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Machine Intelligence and Quality of Life

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Preface

Humanity is facing a quantum leap in evolution. Evolution in the sense of Damasio [1] and Tegmark [2] means above all cultural (technical and social) development. Individuals, companies, and states are competing to lead technological development and, at the same time, to enhance human well-being. Companies are outdoing each other with promises of salvation, from the fully autonomous automobile to cures for diseases such as cancer. Individuals are frequently overwhelmed by their personal experiences with digital services, by the promises and disappointments, but above all by the ever-increasing complexity. Installing a smartphone, using electronic banking to make financial provision for retirement, agreeing to the use of one's personal data and, ultimately, identifying manipulation come to mind in this context. The media and, in some cases, the world of politics take advantage of people's insecurity for scaremongering on the one hand and awaken simplistic euphoria on the other.

Emotions and misunderstandings frequently shape the debate. The question is how humanity can utilize technological opportunities to boost their quality of life and avoid threats. There is a risk that we shall fail to correctly identify what is probably the most momentous innovation in human history while focusing our attention on symptoms such as the loss of printed books or the younger generation's "cell phone addiction," that we shall underestimate many developments such as the surveillance of Internet traffic under the PRISM program [3] or social scoring in China [4] due to a lack of understanding, and, ultimately, that we do not deduce the right action such as, for example, limiting ourselves to a small number of selected digital services, or that we omit to take individual control of personal data. Citizens are massively overwhelmed by questions associated with the protection of privacy, the growing power of service providers with near-monopolies at the expense of states and citizens or the content of a future-proof vocational education. The same applies largely to the world of politics and, in many cases, to the experts, even if goodwill is assumed on all sides.

Various disciplines are striving to achieve sound theoretical foundations: computer science, economics and social sciences, political science, psychology,

www.lifeengineering.ch provides a platform for discussions and links to publications and people working in the discipline of Life Engineering.

philosophy, neurosciences, ethics, and religion. Scientists, who work at the interfaces between information technology, economics, and social sciences, and are prepared to familiarize themselves with the findings of the other sciences, may be able to contribute to the clarification of some positions and, in so doing, help to place the debate on a more objective footing. This book represents a humble attempt in that direction in full awareness of the following limitations:

- Combining the knowledge from the disciplines involved, with their incompatible worlds of thought and concepts, is challenging.
- Statements and conclusions are seldom quantitatively empirical or mathematically provable. Even argumentative deduction is only partially successful, which means that many statements represent personal opinions or should be regarded as speculative. In many cases, the conclusions are not as clear and operational as would be desirable in design-oriented research. This can hopefully be compensated by the gain in structuring.
- Some conclusions contradict firmly established (mainstream) attitudes or are viewed as unwelcome because they contradict instincts for self-preservation and preservation of the species. It is therefore difficult to accept that humans might not be the final goal but only an intermediate stage of evolution. The idea that state surveillance and control of its citizens, as in the Chinese social credit scoring system, could possibly be a model for the social market economy is at odds with our intuitive desire for freedom. It is not always easy to remain within the boundaries of broadly accepted ethical and political principles when describing consequences. Findings can therefore equally well be encouraging or depressing.
- A rational exploration of the topic is not easy and entertaining, but calls for tedious abstraction.
- This text presents one possible view of the digitalized world; others are to be compared. I represent a scientific, market-economy-based, and human-centric mindset; a Chinese or Congolese viewpoint and a religious worldview will differ significantly in many aspects.

In view of the opportunities and threats posed by machine intelligence in our personal lives, it is clearly preferable to identify structures and derive guiding principles from the available knowledge, however uncertain that might be, rather than waiting for findings that are soundly based from a philosophy of science viewpoint, which are mostly only available ex post. However, this also means using the extensive data pools of digital services intensively in order to find correlations and structures.

What is called for is a **Life Engineering discipline**, which shows the opportunities and threats for humans, delivers impetus for entrepreneurial action and contributes to the political agenda. Values such as human dignity, humanism, and liberty need to be concretized in the context of machine intelligence. The reader who is looking for ideas conducive to the understanding and use of technological,

economic, and social change will hopefully find here a rational analysis without overly emotional influence and ideological bias. The intention is for this text to provide ideas for further scientific and, above all, practical analysis.

I would like to take this opportunity to thank everyone who provided support during the creation of this book. With their many thought-provoking discussions, Rieke Bärenfänger, Bernadette Burtscher, Christian Dietzmann, Manuel Eisele, Florian Schweitzer, Bruno Weder, and Bianca Wipplinger played a major role in helping me to hone the statements it contains. Michael Gasser and Annette Glaus turned the manuscript into a book. Melanie Fletcher not only did an excellent translation job but also sharpened many statements during this process.

St. Gallen, Switzerland Hubert Osterle
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Abbreviations

AI	Artificial Intelligence
ARPU	Annual Revenue Per User
BAT	Baidu, Alibaba, and Tencent
BKK	*Betriebskrankenkasse* (company health insurance fund, Germany)
CEO	Chief Executive Officer
DB	*Deutsche Bahn* (German Railroad)
DNA	Deoxyribonucleic acid
EBIT	Earnings before interest and taxes
ECG	Electrocardiogram
eIDAS	Electronic IDentification, Authentication, and trust Services
EMA	European Medicines Agency
ERP	Enterprise Resource Planning
EU	European Union
FAMANG	Facebook, Amazon, Microsoft, Apple, Netflix, and Google
FDA	Food and Drug Administration
GDPR	General Data Protection Regulation
IEEE	Institute of Electrical and Electronics Engineers
MOOC	Massive Open Online Course
NSA	National Security Agency, USA
OECD	Organization for Economic Co-operation and Development
PDA	Personal Digital Assistant
PRISM	Planning tool for Resource Integration, Synchronization, and Management
QLM	Quality of Life Model
VR	Virtual Reality

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Life with Machine Intelligence

1

Abstract

Many types of machine intelligence are changing all areas of our lives. In this context, machine intelligence refers to digital services of any kind that relieve humans of mental tasks or reinforce human intelligence. This can involve administering a bank account as well as managing a supply chain, counterterrorism, home automation, autonomous vehicles, an active exoskeleton, and all apps on mobile devices or internet websites; in other words, everything that supports our lives now and in the future. The areas of life concerned range from communication and medical therapy to financial provision for retirement. Does machine intelligence make us happy or are we becoming unhappy slaves to technology?

1.1 Utopia or Dystopia

For years, the media have been outdoing each other with reports on machine intelligence, which are either utopian or dystopian but seldom realistic. **Fear-related topics** include superintelligence that supplants humans; robots and artificial intelligence that lead to unemployment or dehumanization; the manipulation of humans by social networks; and surveillance by cameras and sensors of all kinds. **Hope-related topics** include prosperity for all, autonomous automobiles with no road accidents, cures for diseases, and the delegation of less pleasant work to robots (e.g. care of the aged). 85% of US citizens believe that information technology is good for their country, and 75% believe that it is good for them personally. At the same time, more than 81% of the 1003 people interviewed in a survey want social media to do more to combat hate on its platforms, 82% want social networks to collect less data, and 89% want fake news to be more readily

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identifiable [5]. People therefore like the convenience provided by digital assistants and are concerned about their development.

Even in the non-fiction and scientific literature, one finds extremely contradictory scenarios. Diamandis and Kotler, for instance, create the vision of a worldwide **affluent society** [6]. Zuboff provides a call to battle against surveillance capitalism, which is primarily directed at the dominance of the *datenkraken*[1] [7]. According to Christl and Spiekermann, these include not only Google and Facebook but also data brokers like Acxiom, Oracle, and arvatoBertelsmann [8]. McNamee, an early and still active investor in Facebook, even goes as far as to warn against a Facebook catastrophe [9]. As early as 2013, Schmidt and Cohen developed a more sober political agenda for dealing with digitalization [10]. Collier puts forward suggestions for reestablishing an ethically based society [11]. Harari sees the vision of a human-level intelligence as an inadmissible simplification of life and places his hopes in human transcendence [12, p. 401], but expects a biochemical improvement and reengineering of our bodies and minds [12, p. 48]. Others attempt to develop digital ethics or rules for dealing with machine intelligence [13, 14].

Are people happier nowadays than they were 3000 years ago? Does technology improve our **quality of life**? Which technical achievements can you do without: telephony, email, electronic banking, electronic government, internet search, photography, music, video, games, 3D printing, augmented reality, computed tomography, weather forecasts, or navigation? Why don't you? Millions of developers and entrepreneurs utilize every opportunity for the innovation of digital services of this kind. Billions of consumers jump at new developments and improvements. After evaluating numerous studies in different countries, the OECD report "How's Life in the Digital Age?" comes to the conclusion that there is a significant correlation between internet access and satisfaction with life, without wanting to derive any causality [15, p. 92]. The report does, however, state possible reasons for the correlation: newly available goods and services, digitally enabled social relationships, voice and other online communications, more flexible forms of work, better access to medical and government services, greater ease in striking up romantic relationships [16] and, finally, simpler means of acquiring knowledge and skills. *Progress and human happiness therefore seem to go hand in hand*. Nonetheless, there are the many critical voices already mentioned [17]. Serious problems or attention catching?

In the last two hundred years, competition in the **capitalist economic system** has brought virtually exponential technological development and, with it, a level of **material wealth**, which until recently had been inconceivable. An ever-increasing proportion of the world's population has access to all the necessary goods and services, enabling the fulfillment of basic needs such as food, water, shelter, medical care, and security in highly developed societies. In the next decade, we expect to see further rapid advances in technology, above all in information technology. These will lead to continuing increases in living standards, even if the

[1]The *datenkraken* is the German term for the "big beasts" of the internet, named after the murderous sea monster of Norse mythology.

prediction of Diamandis and Kotler [6] that by the 2030s humans will be able to obtain all the goods and services they want and need might be broadly exaggerated. Does quantity come at the expense of quality? Are we capable of understanding the wide array of options (The Paradox of Choice [18]) and of limiting ourselves to the right ones? *Measuring progress in terms of monetary income or gross national product per capita says less and less about our quality of life*.

Humanity is facing a **quantum leap in evolution**.[2] *Humans need to work less and less in order to satisfy their basic needs, and have more and more time to devote to their quality of life*. The available options for the latter are almost limitless, from fashion to video games. Machine intelligence is creating new possibilities for enhancing well-being, be it through convenience such as online shopping and 24/7 access to an inexhaustible supply of music, films, and games, more comfortable forms of mobility such as navigation with a combination of different modes of transport, or through medical treatments to improve and extend life.

At the same time, there is growing concern that technology will lead to a loss of human values. When a Steinway Spirio self-playing piano, rather than a musician, plays thousands of pieces of music as interpreted by the world's best pianists, when electronic books replace the bookshelf containing carefully bound editions, or when youngsters prefer to chat on social networks rather than talking to physically present parents, many people see these developments as the demise of **humanism**. They talk about dumbing down and cultural impoverishment.

"Companies offer what people need, and people buy what makes them happy" is a frequently quoted cliché regarding human **autonomy**. Individuals should decide for themselves what makes them happy. The fact that humans have a limited capacity to do so is borne out by many forms of harmful addiction and the ever-applicable adage: "The spirit is willing, but the flesh is weak." Moreover: People drive where their satellite navigation system guides them, book what Airbnb suggests, listen to what Spotify plays for them, and buy what advertisements advocate. Machine Intelligence determines humans almost unnoticeably, but to an increasing extent extraneously, or at least exerts a major influence on their decisions. *With each function that machine intelligence performs better than a human, we relinquish part of our autonomy and accept the heteronomy associated with the machine*. Marketing and sales rely more on human weaknesses than on human rationality.

The fear of total **surveillance** is a topic discussed almost daily in the media. Alexa, the smart speaker from Amazon, which is already installed in over 100 million households, as well as the voice controls of TV sets can do far more than merely receive specific commands. These devices detect the presence of the occupants, hear the opening of a beer can [19], and understand more of the spoken words in their environments than we realize [20, 21].

[2] In this context, a quantum leap in evolution refers to a large evolutionary step within a short time frame. This raises the question of whether machine intelligence warrants the term *saltatory evolution*.

Nowadays, the recruitment process in businesses can use the personal profile from the job candidates' application documents and the interview, additional data such as their creditworthiness, their contacts on social networks, or their search behavior on the internet. In future, it will be technically possible to select candidates on the basis of physiological features such as facial expression, voice, heart rate, athletic capabilities, and specific gene variants in their DNA. For many people, this constitutes a violation of their **personality rights** and poses a huge risk of discrimination.

Robots and machine intelligence destroy millions of jobs and lead to **unemployment**. Since the beginning of computerization in the 1950s, employment has nonetheless risen to levels that are unprecedented in peacetime despite repeated predictions to the contrary because new jobs have been created. Employees have been fighting for shorter working hours for centuries, but rightly fear zero working hours. An unconditional basic income can prevent the impoverishment of broad sections of the population, but will not give people a sense of purpose in life and therefore **self-esteem**, a prerequisite for subjective well-being. Work and a sense of purpose as well as the distribution of income, wealth and power are still being discussed, as they were before industrialization when hunger, medical care, and security were the main issues.

People feel that machine intelligence is changing their lives much more fundamentally than they experienced when businesses were computerized. Humans allow digital services to assist them in all areas of their lives without realizing it and, in so doing, relinquish competence and autonomy to machines.

1.2 Machine Intelligence for the Well-Being of Humanity

The economic benefit to business drives technological development. But do capitalism and technology lead us to paradise or misery? There is certainly a growing focus on **quality of life**, which is reflected in the happiness industry that has been thriving since the 1990s, from science [22, p. 12], practical guides, and drugs to life counselors of all kinds and subsidies such as government support for the arts.

In their **marketing communications**, leading technology corporations address the fear of technologization and formulate slogans for their organizations such as "for a better world", "for the well-being of people", "for the future of life", "better policies for better lives", and "don't be evil", without going into detail about what they mean, and without clearly defining positive and negative effects.

A gratifying number of initiatives are attempting to use **machine intelligence for the well-being of humanity**. Figure 1.1 shows some widely discussed approaches, some of which focus around artificial intelligence (AI) (see Sect. 3.6) (for further examples, see Figs. A.2 and A.3 in the appendix). This might be correct, from the point of view of wanting to attract the necessary attention, but nonetheless narrows the picture unduly. Despite all the successes of AI, which tend to be in specific technical areas (e.g. pedestrian recognition in automobiles), its

Initiative / Organization	Key Statements on Quality of Life
The Asilomar AI Principles The Future of Life Institute [23], [24], [25]	Artificial intelligence (AI) for well-being, sense of purpose in life, and ethical values (dignity, rights, freedom, security, and cultural diversity). Create not undirected intelligence but beneficial intelligence. Mastery of AI, responsibility of developers, transparency of AI decisions, rights of the individual to control personal data, freedom of humans to make decisions, open cooperation between AI researchers, preparations for machine superintelligence Benefits and prosperity for all, support for the social order, avoidance of an arms race, links between science and policy-makers
IEEE Ethically Aligned Design. A Vision for Prioritizing Human Well-Being with Autonomous and Intelligent Systems IEEE Standards Association [26]	Human well-being as the highest virtue for a society through autonomous and intelligent systems: human rights, equality, freedom, dignity, accountability, transparency, privacy, avoidance of misuse Control over personal data, human freedom of choice, transparency of AI decisions
The World Economic Forum [27]	Network access, responsible business management, competent policy-makers, robustness against disruptions, trustworthy digital identity, use of data, privacy
OECD Going Digital [15]p.22, [28]	Income and wealth, jobs and earnings, health, education and skills, work-life balance, civic engagement, governance, social relationships, environment, personal security, housing, subjective well-being
European Commission [29]	Rights: dignity, freedom, democracy, equality, citizens' rights Principles: to the benefit, not to the detriment, human, autonomy, justice, transparency, security Values (examples): informed consent, equal opportunities, environment, self-determination

Fig. 1.1 Organizations on the subject of artificial intelligence (AI) and quality of life