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FUTURE SKILLS

Four scenarios for the world of tomorrow

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Preface

Dear reader,

We live in an ever-changing world, with rapid development of new technologies and a continuous flow of information. Our society faces challenges of a rarely seen scope affecting our climate, health and economy. What are the essential skills we all need to adapt and face this continuously changing environment? What kind of future awaits us? These are fundamental questions without any certain answers. They force us, however, to go back to the basics: What do we have to learn, what do we have to know in order to function in an as of yet uncertain future?

For thirty years, the Jacobs Foundation has been investing in the development of children and adolescents, both in research and in practice. It contributes to improving the framework conditions in various countries, as it does in Switzerland, so that all children can realise their potential right from the start by benefiting from learning and support opportunities and become responsible members of society. Equal education opportunities and life-long learning options are the basis of our work, which is underpinned by the findings from scientific research. These findings time and again put emphasis on the significance and importance of early childhood, the first years of life of all humans, during which the foundation for the best development possible is laid.

In the context of a strategic transition, the Jacobs Foundation has decided to assume a longer-term perspective. It asks questions about possible scenarios that could change the way we live and work in the decades to come and intends to find out, in the process, how best to prepare children and young people for the challenges they will have to face. This approach is about designing the framework conditions, particularly also in the field of education, in such a way that all children are provided with the life skills necessary for their development. This forms an essential basis for their future development in youth, adolescence and young adulthood. The goal is to enable all humans to contribute constructively to the world in the year 2050.

To this end, the Jacobs Foundation has commissioned a study with the Gottlieb Duttweiler Institute that illustrates not a linear projection of the future but several possible future scenarios and the associated skills and aptitudes humans will need in each one of them.

As coincidence would have it, this study is being published just as the global crisis caused by the COVID-19 pandemic is at its peak and fundamental questions arise on all fronts. The projections into the future show us that, independent of the scenario presented in each case, the fundamental skills such as community spirit and teamwork, flexibility and the courage to innovate and overcome failure are what define the individual and our society alike. These are the skills we urgently need and which children and young people should learn today in order to endure in an as of yet uncertain future.

We hope that you will be inspired by what you read!

A handwritten signature in blue ink, reading 'P.X. Zimmerli'. The signature is fluid and cursive, with the initials 'P.X.' clearly visible at the beginning.

Philine X. Zimmerli
Lead Early Childhood Programs Europe
Jacobs Foundation

Synopsis

Education is intended to prepare children and young people for the future. It currently appears uncertain, however, what this future will be like. Climate change, geopolitical power shifts, the long-term impact of the coronavirus pandemic – many current trends make the future highly uncertain. Due to this unpredictability, future skills studies are very difficult, but also increasingly important.

We cope with this unpredictability by outlining four different scenarios for Switzerland in the year 2050:

- > **Collapse.** International trade is almost non-existent. Local communities are no longer integrated into national or supranational organisations and have to reorganise amidst the ruins of a globalised and industrialised world.
- > **Gig Economy Precariat.** Machines have taken over many jobs and have caused technological unemployment. Instead of switching to other sectors, the people affected turn to a new type of employment: the gig economy. As digital day labourers, they fight for rare jobs in a thoroughly commercialised world.
- > **Net Zero.** The hope to slow climate change with progress and technology has vanished. Only severe personal restrictions have an effect. The goal with the highest priority is reducing CO2 emissions to zero. How this is achieved differs from region to region. To ensure readiness for and acceptance of personal restrictions, these measures are defined as locally as possible.
- > **Fully Automated AI Luxury.** Machines have taken over many jobs previously done by people. Everyone benefits from the fruits of this labour. People can do anything, but they do not have to. This gives rise to the challenge of generating purpose in their lives and main-

taining their individual autonomy when faced with the superiority of artificial intelligence.

These scenarios are not predictions with 25% probability of becoming reality but rather end points of a space of possibility. For each of these worlds, we determine skills and qualities that are necessary to function and prosper in them. In a survey, Swiss teachers assessed to what extent these skills are taught at their schools.

The uncertain nature of the future and the heterogeneity of the four scenarios suggest that it is impossible to prepare children and young people for one specific future. The more the future deviates from the world of today, the less existing institutions and experiences can provide orientation – and the more future generations will be left to their own devices. Skills of self-determination such as self-motivation, self-efficacy and the ability to make decisions in groups are consequently important in all scenarios.

However, “Future skills” does not only mean being able to react flexibly to any potential future. It also means shaping the future. The creative freedom of society is barely acknowledged in the Western world, because latest since the end of the Cold War we have privatised the future. Social goals have become personal ambitions. This means that the future has turned into something that happens to us and we have to cope with.

To empower children and young people to create the future, the study proposes three categories of skills:

- > **“Knowing”**: To shape the future, you need to know the present. This requires basic knowledge and therefore also knowing what one does not know. In a fast-changing world, the tools to acquire new knowledge quickly are likewise important.
- > **“Wanting”**: Goals are essential to shape the future. Introspection enables reflecting on one’s own wishes and needs and expressing one’s goals better. New ideas are needed, not the feeling that “everything has already been invented” regarding society. When these new ideas are informed by communal values, everyone will benefit.
- > **“Doing”**: Concrete behaviour is necessary to reduce the discrepancy between the present and the expressed goals. This requires self-efficacy and the belief in being able to make a difference with one’s own skills. The specific implementation requires practical skills – from mechanical dexterity to organisational know-how. Finally, social skills are necessary to make decisions in the group and implement them.

Shaping the future requires new ideas that are implemented in the community. This does not require a consensus of the entire society. A highly complex world cannot be centrally organised. Small communities that try out new ideas and can learn from each other are the path to a resilient society. Children and young people can acquire the skills to experiment in small communities through practical group projects of their own choosing.

Introduction

What comes to mind when you think about the future? Flying cars? The white and earless artificial humans that pop up in huge numbers in the Google image search for “artificial intelligence”? Do you think of rising life expectancy or rising sea levels? Overcoming cancer and/or privacy? Or do you rather think of your personal career, retirement plan, family bliss and real estate property? Maybe you are one of those people who do not think about the future at all and long for the “good old days”, since the future appears too threatening.

While the individual can avoid thinking about the future, educational institutions must address this issue. Education is intended to prepare children and young people for the future. For good reason, the brochure describing the education plan for the 21st century in the canton of Zurich bears the title “Well prepared for the future” (Fit für die Zukunft). This unavoidably leads to the question what this future will be like.

Finding answers to the question of the nature of the future is particularly difficult these days because the next decades appear exceptionally unpredictable. This is also the reason why the future seems threatening. Many things are in a state of flux: The global climate is changing at a pace never before witnessed by humanity. The long-term impact of the coronavirus pandemic is entirely uncertain. It cannot be ruled out that the Western model of success with liberal democracy and geopolitical dominance is nearing the end; developments in genetic engineering or artificial intelligence could entirely redefine what it means to be human over the coming decades.

This unpredictability makes addressing the future very difficult. At the same time, it is this unpredictability that makes addressing the future necessary in the first place. There was no high demand for “future skills” studies as long as the world of the children was approximately the same as that of their parents and grandparents, when the son of a blacksmith later became a blacksmith himself (as was the case over long stretches of human history¹). How do you determine, however, what to teach children and young people when it is unclear where they are headed? This question cannot be answered empirically, since there is no data available on the future.

Many so-called “future skills” studies, such as the annual OECD report “Trends Shaping Education”², focus on certain trends and assume that they will continue linearly. This is useful and important, because many of these assumptions are quite plausible. Nonetheless, as emphasised by the OECD report itself, the future is inherently uncertain and there is often no linearity. It is often realised only in retrospect which trends were relevant (afterwards, however, it seems like the development was inevitable). Predictions are difficult, since our world is subject to a huge number of chaotically interacting trends, actors and influences (among them also future forecasts and education programmes). Unexpected events such as 9/11, for which risk analyst and economic theorist Nassim Taleb has coined the term “black swan”, cannot be calculated.³ The unexpected in itself must be expected, however. Although

¹ Harari, Y. N. (2018). 21 Lessons for the 21st Century. Random House.

² <https://bit.ly/fsk-oecd> (Source: oecd.org, 6.5.2020)

predictions are not *per se* useless, one should always consider the possibility that things will turn out to be quite different.⁴

As an alternative to the assumption of a seemingly plausible future or to the extrapolation of a currently dominant trend, one can better account for the inherent uncertainty of the future by speaking of the future in the plural form and presenting several possible futures. This is exactly what we intend to do in this study by outlining four different scenarios for Switzerland in the year 2050. These are still based on current trends and future narratives, but selectively on trends and narratives that point in very different directions. This allows outlines of very different possible futures.

These scenarios are not predictions with 25% probability of becoming reality but are end points of a space of possibilities. It is highly probable that the future will not correspond to any one of these four ideal-type models but will be something in between and may feature aspects of all the scenarios. As corner points, these scenarios may be intentionally exaggerated in order to become more concrete. It is easier to derive implications from such exaggerations. To ensure leeway for this exaggeration, we place the scenarios in the year 2050. It must not be overlooked in this context, however, that the scenarios are based on trends already relevant today and implications of those seemingly far-away scenarios can also be applied already in the present.

Following the quote from science-fiction writer William Gibson: “*The future is already here – it’s just not evenly distributed,*” we need to assume that, in the future also, not all humans will live in the same scenario. Rather, different people

will live in different manifestations of these scenarios. Individuals may even experience several scenarios depending on the situation they are in. Accordingly, contradictory scenarios may be equally relevant for the future.

But how can scenarios be developed that depict maximally distinct futures? What are these scenarios like and how do they differ from each other?

³ Taleb, N. N. (2007). *The black swan: The impact of the highly improbable* (Vol. 2). Random house.

⁴ Luhmann, Niklas (1992c). Kontingenz als Eigenwert der Gesellschaft [Contingency as an intrinsic value of society]. pp. 93–128 in: *Beobachtungen der Moderne*. Opladen: Westdeutscher Verlag.

Methode

Collecting trends and visions of the future

To generate the scenarios, we collected various current trends, as well as narratives and predictions of the future. This was partially based on preliminary work done by Prof. Martin Hafen of the Lucerne University of Applied Sciences and Arts (see www.bit.ly/fsk-hafen). These include trends such as climate change, developments in the field of artificial intelligence (AI), populism, the ubiquity of data, the economization of the private domain, the increase in renewable energy and many other developments, which are described in more detail in the scenarios.

We did not only want to collect the trends, however, but also categorise them. A useful categorisation has been established by the Hawaii Research Center for Future Studies at Manoa. Under the direction of Professor Jim Dator, the researchers examined company forecasts, long-term plans of governments, NGO studies and science fiction literature. They found that many of these narratives are similar. They subsequently defined four categories to which most of the predictions and visions of the future can be assigned.⁵ In the following, we will describe this categorisation as the “Manoa model”.

- > **Continuous Growth.** According to Dator et al., Continuous Growth is the “official” view of the future towards which governments, companies and educational institutions are oriented. It assumes a non-disruptive, continuous evolution towards the future, in which individual technologies will change, but things will generally stay as they are today.
- > **Collapse.** A second category features narratives of the future describing a sudden end of growth. The Collapse scenarios can be of an

environmental, economic, health-related and moral nature. What they have in common is that all of them describe a regression to a “lower” level of development. In most cases, this is described as a less complex world and reaches from an economic crisis to regression into a new “dark age”, to the complete extinction of all life by an asteroid, for example.

- > **Discipline.** The Discipline narratives frequently include a voluntary renunciation of materialism and consumerism. Life is oriented towards basic values of religion, spiritualism, politics or culture. In most of these scenarios, materialism and consumerism are environmentally and/or spiritually unsustainable or even immoral.
- > **Transformation.** The Transformation category comprises narratives of the future marked by disruptive technologies such as robotics, artificial intelligence or genetic engineering. These narratives not only describe a revolutionary technology, but at times also a modification of humans themselves. Such futures are then described as posthuman or transhuman.

The specificity of the categories in the Manoa model varies. The *Transformation* category in particular is extremely extensive and diverse. Depending on the technology and how it is handled by society, the scenarios can be very different. Exactly these social factors, i.e. how a technology is used, are not sufficiently considered in the Manoa model.

⁵ Dator, J. (2019). Alternative futures at the Manoa School. In Jim Dator: A Noticer in Time (pp. 37-54). Springer, Cham.

Even after assigning trends, future narratives and predictions to different categories, mutual interrelations are lacking. For this reason, we intend to introduce a system that puts the scenarios in relation to each other. Such a system allows to outline scenarios that cover potential futures which are maximally distinct.

Dimensions of uncertainty

Establishing a classification system requires defining dimensions on which scenarios can be mapped differently, i.e. in which the scenarios differ from each other. These dimensions constitute uncertainties regarding the future when both a high and a low future manifestation on that dimension are plausible. One uncertainty in which the categories of the Manoa model differ is continuous economic growth. In the case of the category *Continuous Growth* this is obviously the case, but not for the category *Collapse*. Since the notion of growth is closely linked to the gross domestic product in public discourse and we do not want to reduce wealth to this indicator, we will speak more generally of abundance and scarcity as endpoints of the dimension of wealth. In this study, abundance is defined as a state in which no-one is lacking existential resources such as food, healthcare, education, etc. In scarcity scenarios, many people (in scenarios with social inequality) or all people (in Collapse scenarios) lack basic resources. According to this definition, abundance is given when sufficient resources are available and everybody can partake in them.

Since the future does not contain just one uncertainty, an additional differentiation can be achieved by introducing a further dimension that intersects with the first one. With each additional dimension, however, the number of sce-

narios doubles. In addition, the narratives converge. Therefore, the intersection of two dimensions with four resulting scenarios is a useful compromise between manageable size and differentiation in this study.

The second dimension is inspired by the *Discipline* and *Collapse* categories of the Manoa model. Considering environmental and economic crises, the rise of authoritarian systems and digital surveillance mechanisms, it appears plausible that people will have to renounce certain freedoms in the future to which we have become accustomed today. The massive worldwide restrictions of movement in the context of the coronavirus pandemic are the best example for this. Such restrictions can take the form of a societal decision, e.g. in the form of environmentally or ethically motivated renunciation. Restrictions can also be forced, however, because certain things, such as transatlantic flights and the associated freedom of movement will simply be no longer possible in the context of an environmental or economic collapse.

The terms “discipline” and “freedom” are problematic as descriptions of dimensions. Discipline in general carries highly negative connotations as authoritarian disciplining and the antithesis of the positively associated notion of freedom. These terms need not be opposites, however. Discipline is necessary in order to enjoy certain freedoms. Think of rules of hygiene or traffic regulations, for example. Often these rules have been internalised to such an extent, however, that they are no longer perceived as rules, let alone as imposed discipline.⁶

On the other hand, the term “freedom” likewise

⁶ Foucault, M. (2012). *Discipline and punish: The birth of the prison*. Vintage.

Dimension matrix of the intersected dimensions “wealth” and “restriction of existing freedoms”

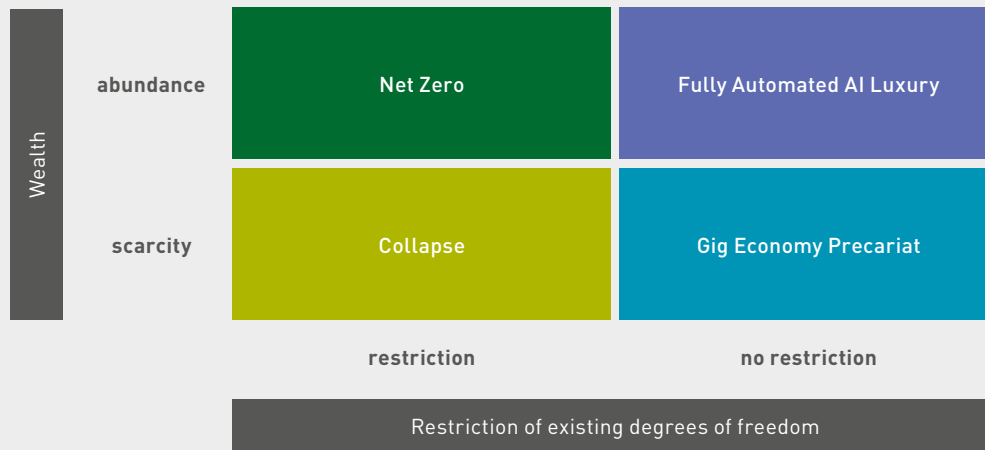


Figure 1, Source: GDI

is more layered than it appears at first glance and sometimes merely means maintaining existing privileges and hierarchies. Restricting the freedom of some can mean new freedom for others, often less privileged people. For example, an environmentally motivated restriction of freedom can ensure more freedom for future generations, just like a smoking ban means more freedom for non-smokers.

*Does banning cars in city centres
reduce freedom if it allows children to
play in the streets?*

Marcel Hänggi, Initiative Committee Glacier Initiative

tion of existing degrees of freedom. In our definition, degrees of freedom are not restricted, if certain behaviours and life plans are still part of the behavioural repertoire of a society (cf. the example of transatlantic flights), independent of the question whether they are available to all or only to a privileged group of people.

For the second dimension, we therefore do not speak of more or less freedom, but of the restriction of *existing* degrees of freedom. In this way, restricted and potential newly arising freedom are not played off against each other. In the dimension of wealth the distribution of resources plays a role. This is not the case for the restric-

The two dimensions of “wealth” and “restriction of existing degrees of freedom” are now intersected. With two manifestations each as endpoints of these dimensions (abundance/scarcity and restriction/no restriction), this results in a two-dimensional matrix with four scenarios (see Fig. 1). Each cell still allows for a multitude of different narratives, from which we will select one.

The cells with restricted existing degrees of freedom are based on the examples of the Manoa model. In the scarcity variant, we have constructed a “Collapse” scenario. In the abundance variant, we refer to the “discipline” category of the Manoa model and select one – the “Net Zero scenario” – that features environmentally motivated restrictions. For the scenarios without restriction of existing freedoms, we select such scenarios that are based on transformative technologies taking away work from people or relieving them of it, consequently generating scarcity or abundance. The difference is in the way society handles the technology, which is not sufficiently considered in the Manoa model. The “Gig Economy Precariat” scenario is characterised by scarcity, since only a small group of people benefits from the fruits of machine labour, whereas the “Fully Automated AI Luxury” scenario is characterised by abundance, because all the people benefit from the work of the machines and wealth is evenly distributed. The “Continuous Growth” category of the Manoa model does not constitute a corner point of the space of possibilities and therefore is not covered by any of the four cells but is located somewhere between these four corner points.

Further methods

WORKSHOPS

We have based the creation of the matrix including the four scenarios primarily on the collection of trends and on literature research. A separate workshop was organised for each scenario. In these workshops, the respective scenario was specified further, unclear aspects were clarified and necessary skills and qualities were collected for some. The workshop participants are listed at the end of the study (see Appendix B).

INTERVIEWS

In addition to the workshops, various experts were interviewed for this study. Their valuable considerations have provided input for the entire text. Occasionally, the text contains quotes (such as the one on the preceding page) from the interviews to underline the contents. The interview partners are also listed again at the end of the study (see Appendix B). Quotes marked with a footnote originate from other sources.

SURVEY

The third contribution to the study was a survey. Invitations to participate in a survey on the topic of “future skills” were issued in several newsletters of teachers’ associations at the cantonal and national level. 169 teachers from French-speaking and German-speaking Switzerland completed the questionnaire. Their task was to go through a list of skills and qualities and to assess how well these are taught at their school. They were asked to make this assessment by comparing the teaching of the skills and qualities with how these skills could be ideally taught. The precise wording of the questions, the skills and qualities as well as an overview of all results is included in Appendix A.

The results of the survey show that the variance of the responses is very high. For almost any referenced skill, some teachers have assessed the quality of teaching as very good, while others think that the teaching of the skill is very bad. For this reason, all mean values are relatively close to each other, in the range between 3.5 and 4.5 on a scale of 1 to 6 in most cases.

This variance can be explained by different factors: by different schools, school levels, linguistic regions, etc. on the one hand, and by the assessment scale on the other hand. The teachers had to compare the quality of teaching with a personal ideal concept. How well something could be ideally taught can vary widely from teacher to teacher, however. In this case, you do not only measure the quality of teaching, but also the ideals of the teachers.

Even if it is not necessary to overinterpret minor differences, some things can be taken away from the tendencies. Differences amounting to more than only a couple of decimal places on the Likert scale are still noteworthy and will be discussed again later in the text. The variance of the responses for most queried skills suggest that different things matter to different teachers and different schools. There does not seem to be a consistent understanding. Interested teachers and headteachers are encouraged to contact the author of the study if they want to conduct the survey at their school. This way, it can be explored to what extent a consistent assessment of quality exists and a discussion can take place on ideal concepts and the importance of different skills.

Scenarios

Approach

The scenarios for the year 2050 are discussed in detail below. This outline consists of the following items:

Context

What are reasons why the scenario might become a reality in Switzerland? Examples from history and current trends are discussed.

Development 2020–2050

What will happen between 2020 and 2050, so that Switzerland will be as described in the scenario? The development history serves to make the scenario more plausible and more concrete.

Situation in 2050

What will Switzerland be like in 2050?

Challenges

What are the challenges people face in this world?

Possible solutions

What are ways to deal with the challenges?

Skills and qualities

What is necessary to master the challenges in accordance with the proposed solutions? The most important skills and qualities are subdivided into three categories:

- > **Knowing:** Specific knowledge and skills of information handling
- > **Wanting:** Skills needed to define goals, as well as values underlying the goals
- > **Doing:** Skills needed to implement goals

Survey results

How well does school teach the discussed skills and qualities?

The present study is not intended to focus on education or developmental psychology. The question how, when and by whom different skills and qualities are best taught is therefore addressed only marginally.

Collapse





Collapse describes a decline of the existing social order, institutions and infrastructure. The “Collapse” scenario is not only characterised by scarcity, but also by a restriction of degrees of freedom existing today, because many activities simply are no longer possible.

The decline of the Western Roman Empire is the classic example of the collapse of a civilisation in the Western world. While 1.5 million people lived in the city of Rome in the year 100 CE, only about 30,000 remained in the year 800, living in the ruins of an empire long gone. Aqueducts, trade routes and other infrastructure of antiquity disintegrated; the number of people able to read and write decreased, knowledge and manual skills were lost.⁷

A large number of historical examples for the fall of civilisations can be found worldwide: the civilisations of the Bronze Age, the Maya, the Khmer Empire, the Mali Empire, the Inca, etc. All collapses have in common a significant population decrease and a reduction in social complexity.⁸ Reduced complexity means less differentiated social, economic and political structures and institutions, i.e. less differentiated cultural artefacts and objects, less differentiated social roles and less differentiated forms of organisation. Reduced specialisation and division of tasks result in the already mentioned loss of knowledge and manual skills.

For the anthropologist Joseph Tainter, the complexity of a society is a central aspect in the understanding of collapses.⁹ The more complex a society is, the more energy and raw materials it needs to maintain its complexity. At the same time, it can also generate more energy and extract more resources as its complexity increases. As long as a society extracts more resources than required to maintain its complexity, it will continue to function. According to Tainter, however, this difference between cost and benefit decreases from a certain point with increasing complexity. The costs to obtain one litre of crude oil or to mine one kilogram of lithium will increase, for example, once the most accessible sources have been exploited. Innovation can counteract this; however, its complexity will also continuously increase. Each innovation becomes more costly than the previous one; the number of authors per scientific paper increases while the average number of patents per person decreases.¹⁰

If the complexity cannot be maintained for a certain period, this leads to a downward spiral that is difficult to stop. The decrease in complexity also causes the opportunities for resource extraction to disappear, resulting in an inability to maintain even this reduced complexity. External

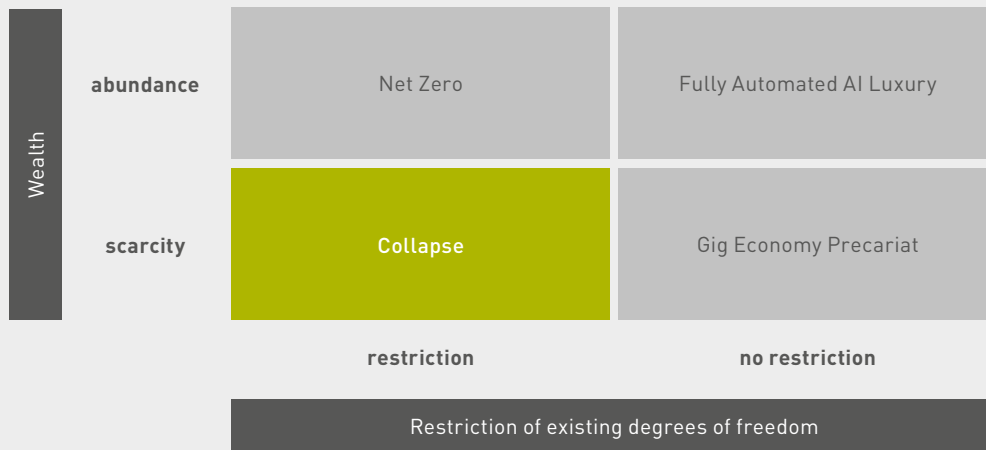
⁷ Ward-Perkins, B. (2006). *The fall of Rome and the end of civilization*. Oxford University Press.

⁸ Tainter, J. A. *The collapse of complex societies*. Cambridge University Press, 1988.

⁹ Ibid.

¹⁰ Strumsky, D., Lobo, J., & Tainter, J. A. (2010). Complexity and the productivity of innovation. *Systems Research and Behavioral Science*, 27(5), 496-509.

Dimension matrix - collapse



Source: GDI

shocks can trigger such a reversal if the difference between resource extraction and resource consumption is already small. In the historical perspective, systems rarely collapsed due to single factors, but in most cases as a consequence of the combination of several unfavourable developments, such as changing climate, worsening environmental conditions, armed conflicts or pandemics.^{11,12}

Switzerland also relies on a highly complex infrastructure and international, just-in-time flows of goods, information and resources which are very expensive to maintain. For us as a modern society, it is of course difficult to image that our world in its current form could ever collapse. One needs to realise, however, that the Romans or Maya likewise could not anticipate that their great civilisation would ever end. But how might a collapse occur and what would it be like?

¹¹ Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*. Penguin.

¹² Harper, K. (2017). *The fate of Rome: Climate, disease, and the end of an empire*. Princeton University Press.

Collapse

Development 2020–2050

After the previous summers had already broken all temperature records, the summer of 2041 was even hotter than anything experienced before in many places. In Sub-Saharan Africa in particular, where the population had almost doubled since 2020¹³, as well as in the Middle East, heat-waves and droughts caused an acute scarcity of food and water.¹⁴ This, in turn, partly resulted in armed conflicts between neighbouring countries.¹⁵ The dispute about a gigantic dam on the Nile triggered a water war between Egypt, Sudan and Ethiopia. As the local refugee camps were quickly overcrowded, huge cross-border refugee migrations resulted, also towards Europe among other destinations. The impending migrations, more climate-related diseases^{16,17} and a negative economic outlook brought to power authoritarian, nationalist leaders all over Europe. The borders were closed as a first measure.

This new isolationism, which had already led to massive losses of wealth during the coronavirus pandemic, was the final death blow to the EU. Trade wars and the oppression of minorities were the result. Even the borders within Europe became more and more difficult to cross. International trade collapsed, which made everyday goods increasingly expensive. Inflation reached staggering heights, supermarket shelves were empty. Even optimists no longer believed that the economy would continue to grow.

The bloated global financial system, which had been kept alive only by repeated cash injections from governments over the last decades, suffered its final collapse. Since the major economic powers in 2041 – China, India and Nigeria – had to deal with similar problems, they were

unable to absorb the crisis and were likewise caught up in the economic downward spiral. Currencies lost much of their value. Queues formed in front of banks, but people were unable to cash out their savings.

Invoices could no longer be paid and governments were in turn unable to finance services such as public administration, the health system, energy supply, the police or the military. Due to the extreme weather events which had become much more frequent as a consequence of climate change, maintaining the infrastructure had already become much more expensive anyway. Accordingly, it also decayed relatively quickly. Social unrest accelerated this process of decay. Power cuts, initially rare, became common.

Without financial power and with the infrastructure in decay, governments lost much of their importance. Loyalties eroded while trust in the institutions vanished. Once it became clear that the situation would not calm down soon, the soldiers deployed during states of emergency no longer felt loyalty towards the government, but rather towards their families and friends at

¹³ <https://bit.ly/fsk-pop> (Source: un.org, 6.5.2020)

¹⁴ <https://bit.ly/fsk-warm> (Source: un.org, 6.5.2020)

¹⁵ Farinosi, F., Giupponi, C., Reynaud, A., Ceccherini, G., Carmona-Moreno, C., De Roo, A., ... & Bidoglio, G. (2018). An innovative approach to the assessment of hydro-political risk: A spatially explicit, data driven indicator of hydro-political issues. *Global environmental change*, 52, 286-313.

¹⁶ Semenza, J. C., & Menne, B. (2009). Climate change and infectious diseases in Europe. *The Lancet infectious diseases*, 9(6), 365-375.

¹⁷ Navarrete, C. D., & Fessler, D. M. (2006). Disease avoidance and ethnocentrism: The effects of disease vulnerability and disgust sensitivity on intergroup attitudes. *Evolution and Human Behavior*, 27(4), 270-282.

home. As a consequence, national organisation increasingly dissolved while people favoured a regional orientation. For Switzerland, the extent of the fall due to the collapse was more substantial than in less wealthy countries where more people worked in agriculture or skilled trades. On the other hand, thanks to the decentralised, subsidiary organisation of Switzerland, the disappearance of the national state was compensated better than elsewhere.

Switzerland is an excellent example of societal resilience. It's decentralised political system, direct democracy, trained citizenry (through compulsory service) and strong surplus all make for a robust system. But in many respects it remains precariously interdependent on others, and on volatile industries such as finance.

Dr. Luke Kemp, Centre for the Study of Existential Risk,
University of Cambridge

Collapse Situation in 2050

In the Collapse scenario, people are largely cut off from the outside world. There is little international trade. Travelling beyond a small radius is very expensive. Migration likewise only still takes place within relatively small spaces, e.g. from the coast to inland areas. Since the collapse, Europe had also become much less attractive as a destination of migration. Reasons for the smaller movement radius are scarcity of energy, ailing transregional transport infrastructure such as roads or railway lines, unsafe travel, distrust towards strangers as well as road tolls as one of the few options for local authorities to generate revenue. The remaining transregional exchange often happens by ship, since transport via lakes, rivers and canals requires relatively little energy and infrastructure. Some digital connection remains, such as via computers in public places and local wireless networks. These networks are primarily for local use, however. While transregional connections are possible, they are slow and unreliable, because the fibre-optic infrastructure soon ceased to work and was replaced with copper cables and wireless connections.

The loss of transregional networks and transport infrastructure in the form of information and goods also resulted in a dissolution of the political integration into a national and international system. There are no more authorities with transregional political decision-making powers. Local communities are on their own regarding both basic security of supply with essential goods and the organisation of communal life.

A collapse is an abrupt, prolonged and drastic loss of socio-economic complexity. Historically it tends to be accompanied by a loss of the state and/or a sharp decline in population.

Dr. Luke Kemp, Centre for the Study of Existential Risk,
University of Cambridge

Most city centres have lost much of their population. Outside of urban centres, it is easier to obtain resources such as water, wood or arable land, while the decaying urban infrastructure represents not only a security issue, but also hygienic problems. In addition, few forms of work remain that would require the presence of many people at the same time. Industrial production is virtually non-existent, which means that fewer complex goods can be produced, because an international value chain is required even for simple things, such as a toaster. Of course, industrial goods such as toasters, mobile phones or solar panels still exist and are either fully functional or at least contain functioning components. However, many medicines can no longer be produced and expire fast, resulting in a shorter life expectancy.

Collapse Challenges

Existential needs such as *access* to clean *drinking water*, *food* or *healthcare* need to be addressed first. However, other needs ranked higher in Maslow's hierarchy of needs, such as the need for *security*, *access to energy* and *information*, the *manufacture* and *repair* of everyday products or *transport options* are also no longer secured.

In addition, societal challenges such as the maintenance of *knowledge* and *education*, the *legal system* or *democracy* must be met. In case of a sudden collapse of governmental structures, local communities must take charge of these cooperation and coordination services (e.g. also conflict management). Particularly when the time frame is small as a consequence of the stress situation and the pressure to act is accordingly high, long-term ideals such as *sustainability* (not to clear all forests) or *human rights* (such as how to treat migrants) are often disregarded. Stress, insecurity and the sudden absence of a stable public order, as well as the rise of collectivism, are fertile ground for populists and demagogues. They can rise to power by projecting the general frustration onto a minority or a neighbouring community. Short-term enrichment instead of long-term cooperation is particularly attractive when the neighbours own an important resource such as a hydroelectric plant or a well-equipped library. This means that maintaining *peace* becomes a challenge.

Collapse Possible Solutions

The needs stated above had previously been covered in interaction with governmental actors or internationally operating companies and organisations. Besides informal networks, *local and decentralised forms of organisation* not exclusively based on economic principles best survived the economic crisis and have now assumed these tasks. *Vegetable cooperatives* and *communal gardens* provide their members with food. Water, housing, healthcare and security are organised by *local councils*, *neighbourhood networks* and *housing cooperatives*. Goods are produced, repaired or recycled in *local shops*, in *fab labs*¹⁸ and *repair cafés*, often in one-off production. *Division of labour* is *much less developed* than before the collapse, when everybody was highly specialised. Some degree of specialisation still exists, however. Physicians, for example, still rarely work in agriculture.

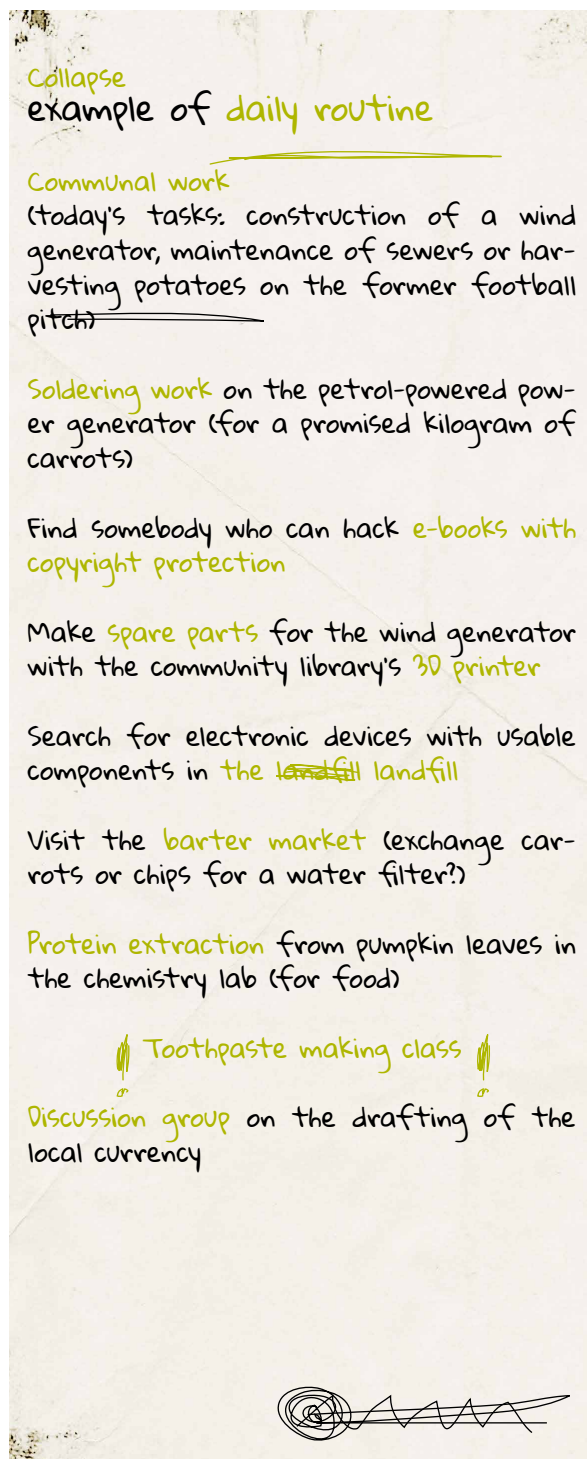
Goods and services are shared, exchanged, donated or traded with local currency. The emergency situation, mutual interdependence and frequent direct and personal contact result in an increased importance of *mutual help* and *commitment to the community*.¹⁹ Potatoes are communally planted on football pitches, wind

¹⁸ open workshops with modern manufacturing methods, e.g. 3D printing, laser cutting or Arduino programming

¹⁹ Klinenberg, E. (2015). *Heat wave: A social autopsy of disaster in Chicago*. University of Chicago Press.

generators and hydroelectric plants, solar collectors or photovoltaic systems are maintained in public spaces. Many of the organisations stated above offer *classes* and *workshops* in which *knowledge and experience are shared*. Stickers on the front door in certain neighbourhoods indicate what can be borrowed from that house.²⁰ A server in the community library is used to *write e-mails, store and exchange news, experiences as well as 3D printing data, construction drawings and Wikipedia entries*.

The *communal assembly* has become the most important decision-making institution. It is where problems are discussed, long-term projects are coordinated and rules of coexistence as well as penalties for transgressions are defined by means of direct democracy. Separation of powers ensures that decisions are deliberate.



²⁰ Such stickers can already be ordered today at pumpipumpe.ch.

Collapse Skills, Knowledge, Qualities

PRACTICAL SKILLS & BASIC KNOWLEDGE

The first priority is survival, which means that *survival skills* are needed, such as making fire, obtaining clean water or recognising edible berries and mushrooms. Knowledge of botany is not only important when foraging for food in nature, but also for agriculture. This also requires *gardening skills*.

Mechanical skills are important for the production, repair and recycling of furniture, houses, clothing, etc. *Technical tinkering skills* are needed to replace a smartphone battery, remove a chip from a circuit board or repair a photovoltaic panel. Practical knowledge of chemistry, physics and electronics is helpful here. When tinkering with removed chips or programmable microcontrollers (Arduino boards), *programming skills* are also useful. The mentioned skills can be applied to construct an automatic irrigation system for a vegetable patch.

EXCHANGE OF KNOWLEDGE

Not all members of society need to have mastered all skills. The expertise must be available in a society, however, and it must be possible to exchange it quickly. People must be able to *acquire new knowledge quickly* and *teach their own knowledge in an understandable way*. The exchange of information can save lives, particularly in disaster situations.

Education reduces vulnerability in natural disasters. Access to information and understanding them play an important role here.

Dr. Raya Muttarak, World Population Program, International Institute for Applied Systems Analysis (IIASA)

SELF-DETERMINATION & SELF-EFFICACY

In such a new situation, there are no prescribed behaviours or “top-down” instructions. *Acting of one’s own accord, personal responsibility and the ability to adapt* are needed to tackle projects such as an irrigation system. One has to dare and try new things. This requires *self-efficacy* and *not being afraid to make mistakes*.

TEAMWORK & COMMUNITY VALUES

Cooperation in the group is essential for survival. The members of the community must be able to *make decisions in the group* and *coordinate within the group* in order to implement decisions. First and foremost, however, it is important to *show commitment to the community* and to also *trust people you do not know yet*. These people may be members of the community you do not know yet, but also out-of-towners with whom you could trade and share knowledge.

Tightly knit communities recover from disasters faster than more individualistic societies.

Dr. Raya Muttarak, World Population Program, International Institute for Applied Systems Analysis (IIASA)

EMOTIONAL STABILITY

Stress makes controlling impulses difficult.²¹ And stress is ubiquitous in the Collapse scenario. *Stress resilience* is required in order to think in the long term and rebuild the world patiently instead of reverting into a natural state as described by Hobbes, where everyone fights against everyone else. People who are more emotionally stable because they can *reflect on their own feelings and needs* and *talk about their feelings*, for example, are less susceptible to agitation and placing of blame on minorities and neighbours.

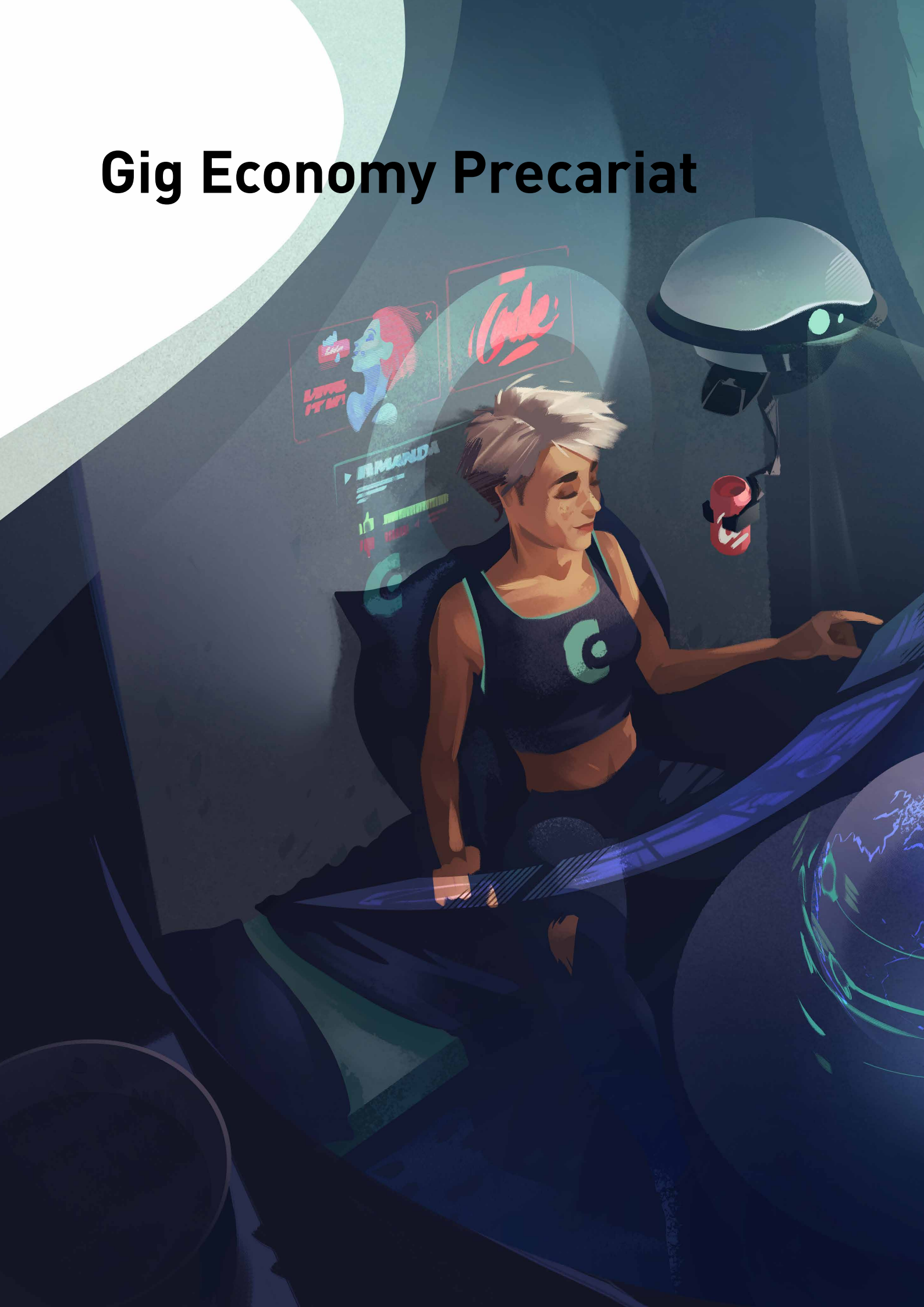
²¹ Oaten, M., & Cheng, K. (2005). Academic examination stress impairs self-control. *Journal of social and clinical psychology*, 24(2), 254-279.

Survey Results Collapse

Skills and qualities required for the Collapse scenario, subdivided into the categories “Knowing”; “Wanting” and “Doing”. The figures in brackets indicate how well (on a scale of 1 to 6) the skills are taught in Swiss schools according to the teachers (see Appendix A). It is important to note that the teachers have made their assessments not with regard to the scenario but regarding activities relevant today.



Gig Economy Precariat





The Gig Economy Precariat scenario describes a world in which there is scarcity due to technological unemployment. Machines have taken over human labour at such a speed that neither the job market nor the welfare state can cope. Existing degrees of freedom have not been restricted, however, since anything is still possible in this world. On the other hand, many of these freedoms are *de facto* only enjoyed by a small elite.

This scenario is based on the question frequently discussed in the media whether machines, and in particular developments in the field of artificial intelligence, will take work away from humans. Various studies have tried to estimate the percentage of jobs threatened by digitisation for the next one or two decades. The results of these analyses vary widely, from 50%^{22,23} to 30%²⁴ to as little as 5–10%²⁵. These concerns are countered by the fact that the same fears have existed for millennia. In the 4th century BCE already, Aristotle reflected on unemployment caused by technology.

For if every instrument could accomplish its own work, obeying or anticipating the will of others, like the statues of Daedalus, or the tripods of Hephaestus, which, says the poet, “of their own accord entered the assembly of the Gods;” if, in like manner, the shuttle would weave and the plectrum touch the lyre without a hand to guide them, chief workmen would not want servants, nor masters slaves.

Aristotle, Politics – Book One
(translated by Benjamin Jowett)²⁶

The classic example of a changing labour market is agriculture. Around the year 1800, it still contributed more than half of all jobs in many places in Europe. Today this is in the single-digit percentage range.²⁷ There is no unemployment because of this, however. Former farmhands found new jobs in factories. But what will lorry drivers or sales clerks do when their work is automated? According to economic theorist Jeremy Rifkin, although there would be new jobs, they would be mostly reserved for highly qualified employees, since the jobs would require the handling of technology.²⁸ And even the go-to solution of education is no guarantee for success, because even jobs for highly qualified people could be increasingly automated.²⁹ In contrast to the steam engine or the tractor, software and developments in the field of artificial intelligence are not limited to specific activities, but can put people in many sectors of the economy out of work at the same time.

²² Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological forecasting and social change*, 114, 254–280.

²³ <https://bit.ly/fsk-54> (Source: bruegel.org, 6.5.2020)

²⁴ Berriman, R., & Hawksworth, J. (2017). Will robots steal our jobs? The potential impact of automation on the UK and other major economies. *UK Economic Outlook*, 30–47.

²⁵ Arntz, M., T. Gregory and U. Zierahn (2016), “The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis”, *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris.

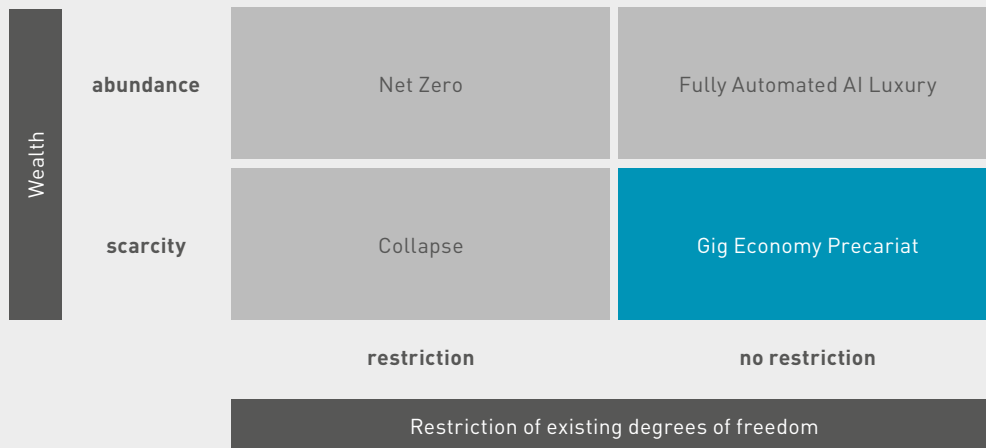
²⁶ Aristotle (1999), *Politics*. Translated by Benjamin Jowett. Kitchener: Batoche Books.

²⁷ <https://bit.ly/fsk-farm> (Source: ourworldindata.org, 5.6.2020)

²⁸ Rifkin, J. (1995). *The end of work* (pp. 3–14). New York: Putnam.

²⁹ <https://bit.ly/fsk-ludd> (Source: nytimes.com, 5.6.2020)

Dimensionen-Matrix – Gig-Economy-Prekariat



Source: GDI

Even if one assumes that people will find work in new occupational fields, the (first) industrial revolution is not necessarily a desirable model. Industrialisation was associated with exploitation, 70 hours of work per week, child labour and a lack of insurance or pension schemes.³⁰ Only many decades later, the labour movement and unions were able to push through legal provisions that shortened working hours, introduced minimum wages and banned child labour.

Digitisation also appears to increase inequality. The wage ratio, i.e. the share of productive profit which is provided to the employees in the form of wages (as opposed to capital income), has been continuously dropping worldwide since the 1980s, which is at least in part due to technology.^{31,32,33} In addition, according to the U.S. Bureau of Labor Statistics, many of the new jobs are created in the low-wage sector.³⁴ Very badly paid jobs

appear to be less threatened by automation – perhaps because they are so cheap that it is simply not economical to automate them.

³⁰ Voth, H. J. (2003). Living standards during the industrial revolution: An economist's guide. *American Economic Review*, 93(2), 221-226.

³¹ <https://bit.ly/fsk-imf> (Source: imf.org, 5.6.2020)

³² Dauth, W., Findeisen, S., Südekum, J., & Woessner, N. (2017). German robots-the impact of industrial robots on workers.

³³ Acemoglu, D., & Restrepo, P. (2017). Robots and jobs: Evidence from US labor markets. NBER working paper, (w23285).

³⁴ <https://bit.ly/gdi-bls> (Source: bls.gov, 5.6.2020)

It is possible, however, that workers will not turn to new sectors and jobs, as they did during industrialisation, but to new forms of work that are less well paid. Most of the jobs newly created in the USA between 2005 and 2015 fall under the category of “alternative work”.³⁵ This includes temporary employment and on-call work in the form of self-employed activity or temporary work negotiated by employment agencies. In Germany, fixed-term employment contracts are also becoming more frequent.³⁶

The increase in temporary and self-employed work could be in part due to digitisation, which cuts out intermediary enterprises such as taxi dispatch centres, music or video stores. Generally, the question can be asked: Why do any (centrally planned) companies exist when the free market presumably ensures the most efficient allocation of resources? The answer is transaction costs. If one wants to procure services on the market, this is associated with costs while searching for and researching quotations, concluding contracts and associated with the uncertainty of the relationship with unknown contractual partners.³⁷ For this reason, major purchases such as new machines are made on the market while minor services are rendered internally and reimbursed at a flat rate in the form of monthly wages. Since the strengths of digitisation are found in the fields of searching, research, conclusion of contracts and trust (via ratings), it is plausible that more and more services will be traded on the market instead of being covered by permanent employees. In the USA, 30% of workers already earn money by means of occasional employment, whereas this is the most important source of income for only a few.³⁸ Those who earn money with occasional jobs, however, are at a disadvantage concerning remuneration,

social security benefits and stability compared with regular employment.

While digitisation will destroy jobs, the alternative for those affected by technological unemployment might not be a specific new occupation, but the gig economy, in which they make their way from job to job on platforms such as Amazon Mechanical Turk. On the one hand, the workers would be more flexible and more independent. Just as in the era of industrialisation, on the other hand, this type of work would be less secure and less well protected by law (e.g. concerning the working hours), because it takes decades to adapt the legal provisions to the new circumstances. In contrast to industrialisation, however, workers in the gig economy are additionally exposed to the constant competition of machines. The latter drive wages down or take over their jobs entirely. This unstoppable change in technology and the employment market makes any political regulation more difficult.

³⁵ Katz, L. F., & Krueger, A. B. (2019). The rise and nature of alternative work arrangements in the United States, 1995–2015. *ILR Review*, 72(2), 382–416.

³⁶ Hohendanner, C. (2018). Reform der befristeten Beschäftigung im Koalitionsvertrag: Reichweite, Risiken und Alternativen [The reform of temporary employment in the coalition agreement: scope, risks and alternatives]. IAB summary report no.16/2018. <http://doku.iab.de/kurzber/2018/kb1618.pdf>

³⁷ Dahlman, C. J. (1979). The problem of externality. *The journal of law and economics*, 22(1), 141–162.

³⁸ <https://bit.ly/fsk-gig> (Source: gigeconomydata.org, 5.6.2020)

Gig Economy Precariat Development 2020–2050

In most cases, the automation of jobs did not happen overnight. Instead humans and machines coexisted for a while. Secretaries reviewed automated transcriptions for errors, while radiologists clarified which automated diagnoses in X-ray images were false positives.³⁹ Each correction resulted in the software becoming better and making less mistakes. In the next round of cost-cutting, which appeared necessary sooner or later, the workload was reduced to part-time work and no new employees were hired. The same had been observed with cash machines. The automation of the work of bank employees by cash machines in the second half of the 20th century did not directly result in the closure of bank branches. However, it was the prerequisite for it once the bank wanted or had to cut costs, sometimes only decades later.

A parallel, flexible employment world developed. Former sales clerks sold brand clothing online. Unemployed bank employees speculated with cryptocurrencies. More and more short-term jobs were offered on temporary work platforms. People who were now employed part-time due to the cost cuts legitimised by technology offered their services on such platforms. Often they did the same work as in their regular employment: controlling and training machines in their field. Only this time, they were cheaper workers because they found themselves in a situation of international competition and the ordering parties did not have to pay for any social security benefits. This meant they competed with their own regular employment by offering the same work cheaper on a self-employed basis and by training machines to do their job.

The political institutions were too inflexible to adapt the welfare state to these new, more international conditions. In addition, younger people in particular no longer believed that they would be able to enjoy social benefits such as old age pensions, while the increasing flexibility of jobs offered on platforms was quite in tune with the spirit of the times. The platforms were therefore not exclusively frequented by desperate job seekers. The flexibility was quite appreciated by a new *creative class*. Sought-after and well-paid architects and programmers discovered the advantages of not having to answer to a single employer but being sought after for limited-time projects online.

At some time or another, workers were no longer sought by companies, even in the case of major projects, but by freelancers who teamed up in mobile, temporary project groups. In most cases these project groups were more dynamic and leaner than the inflexible companies with their rigid hierarchies. In a world in which the economy and the human services in demand were constantly changing due to technological progress, this dynamism was exactly what was essential for survival.

³⁹ Thrall, J. H., Li, X., Li, Q., Cruz, C., Do, S., Dreyer, K., & Brink, J. (2018). Artificial intelligence and machine learning in radiology: opportunities, challenges, pitfalls, and criteria for success. *Journal of the American College of Radiology*, 15(3), 504-508.

Since ties to a particular location and compulsory presence were no longer important in many jobs, migration for economic reasons happened much less often. This meant that the wealth gap between countries was reduced. Previously wealthy countries became less prosperous, while less wealthy countries initially benefited from easier access to the international labour market.

Due to network effects favouring monopolies (the more users a platform has, the more useful the platform is), a Chinese Platform which, contrary to its Western competitors, enjoyed unlimited access to the important Chinese market, evolved into the global monopoly for employment services and financial transactions. Soon trade and news were also running on the same Platform which made it dominant and virtually the operating system of the Internet. At the same time, intermediary actors such as companies, associations or unions became obsolete. What remained were individuals, temporary project groups, a weakened government as well as the Platform which centrally managed the complex system of global trade and employment including payment transactions and news.

Gig Economy Precariat Situation in 2050

In the Gig Economy Precariat scenario, many people are living on the poverty line. Governmental funding of education or healthcare is reduced to a minimum. Anything exceeding the bare minimum has been privatised and is therefore very unevenly distributed.

Those who own land, machines and real estate live in closed-off tax havens with an excellent private infrastructure. They protect themselves against any awakening envy in of the precarious masses by means of walls and the occasional philanthropic action. The masses compete for rare short-time employment as day labourers of the digital age. They often do not even know whether they will be able to pay the next rent, while there is little hope for improvement in the near future. Of course, there are also some people who can handle this flexibility very well. Older and less educated people in particular experience great difficulty, however, to adapt to a constantly changing employment market.

Although there would be many fields of activity, such as the care for the elderly, they often do not have any money to pay for care services themselves. Those who do not have any next of kin are in part cared for by robots. Many jobs consist of teaching machines, e.g. to perform knee surgery, speak dialects, detect irony in a message or cook good lasagne (as cooking robots or merely as cooking consultants). One way to teach machines is to feed them data. This allows to monetise personal health or consumption data, for example. Or one can answer questions the Platform asks about friends against payment (“Why did Michael suddenly stop buying energy drinks?”). This allows the Platform to better target its advertising.

Advertising itself is an opportunity to make money. A positive mention of a yoga mat on social media is rewarded with a small payment. People who teach yoga or have many rich followers will receive a little more money. Those who grant the Platform access to the microphone of their smartphone can realise additional monetising models, for example getting paid for recommending products to friends. Some earn money by sitting in cafés looking good and encouraging others to order their clothes (e.g. via augmented reality).

The chances of getting hired are increased by disclosing one's personal data. This is because measurable data, including current health data, is more relevant in hiring decisions than traditional application documents. Although people are not forced to disclose everything about themselves, employers often prefer to hire those who have "nothing to hide". The more things are measured and turned into data, the more life becomes one huge job interview. One incorrect statement, one unconsidered social media post or a single drug experience can have a life-long negative impact on one's chances to get a job.

Private health providers likewise expect full transparency. The more data is shared – from pedometers to smart toilets – and the healthier the person is, the lower the health insurance premium. No-one is forced to disclose any data; not to do so, however, is more expensive than to lead an unhealthy, but transparent life.

Monopolisation also undermines the position of the consumer. Many things are no longer bought, but merely rented, which means they are no longer owned and therefore must not be repaired or modified. Devices only work with proprietary components or spare parts and therefore need to be procured from a single manufacturer.

Due to the weakness of the government and a lack of intermediaries such as associations, consumer protection organisations or unions (with workers considering each other as competitors and failing to organise), only few regulations are in place to limit exploitation, violations of privacy or monopolisation.

Gig Economy Precariat Challenges

The Gig Economy Precariat scenario requires *adaptation to constantly changing market requirements*. Most people experience stress. They do not know whether they will be able to afford the bare necessities next week because no real public safety net exists. In many places, *hopelessness* leads to broken homes, violence, drug abuse, xenophobia and an escape into virtual worlds.

The Platform is more powerful than the government but is not subject to any democratic control, which means that the government has few options to *protect the privacy of its citizens*. Disclosing one's personal data is the norm. This leads to people *censoring themselves* because anything they say or do might affect their chances of getting a job.

Social cohesion is lacking. On the one hand, *private relationships have been commercialised*, resulting in doubt which friendships, tips and opinions are honest and what is said only to make money. A wide *gap between rich and poor people* does additional damage to social cohesion. But solidarity among poor people is also being eroded because they *all compete against each other* for the few jobs available. The competition and stress result in discrimination against minorities in particular.

Gig Economy Precariat Possible Solutions

Life-long learning, constant upskilling and re-skilling are mandatory. Many digital services can be used for this. The Platform itself supports its users in this respect, since it benefits from more skilled workers. There are online classes and the option to participate in “internship projects” that are remunerated with experience badges. Being able to use machines is important, so one can use them instead of being replaced by them.

Offering an attractive combination of skills on the employment market and waiting to be hired for a project is not enough. People need to *develop new business ideas* themselves. These may include launching new products or services, creative advertising of other products, but also investing in promising products, projects or human capital. Investing in the education of another person is one such possibility. In this case, the investors are paid a share of the wages as dividends once the education is complete. Migration can also be financed applying the same principle. Investors then receive a share of the migrant’s income at their destination. Of course, one can also have other people invest in one’s own education or migration.

A *sense of community* develops when goods, uncertainties or tasks are shared. Neighbourhoods lay out communal vegetable patches or establish daycare centres which are cared for by those who currently have no job. Mutual assistance can be remunerated with time credits, even when no money is available.⁴⁰ In job networks or entire professional groups, *peer-to-peer insurance* can reduce the uncertainty of wage loss and create a sense of community.

Where a sense of community exists to some extent, it is possible that individual networks will organise to form *clubs, associations and/or unions*. These could then demand higher prices for their data from the Platform or push through privacy standards.

⁴⁰ <https://bit.ly/fsk-zeit> (Source: benevol.ch, 5.6.2020)

Gig Economy Precariat _example of daily routine_

_BROWSE job offers (extra early, while the others are still sleeping)

_PLATFORM PROFILE optimisation class with a digital gig coach

_Buy CRYPTOCURRENCIES

_Food delivery job during lunchtime

_!CONFERENCE CALL WITH ZHAN AND ABIEYUWA!
concerning project submission for the architecture competition

_Work in the COMMUNAL GARDEN unless a project comes up

_Mediation due to bad ratings by the Platform's arbitration panel

_Attention: "YOU HAVE UNTIL FRIDAY TO TELL FOUR FRIENDS ABOUT SWAG SHOES"

_Get HEALTH INSURANCE CHIP implanted

Gig Economy Precariat Skills, Knowledge, Qualities

SELF-DETERMINATION

In this scenario, it is most important *to act on one's own accord* and to develop *personal responsibility*. This is because nobody will look after you if you do not do it yourself. A prerequisite for this is *being able to deal with stress* caused by the constantly changing, uncertain situation.

LIFE-LONG LEARNING ABILITY

Since the employment market is constantly changing, life-long learning has become essential. What is required is the ability to *acquire knowledge quickly* and to *process complex and abundant information*.

MACHINE SKILLS

The ability to work with machines, i.e. *computer skills* and *programming skills*, are necessary to use machines to increase productivity and to avoid being replaced by them.

ENTREPRENEURSHIP & FLEXIBILITY

In this scenario, it is important to think like an *entrepreneur*. People need to realise opportunities and seize them, whether for their own continued education or to launch projects and products. *Adaptability* and *creativity* are needed to repeatedly develop new business ideas in a world in which the market is always changing.

SELF-EFFICACY

Educating oneself in a previously almost unknown field or putting new products on the market require *self-efficacy*, i.e. trust in one's own abilities. At the same time, *patience and endurance* as well as *the courage to make mistakes* are essential because there is a high probability of failure.

ADMINISTRATION

Acting like an entrepreneur also requires *administrative skills* such as preparing a contract and, plain and simple, the ability to *organise*. Those who want to be successful need to be able to allot their own time well or define priorities.

TEAMWORK & INTERCULTURAL SKILLS

Administration and organisation are particularly relevant in a group. When many people work together for the first time, come from different cultural backgrounds and only communicate online, *decision-making in the group* and the *coordination of group work* becomes more difficult. Intercultural cooperation requires the ability to *reflect on the accepted realities and ideals in our society and to question them*.

TECHNOLOGY LITERACY

Responsible citizens need *online skills*. One *should* know which data to share with whom and how the Platform generally works and makes money. This enables a conscious decision about the compromises to make, if any, between privacy and human dignity on the one hand and economic benefits on the other hand.

*Human dignity is the basis of our democracy.
This is why we need genuine informational
self-determination.*

COMMUNITY INVOLVEMENT

Working together to offer something in response to the almighty Platform requires the *readiness to contribute to the community* – whether in the political arena or in the form of everyday help. Alternatives, meaning *social goals, must be defined* in order to strive for change together. Those who fight for more privacy must accept in return that they will not be able to learn as much about other people. Waiving this transparency requires being able to *trust people you do not know yet*.

Survey Results Gig Economy Precariat

Skills and qualities required for the Gig Economy scenario, subdivided into the categories “Knowing”; “Wanting” and “Doing”. The figures in brackets indicate how well (on a scale of 1 to 6) the skills are taught in Swiss schools according to the teachers (see Appendix A). It is important to note that the teachers have made their assessments not with regard to the scenario but regarding activities relevant today.



Net Zero





The Net Zero scenario describes a world of abundance. Most people do not lack anything materially. The complexity of society is intentionally reduced, however. In this world, this appears to be the only way to deal with environmental problems, in particular with climate change, but also with dwindling biodiversity. Currently existing freedoms, in particular with regard to consumption, are therefore restricted in this future. These restrictions are based on international agreements that are interpreted differently in individual countries. While some favour a participatory approach, others are more authoritarian.

Human civilisation must become carbon-neutral. It is controversial to what extent a reduction of greenhouse emissions also requires the restriction of current freedoms, as described in this scenario. Liberal economic circles often see climate change as a technical problem that can be solved by sufficient research and development. Solar panels and wind generators are becoming cheaper all the time compared with oil or coal, which means that they should soon replace fossil energy sources⁴¹ – even without future technologies such as fusion reactors. This is complemented by reduced energy consumption thanks to more and more efficient engines, lamps, refrigerators, etc. A CO₂-free economy can develop without prescribing how people have to live or restricting their freedom. Economic growth and CO₂ emissions, which formerly went hand in hand, are no longer connected.⁴² Some first signs of this can already be seen in some countries in which CO₂ emissions decrease (including imports) while the economy continues to grow.⁴³ If developed countries succeed in completely removing the link between CO₂ emissions and growth, they serve as a role model for developing countries, which can skip the fossil devel-

opment steps of the West such as oil-fired heating systems, just as some have skipped landline telephony.

Others do not share this optimism, however. In 1972, the Club of Rome postulated that unlimited growth was not possible on a planet with limited resources.⁴⁴ Climate change is only one environmental problem of many in this context. Although more and more growth can be generated per tonne of CO₂ and renewable energy sources are massively expanded, this will not inevitably result in a decrease of emissions (see Fig. 2).

Even if a worldwide reduction of CO₂ emissions was observed, extrapolating this trend to zero would be very optimistic. While initial savings may be relatively easy, every additional tonne will be more difficult. Moreover, it has been known for 150 years now that increased efficiency does not inevitably result in reduced consumption. During the English industrial revolution, William Stanley Jevons observed that increases in steam engine efficiency did not lead to less, but more coal being consumed.⁴⁵ Increases in efficiency lower the costs for power. This in turn increases

⁴¹ Gimón, E., O'Boyle, M., Clack, C., & McKee, S. The coal cost crossover: Economic viability of existing coal compared to new local wind and solar resources. Energy Innovation LLC.

⁴² Fücks, R. (2013). *Intelligent wachsen: die grüne Revolution* [Intelligent growth: the green revolution]. Carl Hanser Verlag GmbH & Co. KG

⁴³ <https://bit.ly/fsk-co2> (Source: ourworldindata.org, 5.6.2020)

⁴⁴ Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth*. New York, 102, 27.

⁴⁵ Jevons, W. S. (1866). *The Coal Question; An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of our Coal-Mines*. *Fortnightly*, 6(34), 505-507.

Dimensionen-Matrix – Netto-Null



Source: GDI

Correlation between worldwide economic growth and CO₂ emissions

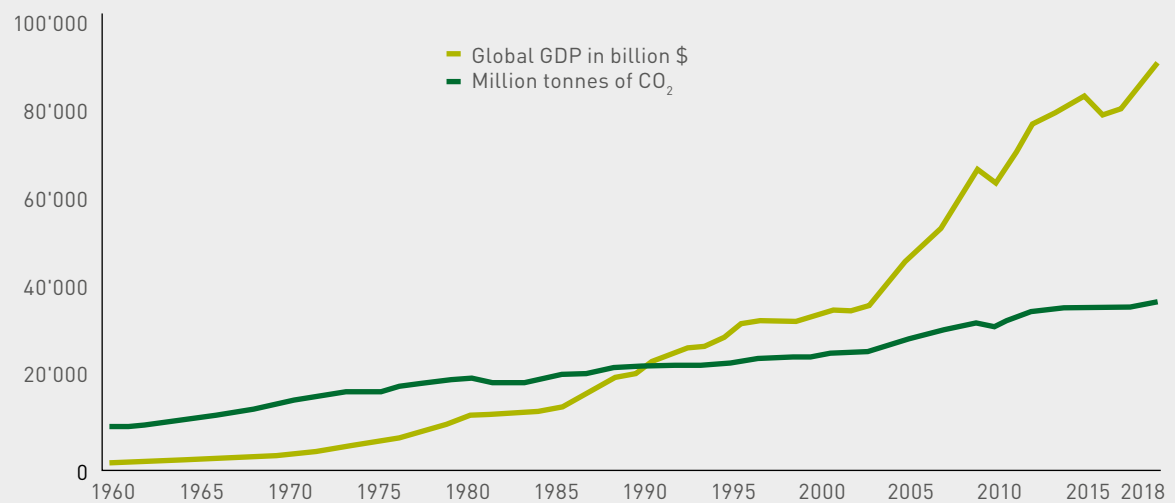


Figure 2

Source: <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>;
<http://www.globalcarbonatlas.org/en/CO2-emissions>

demand. This is also the case at present. With increasing efficiency, cars become heavier, air conditioning units become more popular and refrigerators become larger (while the old refrigerators are not disposed of but continue to be operated in the basement).⁴⁶ Although the share of renewable energy in the energy mix is increasing, this does not automatically mean that less oil or coal will be consumed.

For the Net Zero scenario, we assume that there will be no technological solution to the problem of climate change. While the economy is becoming more efficient all the time and is able to generate more and more growth per tonne of CO₂, emissions do not drop sufficiently. Under this assumption, there is no comfortable transition to a zero-emission economy. One thing is clear: There will be signification daily life restrictions in this scenario.

Net Zero

Development 2020–2050

Initially, some people still thought that climate change was a conspiracy of scientists and leftist politicians intended to undermine national sovereignty. A seemingly scientific question became a cultural controversy because some groups were not ready to accept the conclusions of science for political reasons and felt that their identity was under attack. With frequent record temperatures in the summer, drought, increasingly intense forest fires, storms, vanishing glaciers, winters without snow, floods and other forms of extreme weather, most of these voices were silenced. Not least due to demographic change: Many climate sceptics belonged to an older generation that simply died out.⁴⁷

The readiness to act against climate change gained international acceptance. On the one hand, its urgency became more and more obvious. On the other hand, many developing countries became wealthier, not least because of a fairer economic policy of the West. This meant that there was less expectation that the rich West should take the first step. Although an international consensus was ultimately reached that measures should be taken to combat climate change, there was disagreement about how to proceed. A worldwide tax on emissions? Or rather emissions trade? A ban on coal? Investment in renewable technologies by central banks and specialised trust funds? What should inter-

⁴⁶ <https://bit.ly/fsk-jevon> (Source: newyorker.com, 5.6.2020)

⁴⁷ <https://bit.ly/fsk-mind> (Source: economist.com, 5.6.2020)

national coordination be like? The only thing the international community could agree on was that all countries had to reduce their net emissions to zero by 2050. Relatively vague intermediate goals were also defined for 2030 and 2040. Sanctions were imposed on those who would not commit to net zero by 2050, including the intermediate goals, by the “coalition of the willing”. As the heads of state and government could not agree on a specific approach, each country had to find its own way to reach the goal of net zero emissions.

A majority of countries counted on technological progress and additionally introduced a few regulations such as the definition of new standards for new buildings and cars or light CO₂ taxation. Although progress was made – with photovoltaic systems multiplying on roofs and wind generators on hills – an initial reduction of CO₂ emissions was followed by stagnation at a still relatively high level. The consequence was clear: Drastic measures had to be taken that would mean palpable restrictions in daily life.

Net Zero Situation in 2050

The Net Zero world in 2050 is similar to the Collapse scenario in many respects. The international flow of goods has been significantly reduced; many amenities from 2020 no longer exist. However, while this was the result of factual constraints in the Collapse scenario, it is a conscious decision by society in the Net Zero scenario.

The world has become more local and decentralised overall. People travel by bicycle or public transport. “Home offices”, “co-working spaces” and teleconferences have replaced the long-distance commute to the office. Flights are rare and motorised individual traffic likewise only continues to exist on a small scale. Traffic is electrified. The cars that still exist are shared. The range of movement of most people has become significantly smaller. This also results in changes to public spaces. Many streets are converted into parks that provide shade, which is necessary because of the regularly occurring heatwaves.

Energy is generated primarily from the sun and from wind. Neighbourhoods share solar and photovoltaic panels. A smart network coordinates the energy generated by them. In case of excess production, the energy is used to produce hydrogen or is stored in neighbourhood batteries. If there is a shortage, all fully loaded devices – from e-bikes to computers and drones – are tapped and also the hydrogen is retransformed into energy. Fossil fuels such as oil are only still extracted in small quantities; however, they are no longer burned in motors but only used for important things, e.g. to manufacture medicines.

International trade primarily uses modern sailing vessels,⁴⁸ but is less extensive than at the beginning of the century. For this reason, many products have become significantly more expensive and are more likely to be repaired, recycled, shared and produced locally. Due to the warmer climate, more crops that used to come from overseas can now be cultivated locally. Many people grow some of their foodstuffs themselves in gardens, on building facades and balconies, becoming more familiar with their food in the process.

These standards did not develop spontaneously but have been defined by law. On the international level, for example, regulations are in place regarding the reusability of electric devices, a ban on burning fossil fuels or a distribution formula for climate migrants. The implementation of the standards on the national level varies significantly. In some countries, many things are prohibited or severely restricted, e.g. meat consumption, air travel, pet ownership or living space per person. In other countries, the inhabitants are allocated an emission contingent that becomes smaller every year, but which they can use or sell at their discretion.

Net Zero Challenges

In the Net Zero scenario, the world must *reduce CO₂ emissions to zero as quickly as possible*. As this cannot be achieved without conflict using technological innovations only, *rules for self-restriction* must be established that are *accepted by society*. What makes things particularly difficult is the fact that the *effects of these restrictions are not felt immediately*. The best-case scenario for the decades to come probably is that the consequences of climate change – severe weather, extinction of species, rising sea levels – do not become more severe. The restrictions are therefore very palpable, but the benefits are abstract and will only be felt by future generations. To still achieve acceptance of personal restrictions, understanding the complicated and abstract problem is necessary.

Painful cuts trigger *vocal resistance* and *social unrest*, in particular by people living in more rural regions where bank branches, shopping options and village pubs disappeared and jobs are scarce. They already consider themselves to be on the losing end of globalisation and now get the feeling that the winners of globalisation, who dominate in politics and culture, want to tell them how they have to live.⁴⁹

⁴⁸ <https://bit.ly/fsk-ship> (Source: theweek.com, 5.6.2020)

⁴⁹ Goodhart, D. (2017). *The road to somewhere: The populist revolt and the future of politics*. Oxford University Press.

This is exacerbated by a phenomenon called the *tragedy of the commons*.⁵⁰ From a communal perspective, it makes sense to reduce the consumption of a natural resource because everyone will otherwise come up empty-handed. No-one wants to be the “dummy” who takes a step back while everybody else continues as usual. But when everyone waits for others to take the first step before acting themselves, nobody will ever do anything. Consequently, understanding the problem and being ready to self-restrict is not enough. Volunteering to take the first step requires faith in collective action.

Net Zero Possible Solutions

The complex issue of climate change is taught early on and at all levels of education to enable people to understand the necessity of drastic measures and make the according decisions. The public at large is kept up to date about the latest findings in research.

Measures to reduce CO₂ emissions must be democratically legitimised in order to be accepted in Switzerland. In a world with little mobility, this means that regulation is organised at the subsidiary level, i.e. as locally as possible. *Decision-making bodies of direct democracy* down to the local council or neighbourhood level specify and implement rules, make sure that they are adhered to and define sanctions in case the rules are infringed.⁵¹ For example, these bodies decide how locally generated energy is distributed, which foodstuffs are grown on public land and what is to be considered public land in the first place. The rules are less an objective imposed from above but rather something that is agreed on together, which can even foster a sense of community. This bottom-up mechanism now helps to build trust in order to overcome the phenomenon of the “tragedy of the commons”.

⁵⁰ Hardin, G. (1968). The tragedy of the commons. *Science*, 162(3859), 1243-1248.

⁵¹ Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Environmentalism should work at the subsidiary level and should be implemented locally wherever possible.

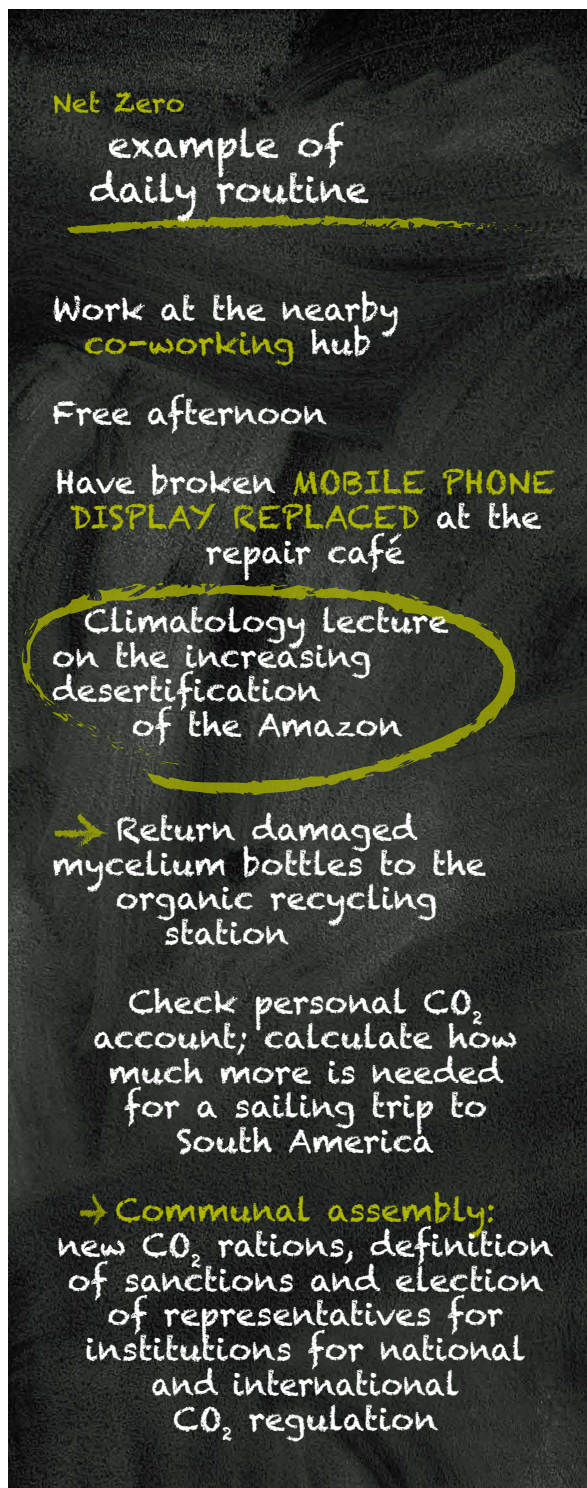
Marcel Hänggi, Initiative Committee Glacier Initiative

But not everything can be organised at the local council level, of course. One of the problems addressed at the national level is the *reduction of social inequality*. For it is the feeling of injustice that prevents less well-off people from accepting significant restrictions.⁵² For this reason, infrastructures such as shopping options or healthcare institutions are subsidised in remote areas so that the people do no longer have to travel far to shop or visit their doctor and feel recognised with regard to their needs. Emissions taxes are fairly redistributed to the population. Taxes on the rich are significantly increased and certain luxury goods such as private helicopters or heated outdoor pools are prohibited in many places.

At the same time, a transformation of values happens, in which time becomes more important as a status symbol than material possessions. Freedom means having time to spare. This is also why people work less. Those who have plenty of time can travel to other continents because this is only possible by boat or by train. Having plenty of time means being rested, even-tempered and healthy. The transformation away from material values and towards immaterial values, towards life satisfaction, nature, health and time also happened at the national level: The gross domestic product has been replaced with a more comprehensive quality-of-life index that takes into account these factors. A different approach to time is also associated with an *expansion of one's own frame of reference regarding time and space*. People reflect on the impact their own behaviour has on people living on

islands in the Pacific or on those who will be born 200 years from now. Consumer culture is regarded as being akin to colonialism. While colonialism was characterised by exploitation of people in the global south, consumer culture considered the wealth of one's own offspring a resource that could be plundered.

⁵² Brown, M., & Uslander, E. M. Inequality, Trust, and Political Engagement.



Net Zero Skills, Knowledge, Qualities

EMOTIONAL STABILITY & PRACTICAL SKILLS

Extreme weather occurs much more frequently. This means *being able to deal with stress* is important. If infrastructures such as heating or fresh water supply fail, *survival skills* help to weather the crisis in the short term. Thanks to *mechanical skills* people can repair damage caused by severe weather themselves. *Gardening skills* enable them to grow food for personal consumption in an emergency.

EFFICACY

Self-efficacy and the courage to make mistakes are necessary to tackle projects with confidence, whether for the renovation of one's own house, to grow one's own food or to repair equipment.

UNDERSTANDING OF PROBLEMS & KNOWLEDGE PROCESSING

Discussing measures against climate change requires a deeper understanding of the problem. This includes *environmental and economic knowledge*. What is the connection between economic growth and emissions? What can be regulated via the price? What will happen when the last glaciers vanish from the Alps? To ensure that their knowledge is up to date, people must be able to *process complex and overabundant information, understand statistics, comprehend scientific approaches* and *assess the reliability of information in the media*.

SHARED RESPONSIBILITY TOWARDS FUTURE GENERATIONS

The mere understanding of the problem does not do much good. What is also required is a *readiness to act for the benefits of the (future) community*, even if this merely means consuming less. It is necessary to *think in the longer term*, i.e. to imagine what the world will be like in 100 or 200 years, and to feel *responsible towards the future generations* that will be alive then. And ultimately, *trust* is required that other people will share this problem awareness and the readiness to consume less themselves.

NON-MATERIAL VALUES

Restrictions are perceived less as such if *non-material resources such as time are valued more*. Accumulation of property does not have to be the only point of reference and is by no means an invariable human trait.⁵³ To focus on this and describe interesting alternatives instead of preaching sacrifice only, *personal wishes and needs must be reflected on, social values must be questioned* and *alternative social goals must be defined*.

DEMOCRATIC ABILITY

For the political implementation of self-restraint, the associated *decisions must be made in the group*. The more people have an *understanding of democratic processes* or are even politically involved, the more legitimised the decisions will be. Otherwise the decisions will risk being perceived as instructions issued by an elite.

FLEXIBILITY

In the face of restrictions, people must be able to *self-organise well* and *be adaptable* because goods and services are no longer available anywhere and anytime. Electricity is not available at all

times of the day and night, for example. Better planning, flexibility and being ready to share are consequently what counts.

⁵³ Sahlins, M., 1972. Stone Age Economics. Aldine, Chicago.

Survey Results Net Zero

Skills and qualities required for the Net Zero scenario, subdivided into the categories “Knowing”; “Wanting” and “Doing”. The figures in brackets indicate how well (on a scale of 1 to 6) the skills are taught in Swiss schools according to the teachers (see Appendix A). It is important to note that the teachers have made their assessments not with regard to the scenario, but regarding activities relevant today.



Fully Automated AI Luxury





The Fully Automated AI Luxury scenario describes a world in which machines have taken over much of the work. But the fruits of this labour are not restricted to a small elite like in the Gig Economy Precariat scenario but are available to all. Consequently, there is no material scarcity in this world and existing freedoms are not restricted.

In 1930, famous economic theorist John Maynard Keynes saw into the future with optimism when he predicted that, due to technological advancements, people would work no more than 15 hours per week at the end of the 20th century.⁵⁴ As far as technology is concerned, Keynes's prediction was quite accurate. What he failed to foresee is that people are very good at inventing new kinds of jobs all the time. According to anthropologist David Graeber, many of these jobs are entirely unnecessary, however. So-called "bullshit jobs"⁵⁵ do not create any value, but at best shift it and are considered useless even by those working in them. Do we really need this many people to review the work of others (middle management)? What value do people create who call others to convince them to change their health insurance? Such conversations do not necessarily benefit the customers and can even be detrimental.⁵⁶ For Graeber, "bullshit jobs" are a type of occupational therapy in which one has to demonstrate one's industriousness in order to be allowed to participate in the communal wealth.

*We invoke artificial scarcity to support
the notion of the lazy individual.*

Daniel Häni, entrepreneur

In addition, work that is truly valuable and necessary is paid much less than jobs nobody would miss. This became more than obvious during the coronavirus pandemic. A prime example is the care for the elderly, which is often provided without any remuneration at all. In many fields, there is no connection, or even a negative one, between benefit to society and remuneration.⁵⁷

It is remarkable that Keynes's optimistic prediction that machines would take over work from people is almost regarded with fear today. Liberation from boring work is now perceived as being robbed of one's social right to exist – therefore people are happy that "bullshit jobs" are still available.

The concept of an unconditional basic income is often mentioned as a solution so that people do not have to feel threatened by machines taking over their job. As a consequence, work that is of value to society could be done instead of "bullshit jobs", without any financial constraints. But what if no money was even necessary in the future because machines will do anything for free?

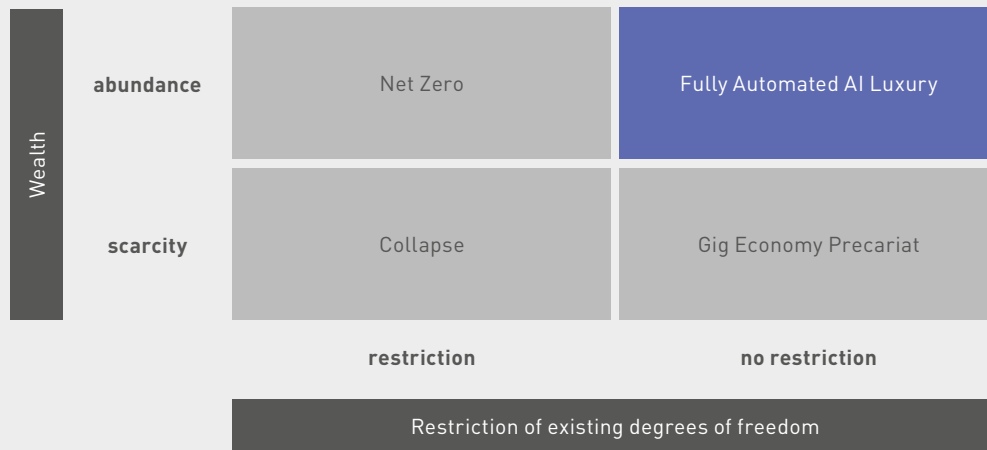
⁵⁴ Keynes, J. M. (1930). Economic Possibilities for our Grandchildren.

⁵⁵ <https://bit.ly/fsk-bull> (Source: strike.coop, 5.6.2020)

⁵⁶ Inderst, R., & Ottaviani, M. (2012). Financial advice. *Journal of Economic Literature*, 50(2), 494-512.

⁵⁷ Lockwood, B. B., Nathanson, C. G., & Weyl, E. G. (2017). Taxation and the Allocation of Talent. *Journal of Political Economy*, 125(5), 1635-1682.

Dimensionen-Matrix – Vollautomatisierter KI-Luxus



Source: GDI

Traditionally, a price can only be defined when goods are scarce. In theory, scarcity should no longer exist in a digitally connected world, because any information can be copied as often as needed once it has been digitalized.⁵⁸ Almost anything could be free in digital form. Scarcity is artificially created by copyrights that prevent the full potential of the information from being achieved.

Extracting money from users of a program by restricting their use of it is destructive because the restrictions reduce the amount and the ways that the program can be used. This reduces the amount of wealth that humanity derives from the program. Where there is a deliberate choice to restrict, the harmful consequences are deliberate destruction.

Richard Stallman, GNU Manifesto⁵⁹

The example of Wikipedia shows what a model of an abundance of information unobstructed by copyrights can be like. Wikipedia represents an unconditional basic supply of information that arises from the intrinsic motivation of a few thousand volunteers. Not only encyclopaedia entries can be digitalized and offered at zero cost, but also films, music, software and operating systems, objects in the form of 3D printer data, an algorithm capable of recognising cats in photos, in the future maybe even medicines⁶⁰ and much more.

⁵⁸ Rifkin, J. (2014). The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism. St. Martin's Press.

⁵⁹ <https://bit.ly/fsk-gnu> (Source: gnu.org, 5.6.2020)

⁶⁰ Zaleskiy, S. S., Kitson, P. J., Frei, P., Bubliauskas, A., & Cronin, L. (2019). 3D designed and printed chemical generators for on demand reagent synthesis. Nature communications, 10(1), 1-8.

Worldwide generation of renewable energy

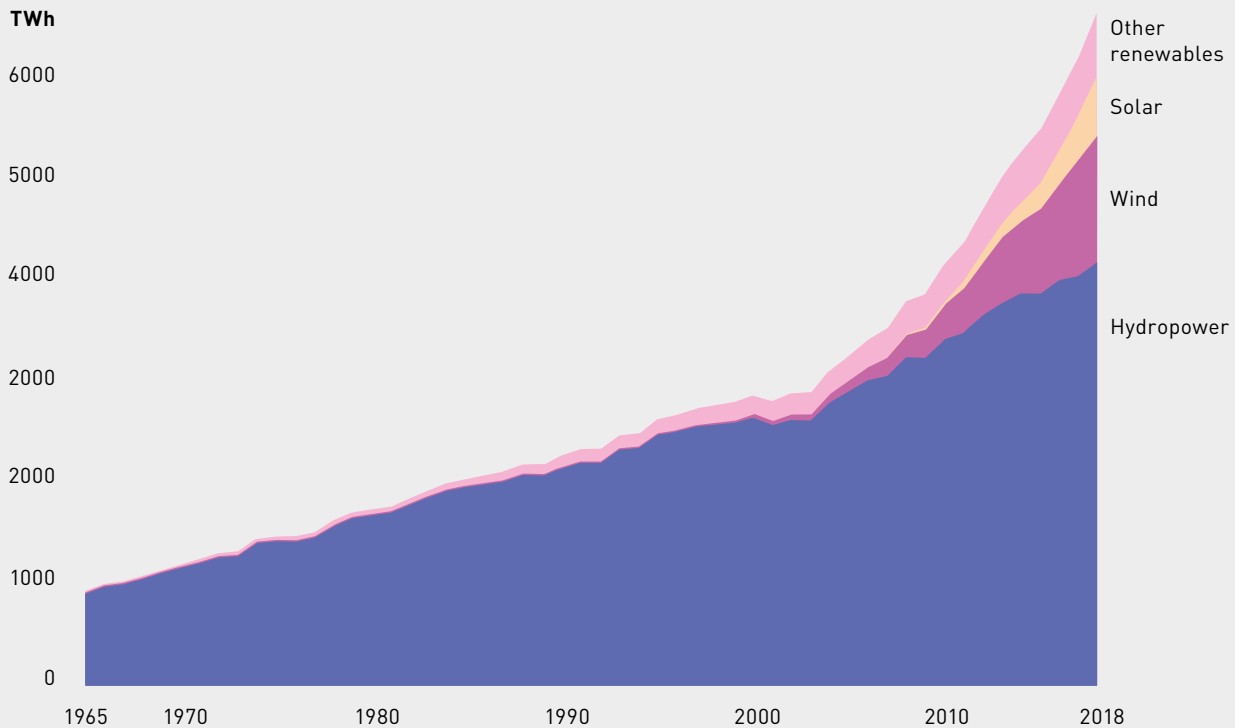


Figure 3, Source: BP Statistical Review of Global Energy (2019)

What is needed for this is a digital-analogue converter that translates digital information into an analogue format. Loudspeakers convert digital MP3s into analogue sound waves, 3D printers convert digital construction plans into analogue objects, and gardening robots convert digitally encoded sequences into gardening work. Once robots and 3D printers (as well as other digital-analogue converters) can in turn be printed out, more and more things can be taken out of the logic of scarcity.

An open-source AI can also be copied infinitely and can itself produce an unlimited number of programs, chemicals, objects, etc. that are free of charge themselves and increase the abundance, even if people do not contribute anything.

Abundance requires energy and raw materials for 3D printers and robots. With the exponential growth of renewable energy sources (see Fig. 3), there will be an increasing abundance of ener-

gy.⁶¹ Thanks to scalable production, the prices for it see double-digit percentage falls each year. In 2020 already, energy from renewable sources should become cheaper than the cheapest fossil sources of energy.⁶²

Scarcity of raw materials could be a thing of the past once they can be mined from asteroids.⁶³ Investment bank Goldman Sachs considers the mining of resources in space a promising investment.⁶⁴ In 2018 already, Luxembourg launched its own space agency in order to mine extraterrestrial mineral resources.⁶⁵ Mining in space is an industry of the future. Thanks to being reusable, the

⁶¹ <https://bit.ly/fsk-nrg> (Source: gdi.ch, 5.6.2020)

⁶² <https://bit.ly/fsk-cost> (Source: irena.org, 5.6.2020)

⁶³ <https://bit.ly/fsk-planet> (Source: planetaryresources.com, 5.6.2020)

⁶⁴ <https://bit.ly/fsk-gold> (Source: businessinsider.com, 5.6.2020)

⁶⁵ <https://bit.ly/fsk-lux> (Source: tagesspiegel.de, 5.6.2020)

price of rockets has dropped considerably. With a Soyuz rocket, it still takes approx. 35 million dollars to send a human into space. Virgin Galactic envisions a price of 250,000 dollars. NASA is working on sending one kilogram of payload into space for a few dollars.⁶⁶ According to Goldman Sachs, the only “problem” is: Some asteroids contain so many precious metals that prices would nose-dive. In a world of abundance, however, financial incentives no longer play a role. The problem that something is too cheap then seems as absurd as robots taking over boring jobs.

Fully Automated AI Luxury Development 2020–2050

Initially, only those who held shares in tech companies benefited from the accelerated technological progress. A certain software, for example, excelled in controlling self-driving cars and was used worldwide. A small team of approximately two dozen software developers generated billions in revenue for the shareholders while many people lost their jobs as drivers. Ironically, it had been them who had trained the machines in the first place. They and many others whose jobs were automated became a “useless class”,⁶⁷ no longer needed by anybody. Meanwhile the software for self-driving cars improved all the time the more it was used. The competition was soon forced out of the market.

Monopolisation increasingly became a problem. The EU therefore implemented regulations to which Switzerland also subscribed. This regulation promoted greater access to data. Companies that tended to achieve a monopoly had to make a part of their anonymised data, corresponding to their share of the market, available to the competition.⁶⁸ Users were also granted more rights to the data they constantly, often unknow-

⁶⁶ <https://bit.ly/fsk-nasa> (Source: nasa.gov, 5.6.2020)

⁶⁷ <https://bit.ly/fsk-ai> (Source: guardian.com, 5.6.2020)

⁶⁸ Graef, I., & Prufer, J. (2018). Mandated data sharing is a necessity in specific sectors. *Economisch Statistische Berichten*, 103(4763), 298-301.

ingly, produced. They were given easy options to view, delete and share them with third parties. The government also implemented an ambitious open-data policy. Data from university research was made public. Weather, traffic, finance data, etc. became open data. The Internet of Things resulted in a veritable explosion of the quantity and variety of freely available data.

A self-sufficiency movement arose among the “useless class”. These people not only cultivated their own potatoes, but also produced their own electricity, built simple robots and used, improved and shared open-source software. Those who did not live in big cities also led a relatively inexpensive life. This was not least due to the fact that automation made many things such as transport services, photovoltaic systems or robot components very cheap and much data was freely accessible. This open-source outsider scene was so appealing that it soon not only attracted the unemployed, but increasingly also people who, although they had a job, found work increasingly devoid of any purpose. More and more things were shared and consequently no longer traded. This enormously boosted development also in emerging and developing countries and resulted in a significant decrease in economic migration.

The culture of openness and exchange made itself felt in a changing approach to privacy. People made more and more of their personal data public. Thanks to the aforementioned regulation, this was also possible with data collected about them by platforms or by the government. Collecting and sharing data became a religion for some. Its followers saw the world as a stream of data and their own task as feeding as much data as possible into it, ultimately becoming one with the data stream via brain interfaces.⁶⁹

The disclosure of data meant that platforms lost their data monopolies and were replaced by open and free alternatives without any advertising, just as fee-based encyclopaedias were replaced by Wikipedia. Platforms in turn were not replaced by other platforms, but by decentralised protocols. This meant that data was no longer gathered in a single place. A decentralised network of data referencing each other developed instead.

The abundance of freely accessible and interconnected data resulted in rapid advances in the development of artificial intelligence. As the AIs were frequently developed at universities and in the open-source scene, they were non-proprietary and not the property of a monopoly platform. Decentralised artificial intelligences were often run on local devices, using not only the vast quantities of publicly accessible open data, but also sharing their own data in turn in order to learn from each other. AIs helped humans in all areas of life, from finding a partner to ground-breaking developments in fusion energy to the removal of atmospheric CO₂.

⁶⁹ <https://bit.ly/fsk-data> (Source: ft.com, 5.6.2020)

Fully Automated AI Luxury Situation in 2050

In the world of the AI Luxury scenario, only little obligations remain. Nobody needs to work for money because data, energy and resources are abundant. Foodstuffs can be grown by robots: Fresh produce in vertical gardens on building facades, meat in laboratories, grain on permaculture fields. Healthcare likewise can be provided by robots. These robots ensure a basic supply that often is not even needed. The reason for this is that many people enjoy tending to gardens and only use robots to mechanically remove weeds in order to avoid spraying pesticides. Others find their calling in the care for ill people, or in teaching children.

Luxury and abundance do not mean that everyone leads a wasteful and decadent life. In a world of abundance, amassing property makes as little sense as printing and hoarding Wikipedia entries. Accordingly, property is not a status symbol and people only own what they really use. Abundance also does not mean that all are equal. The opposite is the case. The many freedoms result in vast differences between people. It is just as possible to make full use of one's potential as it is to lose all social contact and pass the entire time playing video games.

This multitude of development options manifests itself in very different communities. Some communities experiment with new gender identities while others negate the existence of genders. Some genetically modify their bodies to prepare them for life on Mars while others renounce almost all technology. Some live in religiously motivated celibacy, others in polygamous communities without any claims of exclusivity towards partners. These communi-

ties, which people join voluntarily, have replaced the nation state and define their own (usually minimal) rules of coexistence. Global coordination takes places with regard to data standards to ensure that data can be shared and used worldwide without any problems. Critical technologies such as nuclear weapons are also regulated globally.

Thanks to the abundance of resources and energy, places previously hostile to life are now inhabited and communities are evenly spread across the globe. People live in the Sahara, on the bottom of the ocean and even on the Moon. This means that even space is no longer scarce on the planet in most cases.

Among the few things that are still scarce in this world are appreciation and affection. Those who design useful objects, produce creative art, generate valuable data and algorithms or grow juicy tomatoes and share these products with others are held in high esteem. Reputation and prestige are things that are not registered digitally, however. Any explicit rating, ranking or ostentatious display of one's own merits is frowned upon.

Creating new types of products such as the aforementioned useful objects, pieces of art or algorithms is difficult. In particular in the creation of purely functional, technological products for which the social or aesthetic component is of secondary importance, artificial intelligences are by far superior to humans. And artificial intelligences are omnipresent in all but a few communities. AIs play a decisive role in the development of new technologies and medicines, in the exploration of the solar system and also in the definition of local and global rules. Many people also use personal AI assistants that answer questions, give recommendations or act as partners in con-

versation. The assistant usually knows the users better than they know themselves, which means that they cannot go wrong when they follow its recommendations. Some people even miss making some mistakes, but still do not dare make any decisions on their own.

Fully Automated AI Luxury Challenges

At first glance, there are no problems in this world. People can do anything, but they do not have to. There are no compelling authorities that prescribe what is important and what is not, what is good and what is bad; there are no mandatory tasks and values serving as orientation. *Ideals, motivation and creating meaning and purpose in one's life* are things people *need to achieve for themselves as well as in a community*. This freedom is too much for some, because any meaning found independently can seem arbitrary.

Some entirely renounce any attempt to create meaning and motivation and escape to digital entertainment offers, virtual worlds and sex robots. Others make the AI assistant their new authority and follow its recommendations regarding books, partners, activity, place of residence, etc. to the letter, because the assistants know what activates the reward centre of the users most strongly, i.e. what generates happiness. Creating meaning in one's life is not the same as happiness, however. People can create meaning in their lives by perceiving themselves as autonomous actors whose actions are appreciated by others.⁷⁰ This means one has to be able to create something on one's own and experience agency. The assistant can help in the process, but it cannot entirely assume this task.

*Creating meaning is more important
than happiness.*

Prof. Dr. Theo Wehner, work psychologist, ETH Zurich

⁷⁰ Deci, E. L., & Ryan, R. M. (2012). Self-determination theory.

Only following the guidelines of the machine may cause short-term happiness, but it lacks a feeling of autonomy and any appreciation. The result is a feeling of emptiness such as can also be triggered by excessive consumption of drugs, TV series or video games. It is therefore important to *maintain one's autonomy from the machine*.

If happiness is the goal, one will often discontinue activities halfway through because happiness is volatile.

Prof. Dr. Wilhelm Schmid, philosopher, Berlin

Autonomy from AIs is further impaired by their black-box character; although they are open-source, nobody understands exactly how the systems arrive at their decisions. They regularly give recommendations that are not comprehensible but still lead to good results. This means that the users of AI are like children who do what their parents tell them, without understanding why.

Fully Automated AI Luxury Possible Solutions

To experience meaning and autonomy, one must not allow a machine to dictate one's life. People need to find out for themselves what their wishes and needs are and what they have adopted from outside without questioning or even realising it. To this end, many people *meditate regularly* and talk to others, even to the AI assistant, about *their thoughts and feelings in order to understand them better*. If one is clear about one's feelings, this makes it easier to set purposeful long-term goals and act of one's own accord.

An understanding of one's own needs is necessary in order to define goals. The capacity for introspection is therefore decisive.

Prof. Dr. Theo Wehner, work psychologist, ETH Zurich

To maintain one's autonomy, it is useful to understand the AI assistants better in addition to one's own motivation. For this reason, *experiments from cognitive psychology* are carried out regularly on AIs in order to establish psychological models explaining their artificial neuronal processes. These experiments can also use AIs – even if this sounds paradoxical at first.

Exploring new things is particularly suited to emancipate from the machine and find meaning. These are things for which there is no right or wrong. The process of exploration is at least as important as its result. This approach is about uniqueness, individual experience and expression, not perfection. It requires an avant-gardist turn such as the one taken by the art of painting after the rise of photography. New things can be explored in various domains such as *science* and *the arts* or also in the *creative design of buildings, stories, rituals, etc.*

New things can also be explored with the help of AI as long as it is employed as a tool and not taken as a custodian. If AI has an answer to everything, it is important to constantly think of new questions.

Meaning and purpose are created in a community. People therefore share their creations with others and feel appreciated if others use what they have created. In addition to the appreciation of completed own creations, designing things as a communal process is an important source of meaning. Examples of this are communally created, outsized works of art, scientific investigations (so-called “citizen science projects”) or also merely Dadaist, absurd rituals for communal enjoyment.

*To achieve meaning is a subjective act,
but it takes place against a collective
background.*

Prof. Dr. Theo Wehner, occupational psychologist, ETH Zurich

Helping other people is perceived as particularly meaningful. For this reason, the losers of this world – people who are overwhelmed by the freedoms, are prone to conflicts or are not very highly regarded by society – are also very popular. Because helping them is an opportunity to experience meaning and purpose.

Fully Automated AI Luxury EXAMPLE OF DAILY ROUTINE

“This could be interesting to you today”:

Citizen science experiment,
upgrading of a hiking path, round
table
discussion on the dignity of
laboratory meat

Regular morning meditation circle

Breakfast according to the nutrition
assistant’s plan

Revision and “forking” of
“Weee-Bone” laboratory steak
on Wiki-Food

Experiment to review **AI biases**

Try the rice from the Vertical Robo
farm on the building facade for
lunch

Poetry workshops

Beach volleyball, swimming and
dinner by the riverside

Presentation on **quantum gravity**

Fully Automated AI Luxury Skills, Knowledge, Qualities

DEFINING LONG-TERM GOALS

To avoid succumbing to short-term distractions, people need to be able to define both short-term and long-term goals. This requires *acting of one's own accord and personal responsibility* as well as the ability to *think in the long term*. People need to be able to listen to themselves in order to really understand their own wishes and needs. This requires the ability for *introspection and reflection*, which is achieved among other things by being able to *talk about one's feelings*.

SELF-EFFICACY

A feeling of autonomy will develop when people make their own decisions instead of following the advice of the AI assistant all the time. Individuals need to trust their own ability to make decisions, which means possessing *self-efficacy* and *having the courage to make mistakes*. *Patience and endurance* are decisive in order not to return to the advice of the assistant as soon as the first difficulties arise.

JOY OF EXPLORATION

Those who want to explore new things and ask questions nobody has asked before need *curiosity* as well as *creativity and imagination*. This requires being able to question the routine thinking and the barriers *of the realities accepted by society*.

PRACTICAL SKILLS

Depending on the domain in which one wants to explore new things, specific skills are necessary, for example the capacity for *artistic expression* or the capacity for *scientific thinking*. *Mechanical skills, gardening or technical tinkering*

skills are helpful to not only think about new things, but also turn them into a tangible form.

TRUST IN OTHERS

The world of abundance requires a *commitment to community* where the people share their products with one another. Only then can the full potential be achieved. The readiness for abundance requires *trusting others*, the ability to handle freedom and being able to function not only through imposed discipline and coercion.

Freedom also means being capable of trusting others. Otherwise I am a prisoner of my mistrust.

Daniel Häni, entrepreneur

GROUP ACTION

Since communal projects can give meaning to one's life, one has to be capable to *make decisions in the group* and *coordinate within the group* in order to make the joint ideas become reality. This can turn out to be difficult in practice, when all participants are volunteers and there are almost no hierarchies. For this reason, *patience and endurance* are also important in this context.

UNDERSTANDING OF AI

Ultimately, when handling machines, it is necessary to have an idea how they work in order to be able to use them responsibly. This requires an *understanding of technology* as well as the *ability to understand statistics* because the decisions and recommendations of the assistant are based on statistics. This way, people can know how machines arrive at their decisions and can use them responsibly.

Survey Results Fully Automated AI Luxury

Skills and qualities required for the Fully Automated AI Luxury scenario, subdivided into the categories “Knowing”; “Wanting” and “Doing”. The figures in brackets indicate how well (on a scale of 1 to 6) the skills are taught in Swiss schools according to the teachers (see Appendix A). It is important to note that the teachers have made their assessments not with regard to the scenario but regarding activities relevant today.



A flexible future

The uncertain nature of the future and the heterogeneity of the four scenarios suggest that it is impossible to prepare children and young people for *one* specific future. Instead of being taught cookie-cutter behaviours in school or by their parents, children and young people need to learn to cope with very different potential future scenarios with flexibility, autonomy and a sense of community – independent of which scenario the future will be most similar to. This is not only important because we cannot know what the future will be like exactly, but also because it is unclear to what extent adults, in the first place, possess the skills to give detailed advice to children and young people on a future world that is unfamiliar to the adults.

Therefore, skills that foster the self-determination of future generations, such as *acting of one's own accord, self-efficacy or the ability to make and implement decisions in a group*, are relevant in all scenarios. All these are skills that facilitate autonomous coping with the uncertain and the unexpected.

In addition to acquiring such meta-skills such as acting of one's own accord, the ability to adapt to an uncertain future can be increased by acquiring less narrow specialisations and benefiting from a broader knowledge basis that offers various points of reference instead. The broader this basis is, the more varied are the knowledge and the expertise one can independently build on it. This idea of a broad portfolio can also be implemented at the level of society when individualised and varied education paths are made possible. If a wide variety of expertise and the readiness for cooperation exist, knowledge that suddenly becomes necessary can spread more quickly and can be complemented better.

What is important are not only the skills of individuals, but also how these skills can be combined within teams.

Dr. Sarah Genner, media researcher,
digital expert, lecturer

Although it is important to be able to respond flexibly to different future scenarios, it should not be forgotten that we as a society are not passive recipients of the future. One of the reasons the future is uncertain is that we shape it together. Future skills therefore not only mean being able to cope well with given scenarios. Future skills also mean being capable of shaping the future. This means not only preparing children and young people for the labour market of the future but empowering them to participate in the decision what the labour market of the future will be like or whether any such thing will still exist at all. This ability will not only be important in the year 2050. It is already important today because the decisions made today predetermine what the world of the year 2050 will be like.

In order to discuss the shaping of the labour market and not only how to successfully participate in it, i.e. to truly shape the future instead of merely adapting to it, a societal perspective is necessary. We need to discuss where we want to go together. While many, with a mixture of fear and admiration, look to China, where the Communist Party makes comprehensive long-term plans (e.g. with the Belt and Road Initiative), Western societies struggle with shaping their own visions. The possibilities to create the future is barely noticed in the Western world, because the future has been privatised since the end of the Cold War at the latest.⁷¹ Societal goals and ideals have been replaced by personal ambitions,⁷² reducing the leeway for shaping the future. The future has become something that happens primarily in the private domain: career or holiday planning, family planning, self-optimisation. The project worked on is not society, but one's own body, one's own well-being. In this sense, Margaret Thatcher's famous saying "*There is no such thing as society*" also is a renunciation of societal utopias.

If there is a longing for a societal future in our Western world, then it is primarily that of returning to the (imaginary) "good old times."⁷³ The unknown future is perceived rather as a threat that people are passively subjected to. A dark cloud, of which it is hoped that it will not trigger an (even stronger) storm, and future skills are often understood as skills to weather the storm instead of mastering it.

What is consequently needed to empower children and youth to "master the storm", i.e. to actively shape the future instead of just coming to terms with it? This requires a variety of skills, some of which have already been discussed above. We will subdivide them into the three

categories of "Knowing", "Wanting" and "Doing" below.

- > **Knowing:** An analysis of the present that is as accurate as possible is necessary first to shape the future. What is the situation today? What is good? What is bad? Why are things the way they are?
- > **Wanting:** Based on the analysis of the present, goals can be defined regarding the shape of the future. A goal state is defined, informed values and creativity. How could things differ from their current state?
- > **Doing:** The discrepancy between the present and the defined goal state must be reduced by concrete behaviour. This means actually changing the world, whereas Knowing and Wanting represent rather cognitive and emotional processes.

This taxonomy is inspired by a cybernetic control model⁷⁴ that also describes the mode of action of a thermostat. It measures an actual state (Knowing), features a goal state of a desired temperature (Wanting) and finally reduces the discrepancy between the actual and the target state by turning the heating on or off (Doing).

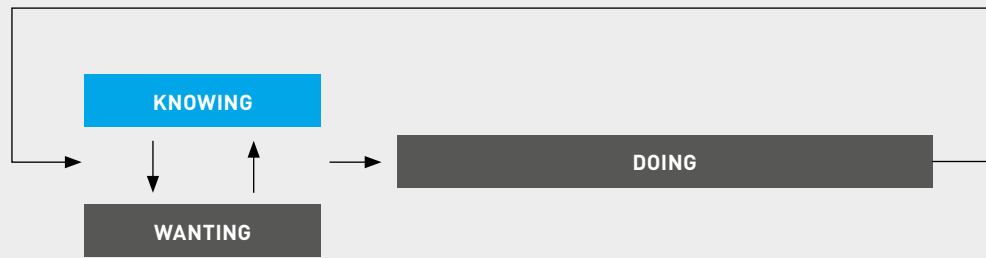
⁷¹ Sixtus, M. (2019). Warum an die Zukunft denken? [Why think about the future?] Duden Verlag.

⁷² And those who pursue a societal goal, such as the young people of the Fridays for Future movement, are constantly reminded of their own shortcomings, which they should remedy first. Because everyone should put their own house in order first.

⁷³ Bauman, Z. (2017). *Retrotopia*. Cambridge: Polity.

⁷⁴ Carver, C. S., & Scheier, M. F. (2001). *On the self-regulation of behavior*. Cambridge University Press.

Knowing (analysis of the present state)



Source: GDI

Knowing (analysis of the present state)

Before people can shape the future, they need to obtain knowledge about the present. A concept of one's own environment, a mental model established through direct and indirect experience, is required for this. This model can later be used to mentally simulate potential future scenarios. Which goals make sense and/or are achievable, results from this. We will address this in more detail later. But let us first take a look at the things children and young people need to understand the present.



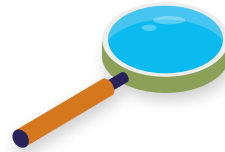
BASIC KNOWLEDGE

It is important that children and young people are enabled to obtain knowledge independently. The pursuit of personal interests should be supported in any case. The Internet seemingly makes learning things by heart obsolete. Children and young people nonetheless need some basic knowledge. Only this enables them to know in the first place what they do not know and which further information they need to research. In addition to specific contents, basic knowledge is important to be able to communicate with others. A minimum consensus about the nature of the world is required for a society to function. For you cannot shape your future alone. Cooperation and social cohesion develop because people agree on certain things.⁷⁵

To shape the future, it is absolutely necessary to know the important factors impacting the fu-

⁷⁵ Harari, Y. N. (2014). *Sapiens: A brief history of humankind*. Random House.

ture. This includes an *understanding of democracy*, the *economy*, the *environment* as well as *technology*. All four aspects are necessary, for example, to design measures against climate change. For a responsible use of technology, it is absolutely necessary to have an idea of the way technology works. People need to know, for example, which data they share or where they would give up a certain amount of autonomy. An understanding of technology, the economy and democracy is important for the establishment of joint rules for the use of this technology, for example to introduce an open-data strategy for governmental institutions or to restrict the ability of health insurers to factor certain data into the calculation of premiums.



ACQUIRING AND PROCESSING KNOWLEDGE

When dealing with domains that are quickly changing, e.g. technology or environmentalism, basic knowledge can only be a starting point. Additional tools must be provided to expand and renew one's knowledge. One has to find orientation in an ocean of new information and *has to be able to process complex and abundant information*. Basic knowledge helps here. On the one hand, this enables people to know what they do not know (which is a prerequisite for intelligence). This means it can encourage research. On the other hand, it can serve as a link to new information. When pieces of information are interconnected and put in relation to each other, important things can be separated from unimportant things, reliable information can be separated from unreliable information.

In order to understand the world, it is increasingly important to be able to *process information in the form of statistics* and, in the best case, to *read scientific literature*. A quantitative scientific approach permits an understanding of the world that stories and images alone do not allow. For example, the fear of crime is increasing while objectively, the numbers are falling.⁷⁶ However,

⁷⁶ Baier, D. (2019). Kriminalitätsoffererfahrungen und Kriminalitätswahrnehmungen in der Schweiz: Ergebnisse einer Befragung [Experiences of crime victims and perception of crime in Switzerland: Survey results].

slow trends cannot be seen in such impressive images or headlines as disasters, accidents or wars. They can only be found in statistics. This is as true for childhood mortality, which is falling worldwide,⁷⁷ but also concerning trends such as the slowly rising global temperature. But basic knowledge of statistics is also relevant for personal decisions such as the assessment of the risk of a medical procedure.

Acquiring knowledge also includes *questioning one's own knowledge*. This is because people tend to ignore things that do not match their world view.⁷⁸ The exchange with people who have a different opinion permits reviewing one's own construction of reality. But even realities on which everyone agrees on should be questioned on a regular basis. Only in this way is it possible to find out whether those assumptions apply or not, and only in this way can things be tried out that are impossible in theory but might still be possible in practice.

Assumptions about human nature in particular should be questioned critically, because people tend to legitimise the *status quo* with these assumptions and present it as natural and inevitable.⁷⁹ This imposes limits on thinking. History is full of injustice explained by human nature and inevitability, e.g. when women's rights are concerned. Ideas undermining the *status quo* are quickly dismissed as unrealistic. Admittedly, many of them are, but not all of them.

In this context, author, futurist and self-appointed agnostic mystic Robert Anton Wilson proposes to express all statements as probabilities. It is 99.999% probable that the sun will rise tomorrow. The probability that one's deceased grandfather will speak through a medium, on the other hand, is rather low. "True" and "false" are

replaced with "more probable" and "less probable". This is beneficial to the freedom to shape the future because it removes conceptual barriers without rendering the concept of truth completely arbitrary.

Only a madman is absolutely sure.

Robert Anton Wilson⁸⁰

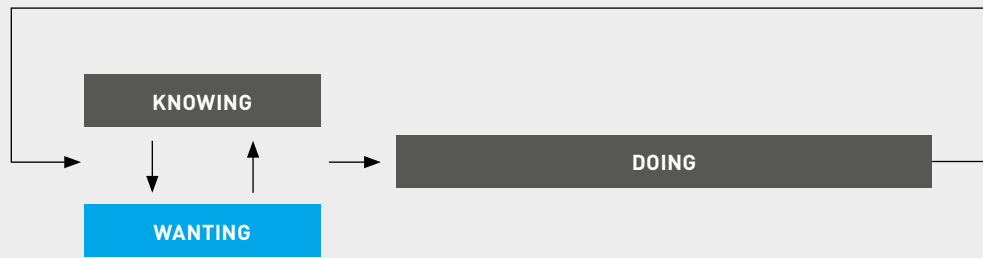
⁷⁷ <https://bit.ly/fsk-child> (Source: ourworldindata.org, 5.6.2020)

⁷⁸ Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of general psychology*, 2(2), 175-220.

⁷⁹ Jost, J. T., Banaji, M. R., & Nosek, B. A. (2004). A decade of system justification theory: Accumulated evidence of conscious and unconscious bolstering of the status quo. *Political psychology*, 25(6), 881-919.

⁸⁰ Wilson, R. A. (1990). *Masks of the Illuminati*. Dell Books.

Wanting (definition of goals)



Source: GDI

Wanting (definition of goals)

The four scenarios described are intended to show that the future could take very different shapes. To ensure that the future does not just happen to us as a society but to enable us to have a say in it, we need to define goals. We need to know what we want in the first place. This does not mean that the goals must always be reached exactly as defined. And maybe it is even better if certain utopias are never realised in their pure form. However, goals specify a direction that triggers movement. They can also contribute to social cohesion through the hope for a better future.⁸¹ What skills and qualities do children and young people need to acquire in order to be able to define goals shaping the future?



REFLECTIVE SKILLS

To be able to define the future autonomously, children and youth need to learn to define goals based on *self-determination and personal responsibility*. Autonomous subjects who shape their own future must be intrinsically motivated. However, children and young people are not given many opportunities to learn to act of their own accord and be responsible for themselves if they mainly follow orders in school and also spend less and less time without adult supervision elsewhere.⁸² Making decisions must be learned.

An important prerequisite for self-determination is the capacity for *introspection*. People need to be able to listen to themselves in order to un-

⁸¹ Turowski, J., & Mikfeld, B. (2013). Gesellschaftlicher Wandel und politische Diskurse: Überlegungen für eine strategieorientierte Diskursanalyse [Social change and political discourses: Considerations for a strategy-oriented discourse analysis]. Denkwerk Demokratie.

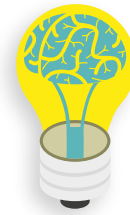
⁸² <http://bit.ly/fsk-nzz> (Source: nzz.ch, 5.6.2020)

derstand what they really want. This also includes the ability to *reflect on one's own feelings, needs and interests* in order to find out which wishes and needs are really one's own and what was unwittingly adopted from others, whether through advertising, social norms or algorithms, as in the *AI Luxury scenario*. Another important ability is *reflecting on social values and questioning them* in order to decide which ones will actually be internalised.

Teaching values is almost inevitable in education. It must be possible, however, to discuss those shared values as a society.

Dr. Sarah Genner, media researcher, digital expert, lecturer

There is of course no clear separation between personal and external values, wishes and needs, because people are always also a product of their environment. Yet some wishes will suit one's own self better than others. Self-understanding can also be learned. It has been shown, for example, that meditation increases the ability for introspection.⁸³



NEW IDEAS

After the fall of the Iron Curtain, political scientist Francis Fukuyama argued that the rise of liberal democracy was not a temporary period. It rather constituted, he argued, the end of an ideological evolution in which liberal democracy of the Western type represented an endpoint as the universal form of human organisation.⁸⁴ Due to the rise of authoritarian regimes, this idea is often ridiculed today. Yet liberal democracy appears to represent some kind of endpoint. Not as a stable end state, but rather as an end to further ideas or new narratives. Maybe it would therefore be better to rather speak of an “end of ideas” instead of the “end of history”. This is because without any new narratives, the end of history in the West constitutes a civilisational apogee, after which a downward trend looms. Dutch journalist and historian Rutger Bregman writes in this context:

The crisis of our times is not that we don't have it good, or even that we might be worse off in the near future, it's that we don't have the imagination to come up with anything better.⁸⁵

⁸³ Fox, K. C., Zakarauskas, P., Dixon, M., Ellamil, M., Thompson, E., & Christoff, K. (2012). Meditation experience predicts introspective accuracy. *PloS one*, 7(9).

⁸⁴ Fukuyama, Francis. “The end of history?” *The national interest*, 16 (1989): 3-18.

⁸⁵ Bregman, R. (2017). *Utopia for realists: And how we can get there*. Bloomsbury Publishing.

Creativity and imagination are therefore among the most important skills required for shaping the future. People need to develop ideas about what could be done better. Could the world be entirely different from the present world, for example such as that of the *AI Luxury scenario*?

Creativity should be a major subject in school. The virtues of industriousness and obedience are no longer useful. We need more people who can define their own goals and can work on their own terms.

Daniel Häni, entrepreneur

A prerequisite for this is overcoming the conceptual barriers induced by the *status quo*, as stated above (see “Knowing”, p. 65). To be creative, existing truths must be continuously challenged. Even if many of the generally accepted truths are quite probable, it is doubtful whether “everything has already been invented” with regard to societal coexistence and all our assumptions about what is possible are correct.



COMMUNAL VALUES

The future is shaped collectively. To achieve this, people must see themselves as part of a community and set goals from that community’s perspective. What is needed is a *readiness to contribute to society* – be it in traditional volunteering, in politics or by jointly working on some software code. A lot more can be achieved in the *Collapse scenario* if people work together, sharing knowledge and goods, instead of each trying to become a warlord. In the *AI Luxury scenario*, abundance is the result of people sharing their data and algorithms. In the *Net Zero scenario*, the readiness to take a step back for the benefit of all is of central importance. This is complemented by the ability to *think in longer time frames* and to *feel responsible towards future generations*. Environmentalism is of course not the only field in which long-term goals are useful.

When speaking of future skills, people too often think of employability and too rarely of values.

Marcel Hänggi, Initiative Committee Glacier Initiative

A prerequisite for the readiness to commit, share or practise restraint is the trust that other people will do the same.

*The readiness to cooperate alone
is not enough. Cooperation also requires
a trust that the others will do the same.*

Prof. Dr. Ernst Fehr, behavioural economist,
University of Zurich

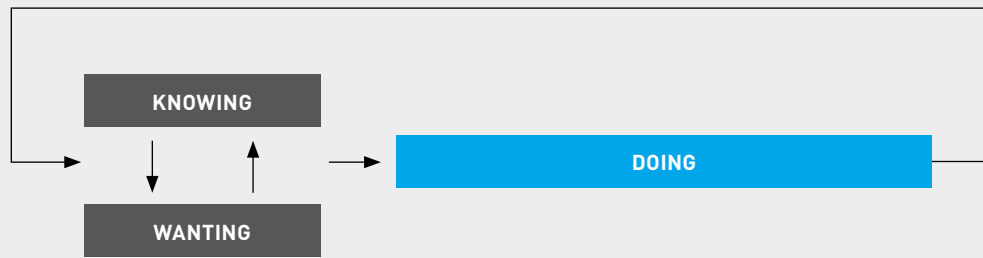
This is important in any scenario. Trust is connected to one's concept of humanity. This should be questioned regularly (see "Knowing", p. 65). As far as basic income is concerned, for example, most people think they could handle the freedoms, but doubt that others could do the same.⁸⁶ In the 2019 Legacy Study by newspaper "DIE ZEIT", a majority of Germans stated that a feeling of community was important to them, but believed most others were indifferent in this respect.⁸⁷ Do we, as a society, have a too negative image of our fellow human beings and trust them too little? Evidence for this is the fact that we grossly overestimate the prevalence of crime. A study by the city of Zurich strikes the same note: People systematically underestimate the readiness of others to cooperate.⁸⁸

⁸⁶ <https://bit.ly/fsk-ubi> (Source: mein-grundeinkommen.de, 5.6.2020)

⁸⁷ <https://bit.ly/fsk-wzb> (Source: zeit.de, 5.6.2020)

⁸⁸ Falk, A., & Zehnder, C. (2013). A city-wide experiment on trust discrimination. *Journal of Public Economics*, 100, 15-27.

Doing (reduction of the discrepancy between goals and the actual state)



Source: GDI

Doing (reduction of the discrepancy between goals and the actual state)

Actions speak louder than words. Even if one has a pretty exact view of the world and many good ideas how it could be improved, another very important aspect is still needed: implementation. This is often where schools face criticism. Although the pupils learn a lot, it is all dry textbook knowledge and of no use in everyday life. This lack of practicality does not necessarily have to be associated with a lack of knowledge only but can also have something to do with a lack of courage to implement things.



EFFICACY

When a decision is made, one does not only decide in favour of a goal, but also of the attempt to make this goal a reality. The best ideas are useless if they are not put into practice. Those who find it difficult to make decisions therefore cannot act with self-determination. A *feeling of self-efficacy* is necessary for this. This is the feeling that one can make a difference in the world and that chance or external factors are not more decisive. This trust in one's own skills can be learned by experiencing success and relating it to one's own skills.⁸⁹

It is not only the trust in success that is important, however. What is just as decisive is whether failure is seen as a threat. If one wants to shape the future, setbacks and failures will be unavoidable. Therefore, what is needed is the *courage to make mistakes* and *endurance* in order not to give up as soon as difficulties arise.

⁸⁹ Albert Bandura: Self-Efficacy: Toward a Unifying Theory of Behavioral Change. In: Psychological Review. 84 (2), 1977, pp. 191–215.



IMPLEMENTATION

Implementation requires taking concrete steps in order to reach a goal. Depending on the domain, this requires different *practical skills* – be it manual skills, administrative skills or the ability to work with computers. This must be complemented by a basic ability *to self-organise*, i.e. to compile lists or define priorities.

In most cases, the implementation of the reduction of the discrepancy between the actual state and the goal will not be as clear as in the case of a thermostat comparing a measured value with a specified value. In the case of a thermostat, both the actual state and the target state are mapped to a single dimension, i.e. the temperature. In the daily life of a person, the definition of a dimension in which the actual state and the target state are positioned is already part of the process of problem solving.⁹⁰ Sometimes it is necessary to move away from a goal in order to reach it, for example by reinterpreting the problem, by which the change initially perceived as moving away is seen as a new approach. This requires *creativity*. Animals standing in front of a fence and unable to move around it because this would mean moving away from their intended destination first are not capable of this kind of reinterpretation.



SOCIAL SKILLS

Those who want to change the future need to look for like-minded people and be able to coordinate with them. Individuals must be able to *communicate their own ideas*, but also to *feel empathy and listen to others* in order to ultimately arrive at a consensus. *Decision-making processes in the group* must be followed, compromises must be made and group action must be coordinated. This also requires *patience and endurance*, as dealing with other human beings is often complicated.

Many futures are global. Neither open-source software nor climate change know any boundaries. Global organisation requires mastering the challenge of communication. Making decisions and coordinating their implementation must work also in an intercultural context.

⁹⁰ Hofstadter, D. R. (1979). Gödel, Escher, Bach. Hassocks, Sussex: Harvester Press.

Conclusion – Great Ideas, Small Experiments

An important conclusion resulting from the four scenarios is that children and young people need not only be capable of responding with flexibility to different future scenarios. They must also be able to contribute to shaping the future. And this starts today, not only in the year 2050. As outlined in the previous chapter, this requires knowledge and the ability to question it; the ability to define creative societal goals as well as the courage and the endurance to approach the implementation of the goals with determination.

This is not possible as an individual, since significant changes are in most cases initiated collectively (see “A flexible future”, p. 63). However it does not require that everybody acts in concert either. An overall social consensus regarding a new idea is neither realistic nor always desirable. According to political scientist Erica Chenoweth, 3.5% of the population supporting protests are already sufficient to trigger serious political change.⁹¹ When the issue is not about changing the entire political system, even smaller support may be enough.

Wikipedia works even when only one percent actively contributes.

Prof. Dr. Dirk Helbing, Computational Social Science,
ETH Zurich

To try out new ideas, small communities that are ready to experiment are enough. On a small scale, things can be tried out much more quickly than at the level of the entire society.

We need small utopias that can be tried out.

Marcel Hänggi, Initiative Committee Glacier Initiative

When the experiments are successful, others can implement the ideas in their community. Examples of this can be found in all scenarios: One of the reasons the “AI Luxury” scenario arose was that some outsiders began living self-sufficiently and shared their data, which ultimately inspired others to do the same. In the “Net Zero” scenario, some people chose more time instead of more money, and in turn became an inspiration for others. In the “Gig Economy Precariat” scenario, employment networks created peer-to-peer insurance and, in doing so, formed a kind of professional solidarity that gave them more power in negotiations with the Platform. In the “Collapse” scenario, individual communities experimented with new ideas and technical solutions and shared their experience with their neighbours. Successful forms of cooperation will be adopted by others.

In order to learn cooperative behaviour, role models are important.

Prof. Dr. Ernst Fehr, behavioural economist,
University of Zurich

Examples of local experiments can not only be found in the fictitious scenarios of this study. Various experiments and social innovations are ongoing worldwide in fields such as basic income,⁹² the legalisation of drugs,⁹³ the provision of housing to the homeless,⁹⁴ decentralised ener-

⁹¹ <https://bit.ly/fsk-protest> (Source: nonviolent-conflict.org, 5.6.2020)

⁹² <https://bit.ly/fsk-ubi2> (Source: wikipedia.org, 5.6.2020)

⁹³ Greenwald, G. (2009). Drug decriminalization in Portugal: lessons for creating fair and successful drug policies. Cato Institute Whitepaper Series.

⁹⁴ McCoy, T. (2015). The surprisingly simple way Utah solved chronic homelessness and saved millions. The Washington Post.

gy grids,⁹⁵ new forms of communal living,⁹⁶ participatory budgeting,⁹⁷ open-source software,⁹⁸ self-sufficiency,⁹⁹ local currencies,¹⁰⁰ free public transport¹⁰¹ and many others. Some ideas will prevail while others will not.

When a highly dynamic and complex system such as the global economy is confronted with many fast-paced changes, it is not possible to wait for the system to adapt from the top down, i.e. that nations, the UN or other international organisations with their relatively inert administrative systems and decision-making processes will take the first step. A multitude of small communities demonstrating responsibility for themselves, experimenting with new ideas and sharing their experience will pave the way towards a resilient system.

Centralised solutions to our problems are not resilient. Resilience develops at the local level. Cities and regions are the relevant organisational units in this context.

Prof. Dr. Dirk Helbing, Computational Social Science,
ETH Zurich

Systems should be decentralised. Too much interdependence and complexity can be dangerous.

Dr. Luke Kemp, Centre for the Study of Existential Risk,
University of Cambridge

Although decentralised experimentation is necessary for the handling of the unknown in complex systems, it is often the opposite that happens. An uncertain future can be perceived as a threat, in particular if people feel that they have no control over it. The “threat rigidity effect” describes the phenomenon of organisations responding with rigidity to threats.

On the one hand, a threat restricts the individual processing of information. The focus of attention becomes narrower, things at the periphery are not perceived and it is more probable that a behaviour will be displayed that already exists in the repertoire. On the other hand, control will be centralised. This means that hierarchies are rather strengthened than relaxed; responsibility is delegated to the top.¹⁰² What results is that decentralised experiments are no longer conducted exactly at the time they would be needed most. What can therefore be done to counteract this centralisation of power in case of threat and support experiments in small communities?

When people revert to familiar behavioural patterns in the face of threats, experimenting in small groups that act autonomously must become an integral element of the behavioural repertoire. Experimenting in small groups should be trained in school. One option to do this is to put more emphasis on independent group projects. For this, it is important that children and young people learn to increasingly choose the contents of the projects themselves. They need to learn to act of their own accord, define goals and

⁹⁵ <https://bit.ly/fsk-brook> (Source: brooklyn.energy, 5.6.2020)

⁹⁶ <https://www.kalkbreite.net/>

⁹⁷ <https://bit.ly/fsk-budget> (Source: wikipedia.org, 5.6.2020)

⁹⁸ <https://bit.ly/fsk-open> (Source: wikipedia.org, 5.6.2020)

⁹⁹ <https://bit.ly/fsk-town> (Source: wikipedia.org, 5.6.2020)

¹⁰⁰ <https://bit.ly/fsk-lokal> (Source: wikipedia.org, 5.6.2020)

¹⁰¹ <https://bit.ly/fsk-oev> (Source: guardian.com, 5.6.2020)

¹⁰² Staw, B. M., Sandelands, L. E., & Dutton, J. E. (1981). Threat rigidity effects in organizational behavior: A multilevel analysis. *Administrative science quarterly*, 501-524.

make decisions in the group. In short: they need to assume responsibility for themselves. When the goals are defined and the decisions made, pupils learn in group projects to coordinate and trust each other in order to implement their decisions. When pupils experience more freedom to decide on educational contents, this can contribute to a more varied knowledge, which is beneficial for an uncertain future.

To learn self-determination, it is useful to combine these group projects with practical activities, for example constructing a piece of furniture, tending to a vegetable garden or replacing a broken mobile phone screen. When people directly experience the fruits of their own work, self-efficacy becomes palpable and they feel that they can make a difference.

*Self-efficacy develops when I touch the earth
with my own hands.*

Prof. Dr. Wilhelm Schmid, philosopher, Berlin

For intrinsic motivation and independence from authorities, it is beneficial if the value of an act does not merely arise from being graded, but through the practical activity itself. Practical activities and theory are not mutually exclusive. On the contrary: Once you have cultivated potatoes yourself, you will be able to classify certain theoretical biological concepts better.

*Individual experience as the basic knowledge
new knowledge can connect to is more important
than any theory.*

Prof. Dr. Wilhelm Schmid, philosopher, Berlin

Knowledge acquired in such practical projects can be better applied to new situations. The attitude towards learning in general is also improved.^{103,104} The latter is particularly important

to foster a readiness to learn and strengthen self-determination in order to acquire new knowledge and new skills at any time in life.

Practical skills such as tending to a garden are also beneficial in any of the four illustrated scenarios. In the “Collapse” scenario, individual survival can depend on the ability to produce food for one’s own consumption. In the “Net Zero” scenario, self-sufficiency is part of the attempt to live more sustainably. In the “Gig Economy Precariat” scenario, the cultivation of a garden reduces dependence on an unreliable economic situation; the cultivation of a communal garden can in turn generate neighbourhood solidarity. In the “AI Luxury” scenario finally, tending to a garden can arise from the need for self-actualisation, such as is already the case today with many people who maintain a garden plot. The universal applicability to all scenarios is equally true for the other practical skills such as mechanical or tinkering skills. Unfortunately, practical skills are exactly those skills that are by far promoted least in their schools according to our survey of Swiss teacher (see Appendix A).

Based on the survey results, it is exactly such practical projects (such as gardening) that should be given more consideration in school. Such projects help to develop self-efficacy and acting of one’s own accord and teach how to coordinate within a group and trust others. They are an option to literally sow the seeds of a more self-determined future.

¹⁰³ Thomas, J. W. (2000). A review of research on project-based learning.

¹⁰⁴ Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The clearing house*, 83(2), 39-43.

Appendix A:

Survey results

169 teachers and education experts in German- and French-speaking Switzerland were given a list of skills and qualities online in the period from early January to late February of 2020. The following question was asked in each case:

- > *How well does your school teach the following skills and qualities?*
- > *Compare the teaching at your school with how well the topics could be taught ideally to the pupils (assuming this is intended).*
- > *Trust your gut when making a decision. Possible basis: framework conditions in school, your impression of your fellow teachers, your own teaching, etc.*
- > *Examples of the application of the skill/quality during adulthood are given in brackets. If your pupils are too young for them, think about how well they are being prepared for obtaining these skills and/or qualities later.*

Attention!

Skills and qualities are listed below. Associated application examples are given in brackets. These examples have been chosen for adolescents and adults. If your pupils are too young for them, think about how well they are being prepared for obtaining these skills and/or qualities later.

Based on the Swiss grading system, the answer format as a six-level Likert scale with the endpoints 1 (very poor) and 6 (very good). The skills and qualities queried, including the mean value of the survey in brackets, are listed below. For the sake of clarity, the skills and qualities are subdivided into the categories “Knowing”, “Wanting”, “Doing” and the respective subcategories. This subdivision is only made in the present report and was not shown in the survey.

Knowing (analysis of actual state)

BASIC KNOWLEDGE

- > Online skills (e.g. understanding where which personal data is disclosed) (4.2)
- > Understanding of democracy (e.g. understanding democracy as separation of powers instead of mere dictatorship of the majority) (4.2)
- > Understanding of economic relations (e.g. understanding why our current economic system is based on growth) (3.1)
- > Understanding of environmental relations (e.g. understanding to what extent electric cars are really more environmentally friendly) (3.9)

ACQUISITION/PROCESSING OF KNOWLEDGE

- > Processing complex and abundant information (e.g. obtaining detailed information from several sources about a proposal submitted to popular voting) (3.4)
- > Acquiring new knowledge fast (e.g. ability to operate a 3D printer following online research) (3.8)
- > Understanding statistics and assess risks (e.g. understanding the risk of adverse events for a medicine expressed in percent) (3.3)
- > Scientific thinking (e.g. thinking about how a hypothesis could be empirically investigated) (3.3)
- > Media literacy (e.g. ability to verify the truth of a social media post by conducting a search) (3.9)
- > Questioning accepted realities (e.g. reflecting on which things we consider given are really social conventions) (3.6)

Wanting (definition of goals)**INDIVIDUAL SKILLS**

- > Acting of one's own accord & be responsible for oneself (e.g. learning more about an interesting field without instructions from authority figures) (3.9)
- > Adaptability (e.g. being ready to move to a new place for a job) (3.6)
- > Introspection and reflection on one's own feelings, needs and interests (e.g. exploring reasons and external influences on one's own wishes through meditation) (3.5)

URGE FOR EXPLORATION

- > Curiosity (e.g. becoming familiar with a topic without being forced or any financial incentive) (3.9)
- > Creativity & imagination (e.g. imagining how things could be entirely different from their current state) (4.1)
- > Definition of societal goals (e.g. eliminating poverty in Switzerland) (3.5)
- > Artistic expression (e.g. generating ideas how to express one's own feelings in film) (4)
- > Entrepreneurial thinking (e.g. launching a self-developed product) (3.2)

VALUES

- > Readiness for commitment to the community (e.g. volunteer work or participating in local politics) (3.9)
- > Readiness to trust people one does not know (e.g. trusting agreements will be adhered to without the need to conclude a contract) (3.7)
- > Thinking in longer terms (e.g. imagining the world in 100 years) (3.4)
- > Responsibility towards future generations (e.g. thinking of future generations when

making consumer decisions) (3.6)

- > Appreciating non-material resources (e.g. rejecting making more money in favour of free time) (3.5)
- > Reflecting on/questioning social values (e.g. reflecting critically on values such as freedom, wealth or democracy) (3.7)

Doing (reduction of the discrepancy between the actual state and goals)

IMPLEMENTATION

- > Practical skills
 - > Survival skills (e.g. making a fire, recognise edible berries/mushrooms, filter water) (2.7)
 - > Mechanical skills (e.g. building a table) (3.7)
 - > Gardening skills (e.g. tending a garden) (2.6)
 - > Technical tinkering skills (e.g. replacing a smartphone battery) (3.1)
 - > Computer skills (e.g. becoming familiar with unknown software fast) (3.7)
 - > Programming skills (e.g. app or Arduino programming) (3.4)
 - > Administrative skills (e.g. preparing a contract or invoice) (3)
 - > Ability to self-organise (e.g. compiling a list of priorities) (4.4)
- > Ability to present one's own ideas, knowledge and interests in an understandable manner (e.g. explaining an idea to someone) (4.5)
- > Ability to talk about feelings and needs (e.g. expressing personal disappointment in a constructive and emphatic manner) (4.3)

EFFICACY

- > Self-efficacy (e.g. confidence in the implementation of new kinds of projects) (4)
- > Courage to make mistakes/experiment (e.g. starting a risky project and take into account from the start that it might fail) (3.9)
- > Patience/endurance (e.g. persevering with a project even when difficulties arise) (4.1)
- > Stress resilience (e.g. being able to cope with loss, setbacks and uncertainty) (3.9)

SOCIAL SKILLS

- > Making decisions in the group (e.g. agreeing on a goal in a heterogeneous work group) (4.4)
- > Coordinating group work (e.g. communicating and assigning tasks in heterogeneous groups) (4.4)

Appendix B

Experts in interviews and workshops

The following experts volunteered for interviews in the context of this study. Their ideas have contributed to the entire text beyond the verbatim quotations. We would like to thank the experts for sharing their valuable experience with us.

Interview partners:

- > Daniel Häni –entrepreneur
- > Marcel Hänggi – Initiative Committee Glacier Initiative
- > Prof. Dr. Dirk Helbing, Computational Social Science, ETH Zurich
- > Prof. Dr. Ernst Fehr – behavioural economist, University of Zurich
- > Dr. Sarah Genner – media researcher, digital expert, lecturer
- > Dr. Luke Kemp - Centre for the Study of Existential Risk, University of Cambridge
- > Dr. Raya Muttarak - World Population Program, International Institute for Applied Systems Analysis (IIASA)
- > Venkatesh Rao – ribbonfarm.com
- > Prof. Dr. Wilhelm Schmid – philosopher, Berlin
- > Prof. Dr. Theo Wehner – work psychologist, ETH Zurich

The following people participated in the four scenario workshops. Their ideas were authoritative for the definition of the scenarios. We would like to thank them for their valuable input.

Workshop participants

COLLAPSE SCENARIO

- > Francesca Giardina – digital sustainability
- > Stefan Klauser – Quantitative Social Science ETH
- > Gérald Marolf – idea designer, advertiser
- > René Odermatt – Studio Porto designer

GIG ECONOMY PRECARIAT SCENARIO

- > Lukas Hess – Dezentrum
- > Marta Kwiatkowski – Researcher @ GDI
- > Nico Luchsinger – Asia Society
- > Andreas Müller – political consulting

NET ZERO SCENARIO

- > Stefan Breit – Researcher @ GDI
- > Thomas Lauber – Crowther Lab
- > Rohit Jain – Ethnology, University of Zurich
- > Anna Stünzi – ETH Center for Economic Research

FULLY AUTOMATED AI LUXURY SCENARIO

- > Nikki Böhler – Director opendata.ch
- > Karin Frick – Head of Research @ GDI
- > James Glattfelder – physicist/philosopher
- > Ariane Koch – author/artist

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