.com/content/01f90fa6-4fb2-4191-89cc-d84c3337b-8ce>.
- 88 Mim Skinner, "From Socialism to Private Gyms: Co-Living Has Gone Mainstream, and It Feels like a Mixed Blessing", *The Guardian*, August 29, 2023, sect. Opinion, <https://www.theguardian.com/commentisfree/2023/aug/29/socialism-private-gyms-co-living-mainstream-developments-community>; David A. Banks, „Against We”, *Commune*, 2020, <https://communemag.com/against-we/>.

- 89 Siôn Geschwindt, "This AI-Powered Exoskeleton Does the Heavy Lifting so You Don't Have to", TNW | Future-Of-Work, May 3, 2023, <https://thenextweb.com/news/ai-exoskeleton-wearable-german-bionic-startup>; Mark Wilson, "Skip and Arc'teryx Built a Futuristic Exoskeleton. Here's What It's like to Walk in It", Fast Company, July 24, 2024, <https://www.fastcompany.com/91159743/skip-and-arcteryx-built-an-amazing-new-exoskeleton-heres-what-its-like-to-walk-in-it>.
- 90 Emma Roth, "An Out-of-Warranty Battery Almost Left This Paralyzed Man's Exoskeleton Useless", The Verge, September 26, 2024, <https://www.theverge.com/2024/9/26/24255074/former-jockey-michael-straight-exoskeleton-repair-battery>.
- 91 Kim Willsher, "Paris Mayor Unveils «15-Minute City» Plan in Re-Election Campaign", The Guardian, February 7, 2020, sect. World news, <https://www.theguardian.com/world/2020/feb/07/paris-mayor-unveils-15-minute-city-plan-in-re-election-campaign>.
- 92 Simon Foxell et al., "City 2040. The pressures on UK cities: an opportunity for change" (Edge, lipiec 2021), <https://www.ucem.ac.uk/wp-content/uploads/2021/07/City-2040-research-report.pdf>; Pauli Komonen i Susanne Jacobson, „Citizens Envisioning Life in 2040: A Qualitative Corporate Foresight Study in London", FUTURES & FORESIGHT SCIENCE, 24 listopad 2023, e175, <https://doi.org/10.1002/ffo2.175>.
- 93 "Digital Consumer Trends 2023".
- 94 Will Henshall, "AI Health Coaches Are Coming Soon to a Device Near You", TIME, December 21, 2023, <https://time.com/6549810/ai-health-coach/>.
- 95 Chris Gilliard, "The Rise of 'Luxury Surveillance'", The Atlantic (blog), October 18, 2022, <https://www.theatlantic.com/technology/archive/2022/10/amazon-tracking-devices-surveillance-state/671772/>.
- 96 Lovedeep S. Dhingra et al., "Use of Wearable Devices in Individuals With or at Risk for Cardiovascular Disease in the US, 2019 to 2020", JAMA Network Open 6, nr 6 (June 7, 2023): e2316634, <https://doi.org/10.1001/jamanetworkopen.2023.16634>.
- 97 Ray Hammond, "Mobility of the Future" (Allianz Partners, 2019), <https://www.allianz-partners.com/content/dam/onemarketing/awp/azpartnerscom/new-zealand/reports/Allianz-Partners-The-World-in-2040-Super-Smart-Living.pdf>.
- 98 Kersten Heineke et al., "The Future of Mobility", McKinsey Quarterly (McKinsey & Company, April 2023).
- 99 Sebastian Philipp, Annina (Auri) Antinranta, and Simone Messmer, "The Future of Mobility 2040" (Futurice, 2023), [https://runwise.oss-accelerate.aliyuncs.com/sites/15/2023/09/Futurice\\_Future\\_of\\_Mobility\\_Scenario\\_Report.pdf](https://runwise.oss-accelerate.aliyuncs.com/sites/15/2023/09/Futurice_Future_of_Mobility_Scenario_Report.pdf).
- 100 Matthew Yglesias, "Self-Driving Cars Are Underhyped", Slow Boring, March 1, 2023, <https://www.slowboring.com/p/self-driving-cares-are-underhyped>.
- 101 Maggi Savin-Baden and David Burden, "Digital Immortality and Virtual Humans", Postdigital Science and Education 1, nr 1 (April 1, 2019): 87–103, <https://doi.org/10.1007/s42438-018-0007-6>.
- 102 Kate Lindsay, "No One Is Ready for Digital Immortality", The Atlantic (blog), July 31, 2024, <https://www.theatlantic.com/technology/archive/2024/07/ai-clone-chatbot-end-of-life-planning/679297/>.
- 103 "Ageing in a Digital World – from Vulnerable to Valuable" (ITU, 2021); „The Role of Digital Technologies in Aging and Health" (PAHO and ITU, 2023), <https://doi.org/10.37774/9789275126554>.
- 104 UNESCO Institute for Lifelong Learning, "The Benefits of Lifelong Learning for Older Adults", accessed July 12, 2024, <https://www.uil.unesco.org/en/thematic-studies-benefits-lifelong-learning-older-adults>; Sharan Merriam and Youngwha Kee, "Promoting Community Wellbeing: The Case for Lifelong Learning for Older Adults", Adult Education Quarterly 64 (April 11, 2014): 128–44, <https://doi.org/10.1177/0741713613513633>.
- 105 Ronald Bachmann et al., "The Impact of Robots on Labour Market Transitions in Europe", IBS Working Papers (Warszawa: Instytut Badań Strukturalnych, February 2023).
- 106 Andrea Zanella et al., "Internet of Things for Smart Cities", IEEE Internet of Things Journal 1, nr 1 (February 2014): 22–32, <https://doi.org/10.1109/JIOT.2014.2306328>.
- 107 Patrick T.I. Lam et al., "Data centers as the backbone of smart cities: principal considerations for the study of facility costs and benefits", Facilities 39, nr 1/2 (January 1, 2020): 80–95, <https://doi.org/10.1108/F-09-2019-0103>.
- 108 Adam Greenfield, Against the Smart City (Do projects, 2013); Jennifer Clark, "What cities need now", MIT Technology Review, April 28, 2021, <https://www.technologyreview.com/2021/04/28/1023104/smart-cities-urban-technology-pandemic-covid/>.

- 109 "Civic Space 2040" (International Center for Not-for-Profit Law, March 2020), <https://www.icnl.org/wp-content/uploads/CS2040-08.2019-Outcome-Report-vf.pdf>; Terri Beswick, "2040 Looking Back: Future Activism Interviews" (ILGA, January 2022); Hollie Russon Gilman, "The Future of Civic Engagement", *Government for the Future: Reflection and Vision for Tomorrow's Leaders*, edited by Mark A. Abramson, Daniel J. Chenok, John M. Kamensky, edit. Mark A. Abramson, Daniel J. Chenok, and John M. Kamensky, IBM Center for the Business of Government Book Series (Lanham Boulder New York London: Rowman & Littlefield Publishers, Inc, 2018); Antonio Castillo-Esparcia, Lucía Caro-Castaño, and Ana Almansa-Martínez, "Evolution of Digital Activism on Social Media: Opportunities and Challenges", *El Profesional de La Información*, May 9, 2023, e320303, <https://doi.org/10.3145/epi.2023.may.03>.
- 110 "PLZ - Vision", Platforma Lokalnych Zasobów, accessed July 18, 2024, <https://plz.pl/vision/>.
- 111 "Signatures on civic bills - also electronically", March 6, 2018, <http://bip.brpo.gov.pl/content/podpisy-pod-obywatelskimi-projektami-ustaw-droga-elektroniczna>.
- 112 Gianluca Misuraca, Egidijus Barcevičius and Cristiano Codagnone, edit., *Exploring Digital Government Transformation in the EU: Understanding Public Sector Innovation in a Data Driven Society*. (Luxembourg: Publications Office of the European Union, 2020), <https://data.europa.eu/doi/10.2760/480377>.
- 113 Oliver Pieper, "German 16-Year-Olds to Cast First Votes in EU Elections", *dw.com*, September 6, 2024, <https://www.dw.com/en/german-16-year-olds-to-cast-first-votes-in-eu-elections/a-69042247>.
- 114 "Should Children Vote?", accessed July 17, 2024, <https://www.unicef.org/innocenti/should-children-vote>.
- 115 Klarna, "The future of retail report" (Klarna, 2023), [https://insights.klarna.com/wp-content/uploads/2023/05/Klarna\\_The-future-of-retail.pdf](https://insights.klarna.com/wp-content/uploads/2023/05/Klarna_The-future-of-retail.pdf).
- 116 Marion Laboure, Nooshin Nejati and Cassidy Ainsworth-Grace, "Part 3: Bye-Bye Cash, Hello Digital Payments", *The Future of Payments* (Deutsche Bank Research, 2023).
- 117 Fiserv Polska, "Payment preferences of Poles 2024" (Fiserv Polska, 2024), [https://www.polcard.pl/content/dam/polcard\\_pl/pl/pl/pdf/raporty/Raport\\_Fiserv\\_final.pdf](https://www.polcard.pl/content/dam/polcard_pl/pl/pl/pdf/raporty/Raport_Fiserv_final.pdf).
- 118 Maciej Sikorski, "The number of Apple Pay and Google Pay payments increased by more than 100 million in a year. The leader of the list remains mBank", June 12, 2024, <https://www.cashless.pl/15476-apple-pay-google-pay-liczba-platnosci-1-kw-2024>.
- 119 Brian X. Chen, "The Future of Social Media Is a Lot Less Social", *The New York Times*, April 19, 2023, <https://www.nytimes.com/2023/04/19/technology/personaltech/tiktok-twitter-facebook-social.html>.
- 120 Ian Bogost, "The Age of Social Media Is Ending", *The Atlantic*, November 10, 2022, <https://www.theatlantic.com/technology/archive/2022/11/twitter-facebook-social-media-decline/672074/>.
- 121 Jonathan Stray, Ravi Iyer and Helena Puig Larrauri, "The Algorithmic Management of Polarization and Violence on Social Media", *SSRN Electronic Journal*, 2023, <https://doi.org/10.2139/ssrn.4429558>; Petter Törnberg, "How Digital Media Drive Affective Polarization through Partisan Sorting", *Proceedings of the National Academy of Sciences* 119, nr 42 (October 18, 2022): e2207159119, <https://doi.org/10.1073/pnas.2207159119>.
- 122 Bo Bian et al., "Individualism during Crises", *The Review of Economics and Statistics* 104, nr 2 (1 marzec 2022): 368–85, [https://doi.org/10.1162/rest\\_a\\_01107](https://doi.org/10.1162/rest_a_01107); Shuguang Jiang, Qian Wei, i Luyao Zhang, „Individualism Versus Collectivism and the Early-Stage Transmission of COVID-19”, *Social Indicators Research* 164, nr 2 (November 1, 2022): 791–821, <https://doi.org/10.1007/s11205-022-02972-z>.
- 123 James Dennis, *Beyond slacktivism: Political participation on social media* (Springer, 2018); „Civic Space 2040”; Nora Madison i Mathias Klang, "The Case for Digital Activism: Refuting the Fallacies of Slacktivism", *Journal of Digital Social Research* 2, nr 2 (September 4, 2020): 28–47, <https://doi.org/10.33621/jdsr.v2i2.25>; "The Future of Public Activism: Populations Poised To Increase Pressure Worldwide" (National Intelligence Council, April 2021), [https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02495-Future-of-Public-Activism\\_18Nov21\\_UN SOURCED.pdf](https://www.dni.gov/files/images/globalTrends/GT2040/NIC-2021-02495-Future-of-Public-Activism_18Nov21_UN SOURCED.pdf); Beswick, "2040 Looking Back: Future Activism Interviews".
- 124 Darren Loucaides, "How Governments Are Using Facial Recognition to Crack down on Protesters", *Rest of World*, March 27, 2024, <https://restofworld.org/2024/facial-recognition-government-protest-surveillance/>.
- 125 Ania Matusiak, "Subscription from the farmer. Organic fruit and vegetables with home delivery", *Newsweek*, February 20, 2016, sect. Lives, <https://www.newsweek.pl/styl-zycia/abonament-u-rolnika-ekologiczne-owoce-i-warzywa-z-dostawa-do-domu/j18npzh>.
- 126 "Community Supported Agriculture", *RWS Wspieraj Rolnictwo*, accessed July 17, 2024, <https://wspierajrolnictwo.pl/>.
- 127 Jonathan Barrett, "'It's Not Even Ugly': The Australian Businesses Rescuing 'Imperfect' Fruit and Veg", *The Guardian*, July 30, 2023, sect. Australia news, <https://www.theguardian.com/australia-news/2023/jul/27/farmers-pick-fruit-subscription-boxes-imperfect>.

- 128 Julia Endres, "Circular Economies Create New Consortiums", KPMG, April 11, 2022, <https://kpmg.com/xx/en/home/insights/2022/03/circular-economies--create-new-consortiums.html>; "Reimagining the Waste Framework Directive" (Eunomia, April 2023), <https://circulareconomy.europa.eu/platform/sites/default/files/2023-04/Reimagining-the-Waste-Framework-Directive-18-April-2023.pdf>; „Towards Eliminating Plastic Pollution by 2040 A Policy Scenario Analysis. Interim Findings" (OECD, November 2023), <https://www.oecd.org/environment/plastics/Interim-Findings-Towards-Eliminating-Plastic-Pollution-by-2040-Policy-Scenario-Analysis.pdf>.
- 129 "Global Water Scarcity: H2O No!" (Bank of America Institute, November 2023); Adam Vaughan, "We Are Running out of Sand and Global Demand Could Soar 45% by 2060", New Scientist, March 2022, <https://www.newscientist.com/article/2313170-we-are-running-out-of-sand-and-global-demand-could-soar-45-by-2060/>; Eric Heymann, "Supply bottlenecks: Obstacles to growth and energy transition" (Deutsche Bank Research, September 2023).
- 130 Juliana Menasce Horowitz and Janel Fetterolf, "Worldwide Optimism About Future of Gender Equality, Even as Many See Advantages for Men", Pew Research Center's Global Attitudes Project (blog), April 30, 2020, <https://www.pewresearch.org/global/2020/04/30/worldwide-optimism-about-future-of-gender-equality-even-as-many-see-advantages-for-men/>.
- 131 Pippa Bailey, "Alice Evans: 'In Times of Scarcity, We Are More Likely to Blame Immigrants or Women'", New Statesman (blog), May 18, 2024, <https://www.newstatesman.com/the-weekend-interview/2024/05/alice-evans-scarcity-sexism-gender-gap-divergence-korea>.
- 132 Stephanie Kwan, "Feminist Visions of the Future of Women's Work: A Systemic Exploration of the Past, Present and Future of Women at Work in Canada", Journal of Futures Studies 27, nr 1 (2022), <https://jfsdigital.org/2022-2/vol-27-no-1-september-2022/feminist-visions-of-the-future-of-womens-work-a-systemic-exploration-of-the-past-present-and-future-of-women-at-work-in-canada/>.
- 133 Luiz Garcia, Lukas Kikuchi and Will Stronge, "GPT-4(day week): Great Britain edition" (Autonomy Research Ltd, November 2023), <https://autonomy.work/wp-content/uploads/2023/11/chtgpt4UK.pdf>.
- 134 Tom Rees, "Could AI Enable Humans to Work 4 Days a Week?", TIME, April 5, 2023, <https://time.com/6268804/artificial-intelligence-pissarides-productivity/>.
- 135 "The State of Cybersecurity 2023" (Field Effect, 2023).
- 136 Josh Taylor, "Google Cloud Accidentally Deletes UniSuper's Online Account Due to 'Unprecedented Misconfiguration'", The Guardian, May 9, 2024, sect. Australia news, <https://www.theguardian.com/australia-news/article/2024/may/09/unisuper-google-cloud-issue-account-access>.
- 137 Maria Libura, Tomasz Imiela and Dagmara Głód-Śliwińska, edit., Digitisation of health in the public interest (Warszawa: District Medical Chamber, 2023), [https://izba-lekarska.pl/wp-content/uploads/2023/05/OIL\\_Cyfryzacja\\_raport\\_ISBN.pdf](https://izba-lekarska.pl/wp-content/uploads/2023/05/OIL_Cyfryzacja_raport_ISBN.pdf).
- 138 Elad Natanson, „Hyper-Personalization Is Already Here – Its Future Is Even More Cutting-Edge", Forbes, 1 czerwiec 2023, <https://www.forbes.com/sites/eladnatanson/2023/06/01/hyper-personalization-is-already-here---its-future-is-even-more-cutting-edge/>.
- 139 Jon Yablonski, „The Cost of Personalization", Humane by Design, 9 styczeń 2023, <https://humanebydesign.com/garden/the-cost-of-personalization/>.
- 140 Jakub Bodziony, „JACYNO: Kult indywidualizmu zabija szczepionkową solidarność", Kultura Liberalna, 2 sierpień 2021, <https://kulturalibera.pl/2021/08/03/kult-indywidualizmu-zabija-szczepionkowa-solidarnosc-jacyno/>.

