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MANAGEMENT IN THE YEAR 2050

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ABSTRACT

Future studies are seen as a prerequisite for the development of a sustainable and prosperous society. Many countries, institutions and corporations invest substantially in the research of the future.

One of the possible and expected future scenarios is the rise of artificial intelligence. It is expected that between the years 2030 and 2045 artificial intelligence will significantly surpass human intelligence. The Robocup Federation, an international organization that promotes research and development in robotics, believes that around the year 2050 autonomous robots will win a soccer game against the current soccer World Cup winners. In that manner, autonomous robots will have the opportunity to take over most, if not all, repetitive jobs and routine human activities. In addition to that, humans will be aided by artificial intelligence, creating consumers with instant, perfect information about all the products and services offered on the market. On the other hand, the labour market will be threatened by the emergence of (close to) humanoid autonomous robots that will potentially make human labour force obsolete.

What are the repercussions of the artificial intelligence development for the corporate business in the year 2050? This article tries to answer that question in the light of current technological trends and the future prospects based on scenario study developed by Deutsche Post. As a consequence, the term *corporation* is redefined in the technological, social and economic context of the year 2050.

KEY WORDS

corporate business, singularity, artificial intelligence, future studies, business functions, prosumers

CLASSIFICATION

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INTRODUCTION

The fast pace of change faces the business environment and management with many unforeseen consequences; both positive and negative. As the future time frame under consideration gets longer, the uncertainty about the general and business environment gets larger. To prevent the unexpected surprises, many companies and countries have established departments, institutes and study programs that are focused on the exploration of the future [1] that directly contribute to the research and development efforts that lead to sustainable economic growth.

The focus of this article is the year 2050 because it is the period in which it is expected that the large number of experts from the present will live and be able to see whether the developed scenarios, based on the current knowledge, came true. Along with the expected beginning of the singularity age, we consider this argument to be the main reason why many companies and organizations seem to be focused on this exact timeframe (a good reference point for the overview of published future scenarios is the European Commission report on forward looking studies [2]).

The aim of this article is to explore the role of management in one such scenario; namely *A Customized Lifestyles* scenario, developed by Deutsche Post [3]. This scenario is analysed from the perspective of technological progress that ends up in the Singularity age, the concept best explained by the work of R. Kurzweil [4].

Almost a hundred years ago J.K. Galbraith jokingly said that the only function of economic forecasting is to raise the reputation of astrology. Was he right? Despite all the sophisticated and computerized econometric models, the actual world recession reveals that economists, just like sociologists, philosophers and meteorologists, seem to be unable to forecast the future. All they can do is describe and interpret what they see, and, hopefully, give more or less reliable short-term predictions.

The key tool of all great economists like Smith, Ricardo, Keynes, Marx, Schumpeter and Galbraith was not econometrics and formal logic, but ideas, concepts, arguments and emotions, powerful enough to move individuals, masses, governments and corporations. It has always been a task of philosophers and researchers to explain the world. But the real challenge is to change it for the better.

In times of emerging paradigms, we do not need tools to describe why something looks as it does. We need tools to help us innovate and move forward. Instead of great researchers with measurement and modelling skills we need great visionaries and motivators. In this article we try to challenge the Galbraith's cynicism and dare to offer a set of predictive ideas about the business and management in the year 2050. But, before describing the future, we must deal with the present.

MANAGEMENT – THE PRESENT

We are surrounded by global communication systems, global ecological problems, global economic issues and global political challenges. Managing such an integrated environment calls for a holistic approach, a global vision, and a unified strategy. Are global managers and modern corporations up to this complex task?

Fifteen years ago P. Drucker wrote that "the corporation as we know it, which is now 120 years old, is not likely to survive the next 25 years. It should survive legally and financially, but not structurally and economically." The management guru perceived corporations, government bureaucracies and most other institutions (including schools and universities) as

old-fashioned organizations unable to deal with the future challenges. They have developed rigid hierarchies, they are characterized by bosses and teams appointed by the senior management, and the goal attainment is based on command and control. Working within such environment causes alienation and depression.

In a society and economy dominated by knowledge, we need new types of "corporations", and new managers. Instead of organizations based on fear, we should build organizations based on playfulness. The traditional corporations have been developed in times of hard physical work. Today, most employees are knowledge workers. Their source of motivation is not control and fear, but creativity and challenge, the feeling of accomplishment and self-fulfilment. Brain-based organizations need a new value system, aligned with passion, enthusiasm, appetite for life, engagement, commitment, great causes, and determination to make a difference. The students and workers of the present are not trained for shared adventures, bizarre failures, and appetite for change.

Today's organizations are functionally divided in areas of responsibility: Marketing and sales, Production, Human resources, Research and development, Accounting and finance, and Supply chain management. Today's managers are specialists in a given field and their managerial style is mostly aligned with the knowledge and skills developed within a typical MBA curricula. In order to manage the corporation or to create its future through a business strategy, they usually do the following: (1) search for new markets; (2) develop new products or services; (3) improve customer service; (4) bring new technology; (5) build production capacity; (6) apply new sales methods; (7) use advanced distribution techniques; (8) control natural resources. Most contemporary managers see their job as a combination of planning, controlling, leading and organizing. The majority of modern managers are more people-oriented than technology-oriented.

SINGULARITY – THE INEVITABLE FUTURE?

Singularity (more precisely, technological singularity) is a concept first in depth explained by science fiction author and mathematics professor V. Vinge. Basically, under the term singularity he considers the rise of super intelligence where the humans enhance their intellectual abilities with intimate technological bonds. Therefore, Vinge refers to singularity also as superhumanity [5]. He places the rise of singularity sometimes after the year 2030.

The concept of singularity was popularized by R. Kurzweil in his book "The Singularity is Near – When Humans Transcend Biology". He defines singularity as "an expansion of human intelligence by a factor of trillions through merger with its nonbiological form" [4; p.123]. Kurzweil is more cautious, and expects that singularity will occur sometimes around 2045. He elaborates this prediction based on his Law of accelerating returns where he argues that the rate of change is accelerating exponentially or, that "we won't experience 100 years of progress in the 21st century – it will be more like 20 000 years of progress (at today's rate)" [6]. Kurzweil also anticipated the impacts of singularity on different aspects of humans and society, for example:

- humans will be on the path of becoming cyborgs,
- the human mind will be expanded by technological means (application of nanobots),
- the advances in genetics, in combination with nanotechnology, will enable most people choose the length of their life span – with possibility of being immortal – only maybe changing the physical manifestation; that will lead to a redefinition of the terms "humans" and "the humanity",
- all the wars will move from physical to predominately virtual world – the issue of cyberwarfare will become of central interest,

- radical transformations of the concept of learning will take place – knowledge and skills transfer will be instantaneously available to everyone, making the schools (as known today) obsolete,
- the concept of employment and work will be redefined – the general trend is moving toward shorter working hours, making more time available for leisure activities,
- the line between play and work will be blurred and, ultimately, it will disappear.

He also recently introduced three more ideas that some consider to be dangerous: the idea that nation-state will soon become irrelevant, that we will hit longevity velocity in next 10-12 years, and that technology will help us in defining human freedoms [7].

It can be argued whether any or all the Kurzweil's predictions will come true, as many experts criticize the concept of singularity [8], but the future studies field is not about making predictions, but about identifying all possible, preferable and probable future scenarios. And the Kurzweil's concept of singularity is within the range of possibility, considering all three factors of the viable future.

DEUTSCHE POST ENVISION – *A CUSTOMIZE LIFESTYLES* SCENARIO

In 2012. Deutsche Post published an analysis of possible futures of the world and its' impact on the logistics industry [3]. They developed five possible scenarios for the year 2050:

- Untamed Economy – Impending Collapse – stresses the materialism and consumption as chief drivers of growth that neglect the need for sustainable development. The expected consequences of such unsustainable lifestyles are massive climate changes and natural disasters.
- Mega-efficiency in Megacities – in this scenario, major drivers of growth are megacities with the focus on green growth while at the same time rural areas are abandoned by most people.
- Customized Lifestyles – stresses the individualization and personalized consumption where the society and economy is based on empowered consumer who actively designs and produces products of interest.
- Paralyzing Protectionism – major concern of this scenario is rising nationalism and reversed globalization. The consequence of such social trends is deceleration of technological and economic development.
- Global Resilience – Local Adaptation – major driving force in this scenario is cheap, automated production but due to radical climate changes economies are more focused on regional production rather than global supply chains.

Based on the Kurzweil's work and the concept of Singularity, the Customized Lifestyles scenario seems to be the most probable. This scenario envisions the future with strong individuals with substantially larger lifespan. The mass production, as we know it, is a matter of history. Because of the development of technology (namely, 3D printers), individuals become their own producers, making their own goods as the need arises. This trend leads to an emersion of a new key economic player – prosumer (combination of words producer and consumer). Namely, typical shopping of the late 20th and the early 21st century ceases to exist – shopping malls are replaced by FabShops. Most goods are produced at home, while larger products (e.g. cars and home appliances) are individually produced in special facilities called FabShops. Internet is replaced by Outernet – a network where everything and everyone is interconnected. All machines are *smart*; they are autonomous and take care of themselves (regarding both, service and maintenance). Everything is recycled, and the product lifespan is drastically shortened. The major engine of the world economy is no longer the consumer goods, but raw materials, design blueprints and software companies specializing in creation of

customized software, enabling people to efficiently manage their work and leisure time on the Outernet. Transportation is radically redefined; there is less need for transport of finished and semi-finished products, individual vehicles are replaced by sophisticated public transport systems.

ARTIFICIAL INTELLIGENCE – CURRENT RESEARCH AND TRENDS

In one of the many definitions, Artificial Intelligence (AI) is the branch of computer sciences that deals with the study and design of intelligent agents. An agent can be a physical artefact or a software program, but has to be able to perceive its environment using sensors, interpret the gathered data and act based on its control program, to maximize its chances of success.

With the rapid development of available computational resources, the development of AI is penetrating many human activities, helping people to, among other, do the following:

- **fly** modern aircrafts, especially the military ones, have no alternative but to fly by wire, using a control program to analyse sensory data and control the actuators of the aircraft,
- **drive a car**, autonomously adjusting the breaking force upon occurrence of slippage between the tires und the underlying surface,
- **write documents** using text processors with ability to learn and correct spelling, and more.

We are often not aware of the fact that an intelligent agent supports many actions that we take for granted. Until recently, the AI concepts were mainly related to the high-tech industry, associating the intelligent robots that move things around, weld car bodies, inspect manufactured goods etc. In the last few years, it is noticed that the industry has reached its potential as far as the new robot installations are concerned, but a completely new market for robots, and the AI related products, called service robotics, has opened. The service robotics considers all aspect of robots developed to assist people, excluding manufacturing operations. To illustrate the potential of this market with exact numbers, according to the IFR [9] in the year 2016 there were 294 312 industrial robots sold, with the main driver being electrical and electronics industry. The value of industrial robot sales peaked 13,1 billion US$ with the average robot density of 74 units on each 10 000 employees in manufacturing industry. It is estimated that an increase of global robot installations is will be 15 % on average per year by the year 2020.

It is clear now why the focus of most AI researchers and practitioners has shifted towards the development of autonomous agents, able to operate in a general environment (as opposed to industrial environment that is structured for the specific activity). The problem of developing intelligent agents able to operate in a general environment is extremely complex and remains a challenge for the future. Thus, the service robots of today are designed to perform single jobs, i.e. vacuum cleaners, lawn mowers, entertainment toy robots. There is an obvious discrepancy between the human abilities and those of a robot – why is it that a human has landed the Moon, and there is still not a commercial robot able to go to a store and bring something back home? There are many possible answers to this question, but one that seems most plausible is that the control program for such a general robot, facing numerous obstacles while completing this at the first glance simple task, is very complex, difficult to be run on-line, and raises ethical questions.

In the near future (and it is important to stress that many of these solutions are already available as pilot solutions, but we are now expecting their widespread market availability) the robots and other intelligent devices are expected to [10] do many things, for example:

- increase the level of autonomy – fully autonomous robots are often illusive, but a compelling trade-off between teleoperation and autonomy will enable the robots to co-exist with humans, to help elderly and disabled people,

- improve the sensing and interpretation – a development of Microsoft Kinect stereovision system (initially developed for Xbox gaming console) had significant impact on AI researchers, especially those dealing with Human-Robot interfaces. Relatively cheap, open-source Xbox has accelerated the solutions of human motion interpretation [11], making possible a safe and intuitive interaction between humans and machines,
- clouds of Smart Devices – the devices (i.e. an oven or a robot) could potentially network and access vast amount of data available on the internet, downloading new programs or skills, and share experience with other devices,
- further penetration of AI concepts in everyday goods from smart clothing, able to monitor heart rate, temperature, injury occurrence, and, if necessary, call for help, to leisure products for augmented reality (i.e. google glasses), reconfigurable smart houses controlled by voice, motion etc.

As a concluding thought one can say that AI-related technologies change rapidly, and it is very difficult to predict the exact scenarios, but based on the trends identified in this short overview, it is possible to foresee that the main focus of the AI research is directed towards bringing humans and machines closer than ever before. We can forecast that in the 21st century, the intelligent robots will coexist with humans in everyday environment, as never before, and will present the first alien intelligence that we, humans, will actually face. Other thing is that the AI concepts penetrate an increasingly broader area of human environment – from technology, medicine, and banking, to education and beyond.

MANAGEMENT IN THE YEAR 2050

Today, the most sophisticated management techniques and business functions are present in largest companies, usually referred to as *corporations*. The corporation is characterized by highly developed functional business areas that are more sophisticated than these areas in small and medium enterprises. Each functional business area is comprised of several business functions that potentially represent the key source of competitive advantage of each company (Table 1).

The corporation, as the most powerful form of private business in essence has two general reference points that dictate its functioning: the consumers that use corporate products and services, and the shareholders that are, ultimately, interested in increasing their personal wealth. The turbulent global economy of the first two decades of the 21st century seems to be in recession due to the erosion of prevailing global economic concept oriented exclusively to wealth creation of minority of global population. It will be successfully transformed only by a paradigm shift that can be characterized by two major factors: prosumers and sustainability. That paradigm shift will redefine the concept of management that will be most evident in the largest companies. In other words, the functioning of all business areas will dramatically change:

- Marketing and sales – Prosumer trend will take over in the 2050. The majority of fast moving consumer goods will be made at home; 3D printers will be owned by most households – similar to today microwave ovens. At the same time, each household will be self-sufficient and sustainable. Singularity will enable people to think about their needs, and these things will be created. Prosumers will be technologically enhanced humans. Marketing as a function will lose its meaning; artificial intelligence will rely on rational parameters that will objectively assess the need of a prosumer to create his own customized product. Next to marketing and sales, the key business activity will be the customer relationship management. In the future it is going to be an artificial intelligence system, networked through the Outernet with all prosumers. The products will no longer be serviced nor maintained – they will be replaced with newer versions, drastically shortening the product lifecycles.

Table 1. Functional business areas and their business functions (adapted from [12]).

Functional area	Marketing and sales	Production	Human resources	Research and development	Accounting and finance	Supply chain management
Business functions	Marketing	Plant management	Recruiting	Innovation management	Financial accounting of payments	Procurement
	Sales orders	Production scheduling	Hiring	Production of new technologies	Controlling	Inventory management
	Customer relationship management	Manufacturing	Training	Design of new and innovative products	Planning and budgeting	Transportation
	Market analysis and forecasting	Quality control	Payrolls and benefits	Improvement of existing products	Cash flow management	
	Advertising	Maintenance	Legal affairs			

- Production – it will implement the total just in time concept, not just from the supply side, but also from the demand side. In essence, the prosumers will become plant managers: quality controls and plant maintenance will become fully automated, autonomous functions.
- Human resources – Corporations of today are seen as the largest employers; for example, Wall-Mart, as the world's largest employer in the year 2016 employed a total of 2,3 million people. The second one on the global list was China National Petroleum with a total of 1,5 million employees [13]. With the rise of prosumer, the need for standard distribution channels (and market intermediaries) will diminish. Wall-Mart is the biggest retailer; in order to survive, it will have to radically transform its business (maybe as the biggest chain of FabShops?). As far as the corporate business size is concerned, the standard will move from tens of thousands employees to only a few hundred [14]. Weekly working hours will shorten, enabling people to use their free time in more innovative ways. As people are expected to live substantially longer (we can expect a dramatic increase in number of centennial men, but there is no consensus about the maximum potential life span [15]), they will work longer with the prospect of never being retired. Also, taking into account the progress of medical research and nanotechnology, there is not going to be a substantial deference between the young and the old in their physical and intellectual capacity. A *merger* of humans with technology will directly influence the educational system. Schools will no longer be a predominant form of getting formal education – merger of humans with technology will enable people to acquire knowledge and skills in a matter of weeks, as opposed to decades of schooling, as required today. This will dramatically change the workforce market; many jobs will become obsolete or replaced by artificial intelligence systems (or artificial humanoid forms). This is especially true for the manual type jobs and the blue-collar workers. The 2050 corporations will be AI-self-managed, possibly without workers, or with only a few employees.
- Research and development – In Singularity age, artificial intelligence will surpass humans intelligence, enabling artificial forms to perfect themselves and, even to initiate new cycles of innovation. The business functions will remain the same but their nature will change. With the advancements in nanotechnology, all existing products will be able to perfect themselves and adapt to the changing needs of the prosumers.

- Accounting and finance – these functions will cease to exist in the present form. The Outernet will enable instant, real time information about every financial and nonfinancial aspect of a business. A fiscal year will become the fiscal day. In essence, all accounting business functions will merge into one.
- Supply chain management – it will be focused on local distribution with the exception of raw materials that will be distributed globally, according to distribution of natural resources. Procurement function will be limited to procurement of services and raw materials. Production sites will be self-sufficient, easing up on energetic infrastructure. Waste disposal will become a historical concept; recycling devices will be omnipresent from home appliance units to large plant recycling facilities. Inventory management will disappear; the ubiquitous just in time concept will make any inventories obsolete.

Based on the anticipated changes in business functions, due to the described technological progress led by artificial intelligence and Customized Lifestyles scenario by Deutsche Post, it can be expected that most companies will become peopleless. The traditional business functions will be fused as they will be performed simultaneously, as needed. The only functional area that is expected to keep its present day shape and content will be research and development, but it will become far less human intensive. Accordingly, most economics and management concepts of today will become a relic from the past. The actual business and management education will cease to exist. If we push it to the extreme, it will turn into a combination of three topics: (1) a study of creative AI application, (2) a study of human-machine interface, and (3) a study of human culture in innovation management.

Table 2 exhibits a view at the changing nature of the functional business areas in the year 2050.

Transformation of all business functions will inevitably have a strong direct impact on the following management functions: Planning, Organizing, Leading, Control, and Human resource management. Thus, the future of *corporate* business and management is definitely going to be very challenging and demanding.

Table 2. Functional business areas and their business functions in the year 2050.

Functional area	**Marketing and sales**	**Production**	**Human resources**	**Research and development**	**Accounting and finance**	**Supply chain management**
Business functions	Customer relationship management	Plant management interface	Recruiting	Innovation management	Merger of all accounting functions into one	Procurement
		Manufacturing	Legal affairs	Production of new technologies		Transportation
		Maintenance		Design of new and innovative products		
				Improvement of existing products		

CONCLUSION

In my opinion, singularity seems to be inevitable. It is difficult to pinpoint the exact future time frame of the rise of singularity, but the current research and the envisioned trends lead to a conclusion that the period between 2045 and 2050 is fairly realistically the period of dominance of AI in business and the everyday life. A merger of biological forms (humans) with artificial creations will dramatically change the look of the world that we are living in. The old business routines from the 20th and the beginning of the 21st century will gradually vanish, and the daily life of all individuals, political systems and private companies will need to adjust accordingly. This will be particularly true for the corporations. They will have to move from the role of wealth creators toward the role of public services. Change will probably be even more dramatic; today, people consider corporations to be major market players who provide existence to their employees and deliver necessary goods and services to their consumers. With the rise of prosumers, corporations will become just another player within a worldwide infrastructure, developed to fully exploit the endless possibilities of human lives merged with technology.

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