

Beyond AI: How Neurosciences and Biology will Change our World and how Leaders Should get Prepared for It.

DOMINIQUE TURCQ

2019



“Leaders have to become “translators” of technologies – today AI, tomorrow all the others – as well as of social movements.”



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Welcome Address by Prof. Danica Purg, President of IEDC-Bled School of Management

Good morning to your Excellencies; Minister Mr. Zoran Poznič; the Mayor of Bled Mr. Janez Fajfar, guest speakers, and guests from 18 countries!

Welcome to IEDC Bled, and to our traditional Annual Presidents' Forum. I am happy to see so many old friends and I would like to extend a warm welcome to all of you, especially to those of you who are here for the first time.

IEDC-Bled School of Management was established 33 years ago as the first management school in CEE. Over the years, we became well known as the institution that develops leaders in an innovative and responsible way. We believe that ethics, sustainability, creativity and innovation are the most important factors in the success of every leader, organization and country.

This is why, every year, for the Forum we choose a topic that impacts business processes, regional and world economies, our environments, and above all leadership. We also bring prominent thought leaders and experts in their respective fields to the school.

After the Forum we publish the traditional Book of the Year with a transcript of the Forum's content and send it as a New Year's present to 10,000 addresses around the world. Most of you received last year's book with Dr Susskind's lecture "Artificial Intelligence and its Impact on Leadership".

This year we are taking another step forward, giving attention to developments that will also have a disruptive impact on business and society: applied neurosciences, genetic sciences and biology. Today's forum is dedicated to the topic "Beyond Artificial Intelligence: How Neurosciences and Biology will Change our World and how Leaders Should get Prepared for It".

I am pleased that Dr Dominique Turcq, a world-famous expert on the topic, is with us today. Dr Turcq comes from France. He is the President of the Boostzone Institute, a research and consulting center dedicated to understanding the management implications of major changes in the world brought about by technology and sociological forces. He is a professor at INSEAD, CEDEP, other business schools in France, and IIST in Japan. He has worked for global companies such as Sony and Manpower, and as an advisor to the French government. He has doctorates in Management (HEC University in Paris) and Corporate Sociology (the Sorbonne). As a consultant to large companies' executive committees his main fields include the impact of major forces on strategy, organization and

operations; the need for a collaborative culture and its implementation; and organization change management in a fast-changing and uncertain external environment. Dr Turċq has authored the books Augmented Management (2013) and Work in the Post-Digital Era; How will It Look in 2030? (2019; in French). Welcome again, Dominique!

After the keynote, Dr Turċq will also lead and moderate a roundtable of business leaders, who will share their views and rich experience on today's topic. These leaders are:

Mr. Manfred Stern, Corporate Executive Officer of Yaskawa Electric Corporation and Managing Director of Yaskawa Europe, Germany

Mr. Nebojša Bjelotomić, CEO of Saga New Frontier Group, Serbia

Dr Mark Pleško, CEO of Cosylab, Slovenia

Dr Mark Pleško is also the recipient of last year's Alumni Achievement Award, which recognizes the most successful IEDC alumni for their individual career achievements, leadership, innovation, service to the community, and contribution to the school's development. This year's Generali Alumni Achievement Awards will be conferred this evening at a special event in Ljubljana. I would now like to publicly announce this year's winners:

Mr. Stefan Frangulea (Romania)

Ms. Nino Chedia (Georgia)

Dr Aleš Rotar (Slovenia)

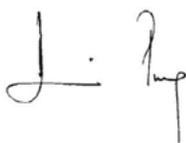
Ms. Olohimai Ruth Omo-Ezomo-Lohi (Nigeria)

Mr. Enver Šišić (Slovenia)

My sincere congratulations!

Dear guests, I would now like to warmly welcome a representative of the Slovenian Government, Minister of Culture Mr. Zoran Poznič.

Thank you. I wish you an inspiring day!



Prof. Danica Purg
President

Opening Address by mag. Zoran Poznič, Minister of Culture of the Republic of Slovenia

Dear Dean Prof. Danica Purg,

Dear esteemed guests and speakers,

Our times are ruled by technology and media. Society is changing accordingly, and everything traditional – education, economy, culture– is being transformed by digital technology and AI.

This transformation involves a large spectrum of new technologies and much experimentation with them. Here AI has become an important field of scientific research, the basic foundation of which is the use of computer systems for creating life simulations. This is the world we live in now, AI is what is contemporary, and AI is the lens we should look through when we discuss everything that is happening in the world today.

The answers to questions that arise with AI, such as what it means to be an active entity involved in the relationship between biological and artificial and between real and virtual, belong to the future. But even as I speak, the platform for these answers, which includes deep philosophical and sociological considerations regarding the virtual and real, is being built. Slovenia is well aware of the seriousness of the global AI phenomenon and is actively involved in an international research center for Artificial Intelligence under UNESCO, which will start up in the next few months. Its role will be to develop and research AI with the intention of assuring an open and unobstructed environment for research and discussion in the AI field.

It is obvious that experimentation with AI is closely bound to science. In a time of globalization, possibilities are growing for interaction among the principles of the humanities, social sciences and natural sciences. Various principles of visual practice are expanding the notion of accessibility and understanding in new media. Although we still lack the knowledge and skills regarding how to employ and deploy novel approaches and technologies, the connecting and co-operation of different scientific disciplines with art (or culture in general) has already produced a surprising number of applicable results, well tailored to our needs, requirements and activities.

The merging of science and art through experimentation with AI can generate products with great potential to enter global markets, where they can reach a wider range of people with more success. These mergings of the left (rational) and

right (irrational) brain hemispheres ensure a sustainable development, with the goal of a better future in all fields of operation and cross-sectoral networking.

AI can be applied in various ways, but its greatest applicability may be in the field of technology. Here AI represents the capacity to optimize the technological processes of the economic cycle. Innovative activities improved through AI allow companies to upgrade their own value chains in order to be more competitive on the global market. This said, it has to be emphasized that AI cannot replace human activity entirely, but can enrich the capabilities of humans. AI is becoming a powerful tool which will change the future of economic development in almost unimaginable ways. AI is changing the world in many ways.

Thank you!

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“BEYOND AI: HOW NEUROSCIENCES AND BIOLOGY WILL CHANGE OUR WORLD AND HOW LEADERS SHOULD GET PREPARED FOR IT.”

DOMINIQUE TURCQ

Good morning and thank you very much for welcoming me today. It is a great honor and a great pleasure to share with you some elements of what our future looks like, and how we all have to prepare for it.

Beyond Digital

Before we go into “Beyond AI” I would like to speak to you about “Beyond Digital”. It might be strange to talk about “beyond digital,” while so many companies are struggling to put in place their digital transformations. However, my point is that if a company only focuses on its digital transformation, however important that might be, it may miss some critical new events that will happen in the future.

It’s time to realize that:

- “Digital”, or computerization and adaptation to a world with the Internet, smartphones, GPS, APIs, screen interfaces, etc. is the “new normal”, like electricity. Electricity is everywhere but nobody speaks about it.
- Digital is no longer a factor of sustainable strategic differentiation. If you have not yet started your digital transformation, it is too late.
- Digital is now in an implementation phase, a transformation phase, and not a decisive strategic phase.

And especially, it is time to realize that the digital era has dehumanized the human relationship.

- The fundamental value of the digital era, since the invention of computers, has been to drastically decrease transaction costs (for instance you order on Amazon in one minute instead of losing time to go to a shop) and access costs (for instance, accessing of information or services). But at the same time, it has increased the intensity of our lives, the productivity of workers, the work pressure. The latter often even leads to cognitive overload. Indeed, since we can do things faster, we tend to put many more activities within the same time frame and end up exhausted. The number of burn-outs at work have increased within the last few years. Digital intensity is a significant cause.
- But digital has also created a paradox. The reduction in transaction costs has primarily diminished the distance between people. But the result is that in some cases there is no more human contact at all, for instance between clients and suppliers, among people at work, even among friends and family members!
- And finally, the digital era has reduced the autonomy of decisions, the autonomy of agents, the usefulness of human contact. Today, in many cases, one has the feeling of serving the computer rather than being helped by it. Machines lead the process in many instances where the operator has no more freedom and can no longer “overwrite”.

Some examples

- An airport check-in kiosk, a digital police officer at a border or an electronic cashier in a supermarket are useful for saving costs, but do they indeed accelerate the process? Do they satisfy the user?
- Virtual meetings are very convenient and cost-saving, but do they also convey human, non-verbal signals?

All these elements explain why we have to go Beyond Digital, why digital has become the new normal. Digital is like electricity; we don't even talk about electricity as a factor of progress or change, while in reality new electricity innovations are changing our world as much as digital. We don't talk about it because it is “normal.” Electricity is within all the elements of our lives.

“Digital” is now in every element of our lives; it is our new normal; let's use it everywhere but let's look at the next issues.

So much for “beyond digital”. But why do I also say that we have to go “beyond AI”?

Why “also” beyond AI?

Some would say that AI is an extension of “digital”. Yes, in a sense it is, because it relies on digital tools, on computers. But saying that AI is digital would be the same as saying that digital was electricity because computers use electricity.

AI is fundamentally different from digital in several ways.

First, with computers you were used to seeing exact results from the computation of exact data. Computers gave us a correct world where additions were accurate; Excel models were precise; and APIs connected systems and data accurately. We could rely on it, apart from a few bugs or a few errors in data entry.

This accuracy and the trust we could have in it is why digital was such a transaction cost reduction factor, and therefore a labor replacement factor. The accountant did not have to “add” any more; the physicist could do massive calculations in a few hours instead of a few days. Errors were rare.

But AI is not exact. It is a fantastic approximation machine, a tremendous prediction machine, but not an accurate tool. It can indicate that radiography may be showing cancer at 93%, or a picture showing a Siamese cat at 95%. It can translate a text into another language at a relatively low but acceptable level of quality. It can accept your dictation of a short message with relative acceptability. It can guide an autonomous car in more and more situations, but not all; far from it.

None of AI actions are 100% reliable. And even if you increase the number of data with which AI works, the machine learning process it uses, the statistical and probabilistic algorithms it relies on, it will never be exact.

In other words – and this is where its beauty lies – AI is a fabulous help to humans in evaluating things, making decisions, thinking, translating ... but it is just a help. It does not replace humans.

Applied AI is a considerable enrichment; continuous; and looks almost limitless. Indeed, AI is an incredibly powerful tool. But it is only a tool.

AI enriches our capabilities. It will allow us to make considerable progress in health management, climate management, agriculture, marketing, social policies, education, and many other fields. To take a mundane



example, every taxi driver today or any hotel receptionist can even speak all the languages of his clients thanks to Google Translate. Is this not enrichment? In short, while computerization was a significant cost-reducer thanks to transaction cost reduction, AI is a considerable value enhancer.

AI, therefore, is here to stay and will change our world. As with the digital transformation, we have to understand that very soon it will also be part of our “new normal.” It will be a differentiating factor, but the competitive advantage it brings will come more from how companies use it and why it is used (its purpose).

And let’s remind ourselves: AI is not “intelligent” at all. Calling it that is journalistic but not scientific. AI has no conscience, no feeling for bad or good, no pride if it beats a world chess master or a world Go champion (it does not even know it has beaten the world champion!). It only has lines of programming done by humans. It relies on vast quantities of data to recognize a cat, while a toddler only needs to see one to identify it.

AI will change the world of work in many ways. It will enhance the skills of many professionals by helping them work or decide faster or better. It will become the companion of many at work in the same way as our smartphone voice-recognition system is progressively becoming a companion.

However, and without entering too deeply into the treacherous field of AI’s perverse effects, it will also help to create a Doppelgänger (i.e., a digital double) for each of us. This digital double will allow marketers or authorities to see and track our behavior better than we can (you don’t remember where you were a week ago today at this hour? Don’t worry: ask Google). It will even predict our behavior. Let me give a few examples. Amazon says they know what you will buy next before you do. A bank can predict that an

employee is preparing to commit fraud. A telephone company can predict when a customer wants to switch providers. A company knows when an employee is preparing to leave.

AI, because it is not exact, because it relies on algorithms designed by humans who may be biased, and because it relies on an enormous quantity of data that can itself be biased, will also be prone to significant errors, to substantial biases. For instance, recruitment AI software today is often biased against women; autonomous vehicle AI is terrible at seeing people of color. Biases will be the new plague of AI.

But as I said, AI is here to stay and is also becoming a new normal. So then, why do I say that we have to go beyond AI? Because new forces are also coming that will change our world at least as much as AI.

Beyond AI: Neurosciences

Let's start with the Neurosciences.

Applied neuroscience will be a very different driver of change than AI, but one surprisingly comparable to AI or to digital or electricity as far as the magnitude of its impact is concerned.

Let's first remind everybody of what neuroscience is. It is, first of all, a science working to better understand how our brains work. Namely,

- how the brain is cheated constantly by its environment (the works of Daniel Kahneman and Richard Thaler, two Nobel prize winners, on the decision biases this implies are just flabbergasting);
- how it deals with emotions and changes in our bodies (we all know that we don't make the same decisions according to the physical condition we are in, e.g. if we are hungry or tired or in pain);
- how it continually learns and sometimes forgets (we all know how we learn and forget foreign languages);
- how it can be modified and changed if we want it to (we know that we can learn to ride a bicycle, to play the piano, to speak another language IF we wish to and take the time).

This science is developing very fast, and every week we discover new ways to understand or change our brains. Also, more and more people are aware of what we can do with our brains and how to better understand its functioning. This includes techniques like meditation, technologies like

brain scanners or brain wave readers, and an incredible number of brain tests. The field is enormous. The applications of this science will soon be part of our daily lives.

Thanks to neuroscience, significant changes are to be expected in several fields:

- Learning. We all know that sitting for hours in a room, often in rooms without windows, with a professor standing and teaching, is by far not the best way to learn. And every Learning and Development officer knows that most of the learning delivered in those circumstances is not acquired. Neuroscience helps us to understand why, to understand how our brains learn, why the brain's attention span is limited, and therefore how we can help it gain new skills, hard and soft; for instance why and how to use video games or collective exercises. In short, the brain learns when you surprise it, generally with fun elements; when an exercise is difficult (but not too difficult); and when you propose a large variety of exercises to it. **Most of today's learning experiences are not fun, not diverse, and not complicated enough. Neuroscience will help us to change that.** Learning and Development officers, get ready!
- Capacity for attention.
 - In China, there are already experiments involving primary school children equipped with brainwave monitors, aimed at seeing whether they are concentrating or not at certain times during the day.
 - Last month Qantas, experimenting during the first-ever 19.5-hour direct flight between New York and Sydney, equipped pilots and test passengers with brain wave readers. They wanted to see if such a long trip could have detrimental effects on their attention or concentration capabilities.
 - Technically this could already be used in corporations if you want to follow the attention levels or burn-out risks among your employees.
- Decision-making. We are full of decision and judgment biases. Thanks to neuroscience, we can ourselves be more aware of our own decision biases, and others can help us to spot them. Tomorrow you will see people in meetings where a decision is being made and the following biases might be involved:
 - The Sunflower bias (this bias is the one appearing when

everyone follows the boss because he is the boss)

- The groupthink bias (this bias appears when a group builds a sort of echo chamber within itself where everyone becomes convinced that an idea is the best just because they have been arguing about it and working on it for a long time)
- The halo bias (the halo bias suggests that because somebody is a recognized authority in one field, he can be right in another field)
- The survivor bias (for instance, when somebody has been a successful leader in a company which faced a difficult situation, we infer that he can be a successful leader everywhere)
- These are just examples; there are hundreds of biases that have been identified and documented.

No one can identify all of one's own decision biases. However, collectively we do much better because we don't have the same biases and because it is easier to see the prejudices of others than one's own. The collective dimension of decision-making is drastically improved when all participants in meetings are able to confront their readings on decision biases. This is one of the advantages of collective decision thinking. We will still need leaders to take the final decision and endorse the accountability of a decision. However, we can hope that decisions will be much more thought-through when the findings of neuroscience on biases are better disseminated in the managerial population.

- Leadership style and development. Obviously, because decision making will be challenged, so will leadership. The authoritarian leader, who knows everything better than anybody else, who is not modest, who is always the father of success and never of failure, will have difficulties surviving in an environment where consciousness regarding his or her sources of influence is more apparent to more and more people.
- NUDGE and influence. Neuroscience helps us to understand how some decisions can be biased; we just saw that. But therefore it can help us also to know how we can bias the choices of others. In gentle terms, this is called nudge; in less kind words, it is called manipulation. The possibility to influence is deployed in marketing, politics, people management, communication and information management.
- On the right side, a nudge is, for instance, used to help people

lead healthier lives by inducing them to eat better or exercise more; or to slow down their cars where children are playing.

- On the wrong side, a piece of fake news with a cute cat picture is nothing other than a neuroscience nudge. The fake news title, or the association of an image of a cat with a title, creates an emotion – if possible a strong one. This emotion reduces our critical sense, and we tend to believe the fake news and to retweet it.
- Physical environment and mobility.
 - Neuroscience is helping us considerably to improve the work environment. We now know scientifically that spending the whole day sitting in a windowless room; or without fractal shapes, like plants; or in a noisy environment; or in polluted air seriously harms one’s performance.
 - Similarly, it is becoming clear that new forms of mobility behavior like staying at home rather than coming to the office have negative implications for the social lives of employees and for their creativity. One of the first measures taken by Melissa Myers when she took over the helm at the ailing Yahoo was to stop teleworking, because she wanted to reinfuse creativity into the organization. If people don’t mix, they don’t create.

The most important lessons we can draw from early neuroscience work are:

- Awareness of cognitive biases by everyone will have to become standard in thought (as psychology was in its time, but now more profoundly and scientifically).
- Cognitive biases require high vigilance in the positive (training, nudge) and in the negative (manipulation, evaluation) senses.
- Collective wisdom with regard to individual and collective cognitive biases and ethical biases can be a means of progress.
- We should understand that this science has the power to modify many of our current habits of management.

Now let’s take a look at biology.

Beyond AI: Biology

Applied biology is another significant change our society will encounter within the next two decades.

First, let's remember that the globally most significant technological disruption in the twentieth century was not the telephone, nuclear energy, airplanes, or the Internet. It was biology. Without vaccines, antibiotics and cancer treatments, the population on this planet would not be close to 8 billion, and a large part of today's audience would never have been born. We would also not be facing the huge issues we have today with pollution, climate change or migration.

What biology will do to us in this century is quite different, but it will have a similar impact. I am not going to list all the effects one can foresee when one looks at this science, but will just mention a limited number of significant changes.

To be brief, the biology of the twentieth century led mostly to quantitative changes in demography. The biology of the twenty-first century will mostly generate qualitative changes for many living species. We understand the DNA structures of living organisms much better, from plants to animals and humans. And we can analyze them better by the day. We can also modify them in a more and more powerful way, for instance, by removing genes we don't like and replacing them with others via various techniques, the most famous being CRISPR Cas 9.

What will this imply? Let's try a laundry list. First, regarding DNA analysis and modification:

- We will have new plants and new animals. The genetically modified organisms (GMOs) of today, against which so many people campaign, will pale in comparison to others we are already seeing, such as
 - Modified pigs for food or for organ transplants to humans
 - Modified cows whose milk is much closer to human milk
- There will be new genealogy analyses for all living organisms.
- We will have new illness analyses and treatments for humans for many genetically related illnesses.
- We will have new treatments where humans are an indirect target. For instance, in order to save millions of lives we will modify the DNA of female mosquitos so that they can't carry the Zika or the Deng fever viruses.



- We will be able to select or modify human genomes in embryos to give them enhanced capabilities such as resistance to viruses, physical strength or blue eyes. Let's not underestimate these evolutions. Trials are forbidden in most parts of the world, but we know some changes will be possible and will happen in the future. A Chinese scientist has already modified babies to make them AIDS-resistant. I tested this concept with my students at Sciences Po. They were between 23 and 30. I asked them if they would use some genetic modification techniques for the children they would have in ten years. Half of them were very interested in their babies becoming stronger, better-looking, more intelligent individuals. The other half reacted very negatively at first, but then wondered what would happen if the first half modified their children and they did not. Would their "natural" children be disadvantaged in the labor and the mating markets?
- There is even work being done by the US army to modify some soldiers' DNA to make them more resistant to pain or radiation (fortunately, this is still science fiction).
- Less science fiction but still very experimentally, some researchers are working hard to discover whether genetic traits in DNA can explain some behavioral characteristics. They work on things like political orientation. Tomorrow they may address tendencies for procrastination, creativity, or punctuality.
- As you can see, biology will open the door to many impostors; let's be careful. And let's not believe that it is easy to be careful. How many companies in the past used zodiac signs or graphology to

screen candidates? These techniques were not scientific, but were widely used.

The second important impact of genetics concerns epigenetics. Epigenetics is the way some substances modify some genes, creating mutations and sometimes generating cancers or other illnesses. These substances can be found in air, smoke, asbestos, tobacco, perfumes and cosmetics, agrochemicals and many other products. The whole debate on endocrine disruptors is mostly an epigenetics debate.

Today the only proof we have that a substance is creating cancers, like glyphosates for example, is a statistical one: you find more cancers among people who have been exposed to the material than in the rest of the population. Tomorrow this will change drastically with the progress of genetics. It will be possible to show how a molecule modifies one or many genes and therefore causes dangerous mutations. As you can see, proof will be very different: no longer statistical but scientific and specific.

To give you an example of how epigenetics works, think of bees. All bee larvae are the same, but depending on how you feed them, with or without royal jelly, they will develop into worker bees (1 cm long and living six months) or into a queen (5 cm long and living six years). The food provided to the larvae allows one gene to be activated (or not) for the larvae to develop into either a worker or a queen!

The implications for our society will be considerable. Let's look at a few:

- Different food will appear.
- There will be fewer illnesses; more treatments will be possible; personalization of treatments will become extreme.
- Some enhanced humans will be born within the next two decades.

But also:

- Multiple new inequalities and injustices will be revealed. Because treatments will not be available to all, and because of our disparities, our relative sensitivities to illnesses depending on DNA will become more transparent, more visible. Just think about how insurance companies will regard your DNA in the future. Or how an employer might select employees according to the health or of behavior characteristics that could appear in their DNA analyses.
- Companies will face many legal issues about their responsibilities because of their products. Lawyers will have a lot of work.

- Many ethical issues will arise regarding whether to use or not use new treatments, or whether to create or not create new products.
- Many ecological risks will appear, because when you modify an organism (e.g., a mosquito or an embryo) you don't know precisely what the consequences might be in the long term for the species or for adjacent species. If a modification actually provokes unexpected modifications or if a modification jumps species, nobody knows what could happen.
- Further costs will emerge for corporations in all cases where they choose to cover the charges of some treatments with their insurance policies. Don't laugh; this is a serious issue. Even today, some corporations' insurance covers the cost of oocyte freezing. Why not genetic treatment for individuals or their families tomorrow?
- We will see the emergence of new national economic players, depending on national regulations and economic investment. Today China is investing more and takes more ethical risks than other major powers.
- We will also possibly see the emergence of new corporate players in addition to pharmaceutical companies, like Google, for instance, which is already leading research in these fields.

Beyond AI: Social Changes

As you can imagine, these technologies will have profound impacts on our society.

But our society is also already changing drastically because of recent technology changes, in particular the digital revolution, the smartphone revolution, and the social network revolution. The world and the leaders of tomorrow will have to cope with several changes already taking place in today's world. Let's underline a few that are posing increasing challenges to leaders and for which we have only seen the beginning of the sea changes to come.

- First, the relationship between information and expertise. The rise of fake news not only shows how some individuals or parties try to use the Internet and social networks, in particular, to distribute fake information. It underlines a more fundamental phenomenon: we are collectively losing part of our critical senses, we are prone to contesting the value of scientific experts, we are tending to become

more naïve. This is not really new, but thanks to social networks it is assuming a new dimension and creating a world where the credibility of any authority has to be continuously regained and everyone has to be ever more careful about accepting information.

- Second, tripadvisorization. What I mean by this word is the fact that we are all evaluated every day, in every forum, by everybody. We don't have one big brother in front of us but millions of little brothers. The implications are that we become more cautious about what we communicate about ourselves. At the same time, we are more and more transparent thanks to all the data existing on us, with or without our consent. This transparency applies to individuals and obviously to companies. It has become challenging to hide anything, and, worse than that, things that may appear to be without importance today could become politically incorrect in a few years and backfire. This will generate new behavior and new issues.
 - An aspect of behavior will be the rise of *social network shyness* where people will hesitate to communicate and speak about their opinions. Last year at Sciences Po, I asked my students to publish their ideas on where the post-digital is leading us, as a final 3000 signs paper, on any public media they chose (such as Medium, Slate, LinkedIn, Facebook). Half of the students refused, and said, "I don't know how my opinion of today might be interpreted in 20 years, and I don't want to take the risk".
 - Among issues, we will see several new information asymmetries appear. Some players will know more than others. Just think of what it means for you if your insurer, Google, or your employer knows more about your health risks than you do?
- Third, social sensitivity to the physical and social environments (climate and pollution) will lead to a "CSR 2.0". Larry Finck, the head of Black Rock Capital, asking its CEOs to be socially responsible, or Greta Thunberg asking politicians to be ecologically responsible, are two sides of the same coin. We are in a world where society will demand the real responsibility of individuals and companies in their actions regarding the environment and the climate. In other words, a company no longer belongs to its shareholders only, but is becoming a social good with social responsibility towards many stakeholders.

- Fourth, we will see the emergence of new human proximities and a new quest for the meaning of life. Many individuals are asking themselves what the meaning of their lives is, in particular their working lives. They want to be closer to nature, to other people, to the physical work of their hands, to their values. Again, this is not new. However, the magnitude of these expectations has led many individuals to ask for more meaning in their work and for different employers to explore their values. It has even led some to leave jobs at large companies to start more meaningful lives. All companies are confronted with this.

As a result of these new social trends, corporations will have to be politically correct, ethically correct, social-network correct, and ecologically correct. A major program!

Which impact on leadership?

What should leaders consider in order to react and adapt to all these technological and social forces? Nobody has a complete answer, but some paths can be identified. Let me outline three.

1. *The first implication is strategic. Include these technological and social changes in corporate strategy, not only in communications, and not only in operations¹*

Use any of the new technologies to see how they can enhance the value delivered to any stakeholder rather than how they can reduce costs. As I said, these changes are profoundly different in nature from those which happened over the last 60 years with the arrival of computers and digital innovations. Those years saw incredible possibilities for reducing costs and increasing shareholder value. But now two things are happening:

- First, increasing shareholder value is not the only priority for corporations; they also have to better serve other stakeholders, from consumers to employees to the society around them.
- Second and most important for our purpose, the new forces may allow reduction of costs, but they mostly allow an increase in value provided.

In other words, they challenge leadership strategy thinking at several levels:

- Looking at business models, operational improvement or cost

¹ On these notions see the excellent report by MIT and BCG: "Winning with AI", October 15th, 2019

reduction is certainly not enough in this new world. On the contrary, revisiting or even reinventing the business model and the corporate strategy is a must. These forces should be used to create a competitive advantage.

- Some startups do it; now all companies should revisit their business models. Another way to say this – especially when the offers from providers using these technologies, and AI in particular, have become so pervasive – is: “Let’s take as a priority the problems you are trying to solve and only then see how you can use tools to solve them.” Do not just use tools because they are new and modern.
 - I am often scared by how companies adopt AI tools just because they look beautiful and contemporary, especially in the HR or marketing fields. In many cases not only are these tools not useful, but they may even be detrimental. For instance, an AI-based recruitment system is often so biased that it is counterproductive. Or a chatbot-based marketing tool may provide a very wrong and dehumanized user interface while users in reality want more human contact.
 - How to revisit communication is another strategic point for leaders because one should not communicate on the technologies one uses but on the additional benefits they bring. Many statements sound bullshit: “For your benefit, we are now using an AI interface tool. From now on, you will not be able to contact us; our AI assistant will handle all your calls.”
 - Leaders will have to invest in their own talents, their core strategic resource, and not rely too much on outsourcing. Outsourcing is great for reducing costs, but not necessarily for increasing the value provided, particularly if increase in value is a strategic asset.
2. *The second implication for leadership is organizational. Understand that if our organizations are also impacted, they are simultaneously a potentially crucial success factor if changed accordingly*

First, your organization is impacted. All parts of organizations are challenged when strong forces shift the business model, the strategy, or the social model. Structures may no longer be adequate; systems may become dysfunctional in a new environment; culture elements may become counterproductive. As an example, trust in managerial skills is currently declining. As shown by a recent study by Oracle and Future Workplace, 64% of employees would trust a robot more than their manager! However, at the

same time employees believe that their bosses understand their feelings better than robots and are more able to coach them. This underlines how individuals want new systems, maybe new structures, and indeed a new relationship with authority and management. Managers may have to be less technical and more human.

Second, your organization is also a factor for success and differentiation, on at least two fronts:

- Attracting the best talent. Talent attraction is already a major issue for all ambitious companies. We see this with AI in particular, where the fight to find good data workers is very tough. The same will happen for other technologies. Attracting talent will require more than money or titles. You may have to think like the pharmaceutical company Roche, who in Silicon Valley seeks data talent with a big billboard on Highway 101 saying, “Join the effort to kill cancer”! This is a social message to the generation with the talent.
- Your organization is your best tool for providing the new value you have decided to offer to clients and society. Your organization has to be adequate.

Easy to say, but what does it mean to change the organization? We cannot address the whole spectrum of organizational change management here, but let me give you a few concrete examples.

Corporate structures and systems (elements that are the backbone of an organization, like its silo structure and its computer infrastructure)

If you want to use the new tools for value creation, who should be in charge? For example, would you give AI to IT? This would mean giving a value generation opportunity to a cost reduction artist. In many cases, this will not be the right choice. CIOs are great at outsourcing, improving processes, **reducing costs**, and less good at finding opportunities for **new value creation**. If you have a CDO (Chief Digital Officer) this person may be a better choice even if, in many cases, the CDO has been marketing-oriented and has provided old values in new bottles. **Maybe you will need to create a CAIO (Chief Artificial Intelligence Officer) or a Chief Neurosciences Officer.**

Culture

Leaders have to become “translators” of technologies – today AI, tomorrow all the others – as well as of social movements. They have to instill a way of thinking which is oriented towards finding new opportunities

for value. This notion of “translation” is crucially important. This is because new forces, technological or social, will only be new sources of value if the organization’s people understand what they mean, how they will be used, why they can become a competitive advantage, and why they require changes in habits, systems and values. The role of the “leader-translator” is central.

In short, the work organization of tomorrow is neither an infantilized organization nor an authority-based Prussian army model organization. It must simultaneously be

- people-oriented, because people are the strategic differentiating factor;
- client-oriented, because clients justify the existence of any company;
- result-oriented (in the simple sense not just of TRS, but of CSR 2.0), because results are the *raison d’être* of a company in the twenty-first century.

Companies that address their organizational rigidities will become attractive again. They will, however, have to solve a paradox. This is almost schizophrenic, because they must also simultaneously

- treat employees as autonomous dynamic and creative entities;
- deploy ever more control, and use the performance measuring tools increasingly at their disposal.

3. *The third implication for leadership is about creating the “CSR 2.0” ethical organization*

The old CSR, which was mostly a compliance game with a few rules and a communication game for the annual report, is no longer sufficient. Employees want more responsibility from the firm they work for. They want consistency between the stated mission and real activities to be stronger. Stakeholders, local authorities, and NGOs in particular want companies to be genuine contributors to society and the environment. Furthermore, ethical expectations are increasing very fast among all stakeholders.

This all means that a new CSR has to emerge. This new CSR will include, in particular,

- an ethical dimension to how the company addresses technology, from data management to usage. This may take the form of an ethics committee, but not necessarily;

- an ecological dimension to how the company addresses climate change, pollution issues and (increasingly) species diversity;
- a justice dimension to how the company handles new inequalities and new injustices that may result from new technologies:
 - addressing of discrimination of any sort
 - addressing of the increasing social inequalities emerging via new economic distinctions in the labor market, e.g. hard skills in high demand which look overpaid vs other skills. How should wages evolve? How to value soft human skills and many manual skills which are currently undervalued?

This is all the more difficult because new technologies and social evolution are generating new inequalities and injustices, such as

- Information asymmetry, which is becoming “normal”
- IA and its biases (in particular databases biases), which are becoming omnipresent
- Neuroscience, which will de facto outline “natural” differences in our brains that could become differentiating factors
- Biology, which by nature is a reservoir of injustice because we are not equal but subject to biological differences

The new CSR will also go a bit further and require application of what is now called an “**ethics by design**” concept for products and the processes. This involves

- conceiving products and operations with an ethical dimension (possibly with an ethicist) right from the start;
- being careful not to give AI the role of an expert over humans.

As a reminder, a few practical ethical issues:

- Just because AI gives a recommendation does not mean that it has to be followed. A bank advisor can provide credit for a customer even if AI advises the contrary. A judge has to remain humanly independent of any AI-assisted justice. A surgeon has to take the final decision on his acts, not the AI assistant.
- Even if neuroscience has an influence, it must not be used to manipulate.
- Just because biology allows many new possibilities does not mean that they should all be pursued.

- Sometimes the leader's role will be to say NO.

And, to conclude discussion of this ethical dimension, may I recommend that you read or re-read Hannah Arendt, one of the most influential philosophers of the twentieth century. She invented the concept of "ordinary evil": the fact that by following a system without thinking, we can all become "evil." **The leader of today has to develop the capabilities to think further, and not just follow the classic path of more growth for more profit.**

Conclusion and final words

I will stop here, with a reminder that I am only trying to help us gain a more unobstructed view of what the future has in store for us – all of us.

The future is uncertain; everybody says so. This is true – but it is only partially true. Some events may be brutal and largely unpredictable because of their timing or their magnitude, like a financial crisis. But many trends are not unpredictable, and most of what I have described today will happen in one way or another – tomorrow or the day after tomorrow, quickly or slowly, but inevitably. It was possible to forecast the future impact of vaccines, automobiles, electricity and nuclear energy, even if only roughly. **It is possible now to predict the future impact of AI, neuroscience, biology, social evolution and climate change – even if only roughly.**

I will be glad to take questions before we move to the round table discussion.

Thank you very much.

ROUNDTABLE DISCUSSION

DOMINIQUE TURCQ

First of all, I would like to have all speakers introduce themselves and tell us what they do. Then, I would like them to tell us what they think of our discussions earlier today.

MANFRED STERN

I am Chief Executive Officer of Yaskawa Holding in Europe. I am also Corporate Executive Officer of Yaskawa Electric, Japan. I think this is very interesting because we often have an entirely European perspective on what we do, but it is important to see global business from the opposite side of the world. Our main business is robotics. We are also active in other businesses, such as green energy. Our goal is to provide pollution-free energy to society. We are also in the general automation business.

What I learned from your presentation is that corporate social responsibility is the most important issue for us. This is not something entirely new. Yet, as I look at the new technologies, I think that we are going to have a completely new situation in the future.

MARK PLEŠKO

I am a nuclear physicist. My father was an economist and he could not understand why his son became a physicist. Maybe I am carrying somebody else's genes. In 2001, with a couple of my students, I set up a company called Cosylab. At present, we are about 200 people there. We are a world leader in both the field of nuclear accelerator research and research related to other large physics research facilities. Some of our customers are Stanford University, MIT, Harvard, and other world-famous universities.

We use nuclear accelerators to kill cancerous cells. It is a novel method that was not invented by us, but we developed a software for these machines. Our share of the global market in this field is about 60 percent. We are not a software company. Our ambition is to be able to kill cancer. By the way, we used all the methods that Dominique mentioned in order to recruit and motivate people. We try to apply the science that you described.



NEBOJŠA BJELOTOMIĆ

Thank you for this invitation. I am Chief Executive Officer of the Saga New Frontier Group in Serbia. In the 1990s, during the turmoil in Yugoslavia, I went to Boston. I ended up on the wrong side of the river, not where the famous universities are. I went to Boston University, but it was a positive experience anyway. I studied medical engineering. I started working for a startup producing protein chips and DNA chips, but I decided that I did not want to live in the United States. I returned to Serbia and I worked for IBM and Siemens Computers, which became Fujitsu. So I experienced American, European, and Japanese management. At that point I realized that I wanted to work for a hidden champion. I transferred to a local information technology company that is 30 years old now. We did something different than other companies. We started collecting bright people from Central and Eastern Europe who are very good in math and programming. We set up our own research and development in natural language understanding and national language processing. We also worked with chatbots and have implemented a few in our region.

One of our Chinese partners noted that we are good in the field of small languages, such as Serbian, Albanian, Bulgarian, and Slovene. From a Chinese viewpoint, these are small languages. Our chatbots cannot be said to be intelligent but they can trick a person into believing that they are.

A year ago, we started dealing with time-related decision-making and personalization issues, using algorithms to catch all the data available out there. We analyze consumer behavior and a lot of other things. It is a lot of fun. Some IBM studies indicate that 90 percent of the existing data has been collected in the last five years. You can imagine the amount of available data.

We are trying hard to keep our talented employees because if I have smart people I can compete with Stanford and Harvard. But I have to keep them here, which is a hard task. Another goal that we have is the international expansion of

our business. We have proven that we can do it here, so now we want to conquer new markets, in the Middle East, Africa, and other places.

DOMINIQUE TURCQ

You mentioned DNA chips. Can you explain what they are?

NEBOJŠA BJELOTOMIĆ

There used to be a theory that if you put a DNA strand in a chip, and then you put the DNA of a single person on top, you can differentiate between genotype and phenotype. Until the late 1990s, treatments for diseases such as colon cancer would cure 70 percent of all patients. Yet, inexplicably, the remaining 30 percent would die. This was seen as just bad luck. After the advent of the GNA chips, scientists started looking at genotypes. They realized that at the molecular level there are differences between cancers that had the same phenotype. GNA chips started solving these issues. They have become a lot cheaper over the years and are now a booming industry.

DOMINIQUE TURCQ

Thank you for this explanation. It was necessary because, without it, what you said sounded a bit like Chinese to most of us.

Manfred, you said that the most important thing was corporate social responsibility implications. Can you elaborate on that? And can you tell us what it means for you in particular?

MANFRED STERN

In general, this question always pops up when you come up with new products and new technologies. What is the impact for your company? How do you position yourself on the market? And what is the impact on society? So far, this impact has been important but it is now going to become crucial. I think that a lot of future innovations will have a direct impact on society. I would even go a step further and add that some of that impact could be very dangerous.

Dominique, today you said that digitalization is history. I think that from an industrial perspective we are just at the beginning of industrial digitalization. Robots always have two aspects in a public discussion. They can be seen as a great tool. Consequently, automation is viewed as desirable. But many people

are also afraid that robots can deprive them of their jobs. When you work in the field of robotics, you get used to having this kind of discussion.

It is been proven that using robots makes an economy more competitive. If you compare the penetration of robots in a particular economy with the unemployment rate, you will see that the more robots, the lower the unemployment rate. South Korea is a case in point. That country has virtually no unemployment and it has the highest penetration of robots in the economy. There is an indicator called “robot density”: number of robots per 10,000 workers in a certain industry. South Korea’s score is 750. Germany’s is 610. Surprisingly, Japan’s score is lower than Germany’s.

The bottom line is that it can be proven that automation has a positive effect and it should be pursued further. We are still at the start of digitalization. People think that a robot is high-technology but it is actually just a machine. It is an electromechanical machine. Nothing more. But connectivity and artificial intelligence are something else. We are only beginning to develop artificial intelligence and machine learning in robotics. At present, robots are becoming capable of making sense of the environment and reacting to it. This will certainly change the situation. Robots are going to become more intelligent. Then, we have another trend in robotics. So far, they have been working in what we call “robot cells” so as to avoid conflicts with human beings. Now we are saying, “Let us make a transition from a traditional robot to a collaborative robot”. This is a so-called “cobot”. This type of robot is capable of direct collaboration with human beings. They can recognize what a human being is doing and they can make decisions in specific situations.

Robots used to be fixed in certain places. Now, they are becoming more mobile. They can move across a workshop in a factory. As this ability is combined with connectivity and artificial intelligence, robots turn into machines that are able to learn from their mistakes and correct their behavior. Connectivity makes it possible for robots to share what they have learned. We are talking about a totally new dynamic. This will have a great impact on society but it is still far from the effect of the technologies that Dominique discussed this morning.

DOMINIQUE TURCQ

Thank you. When I talked about “beyond digital” and “beyond artificial intelligence”, I did not mean to say that they are over. Not at all. Look at electricity. It has changed our society drastically. And yet we do not talk about that any more as we perceive it as something normal. Electrical automobiles will change our world in a dramatic way but we do not talk much about that. But robots are something else. We have to think about all the issues that Manfred mentioned

and then reflect on the implications for corporate social responsibility.

The congruence of robotics and artificial intelligence, including machine learning, is also an interesting topic. Corporate social responsibility is going to be an essential element there, too. This is an important point to make. Thank you very much for that.

NEBOJŠA BJELOTOMIĆ

I want to comment on that. I think you put it correctly. Digitalization is no longer a source of a competitive advantage. You have to have it or you are dead. I agree that at the moment if you implement elements of artificial intelligence you can gain competitive advantage. As for digitalization, it is something that you have to do even if it does not help you to become different from others. It helps you attain the norm. Artificial intelligence is a different matter. If you adopt it, you would be ahead of your competition.

DOMINIQUE TURCQ

This is true. Digitalization and robots are not a competitive advantage any more. But the way in which you use artificial intelligence and the purpose for which you use it can be real competitive advantages.

Mark, in your view, what is the most important thing that we discussed this morning?

MARK PLEŠKO

Maybe I am getting old because I am a little conservative in this respect. As a scientist, I am fascinated with the way that science is developing. It was all science fiction when I was a child. Now it is all becoming true. That is what I had been expecting all my life. Now I have children and I live a normal life and I am really happy that I will die as a normal human being not as an enhanced one. You know all those stories about the creation of man and how he challenged the gods. And then the apocalypse occurred because of that. We are exactly in this situation. Maybe it is not the gods. Maybe it is nature or something else. But we are in a position to make big mistakes due to stupidity. I hope I will die before seeing the apocalypse that will ensue from these mistakes.

Alibaba's Jack Ma said that the Internet is the greatest invention of mankind and it is going to create a lot of pain in the next 30 years because people will have to get used to it. It is like the invention of books. It looked great when it

happened but it facilitated protracted religious wars. And this lasted until people figured out how to use information correctly. Something like this may happen again. If I were a 20-year-old I would probably be looking forward to it, but as an old man I see things differently.

We live in an affluent society. We are so rich that we do not even know it. In Slovenia, we like to complain about all sorts of things, including the government. But we are richer than most other nations in the world. We should just enjoy that. We do not need all this artificial junk, right?

DOMINIQUE TURCQ

I do not share your view of 20-year olds. I am not sure that they are all enthusiastic. Some of us are really scared by the prospect of what can happen. My job is to try to reduce their fears and enhance their optimism. I think that some optimism is warranted. You are not the only one who is scared. We all want to remain human. And I agree that we need not only to remain human but also learn how to enjoy it.

MANFRED STERN

I would like to comment on what Mark said. Whether I like artificial intelligence or not is not an important question. It is happening anyway. As long as we are alive and part of our society, we have to accept the fact of its existence and consider how we can deal with it. Quantum computing is a similar phenomenon. It is going to have a dramatic effect on our societies. It is a reality that we have to deal with.

NEBOJŠA BJELOTOMIĆ

I liked Dominique's lecture this morning because I used to think that artificial intelligence is just math. There is nothing magical in it. Think about technological change, too. I never knew what mobile phones would do to my life. They make me always contactable through calls and e-mail. If I had known this before, I might have wished to terminate the person who invented the cellphone. And yet, it is here and has changed our lives dramatically. Why should we think that a bunch of algorithms should alter our lives much more drastically? As a matter of fact, artificial intelligence relies on some math that is a couple of hundred years old. And the best algorithms have been around forever. The difference is that we can now use these algorithms faster.

I agree that artificial intelligence does not have a purpose of its own. We, humans, give it a purpose. There have been lots of discussions on what that purpose should be and how much artificial intelligence we would like to have in our lives. If you combine artificial intelligence and science, imagine a courtroom in which the judges are robots. They can hear millions of cases in a very short time. And neuroscience can help determine who is lying and who is not. Do I really want somebody to test my brain in that way? And do I really want to have a judge without compassion? Judges often need to walk a fine line between justice and judiciary decisions.

In that sense, there will be lots of discussions on the purpose of artificial intelligence and the digitalization in our lives. I think that there is one alleviating circumstance. I can use Korea as an example. The replacement rate for an economically developed country is 2.1 children per woman. Europe is far below that rate: 1.5. As Korea's gross domestic product grew from the 1960s to the 1980s, their birth rate fell from over 5 children per woman to less than 2. A similar trend is currently being observed in Africa. As a result, the United Nations is revising its predictions for the size of the world's population in 2050.

In Europe, we are having a debate on immigration. But ask employers in Hungary or the Czech Republic how easy it is to find employees for any job. So, in 10-15 years we may need all these robots with artificial intelligence characteristics to do jobs for us. For example, caring for young and old people is a very hard task and we do not have people to do it. This is being felt all over Europe and we need to do something to fix it. If you have a very young child or a very old parent, you know that finding somebody to take good care of them is a huge problem, and it is not going to get easier. So, there is room in our lives for artificial intelligence. But we have to be careful not to surrender too much to it.

DOMINIQUE TURCQ

What you described can already be seen in Japan. They have been trying to replace home care with robots. They also use them to welcome guests at hotels. And this is beginning to generate some revolt. People prefer to see a real human being rather than a robot.

There is a hotel in Tokyo called Henna. In an experiment, they decided to use only robots and no human personnel. You were welcomed by robots and they carried your baggage to your room. Room service was also provided by robots. They would do everything for you. Finally, they fired all the robots. The customers wanted to interact with humans. I think that this is one of the optimistic elements. But the point that you made is extremely important from

a geopolitical perspective. What do we want: more robots or more humans? And if we want humans, we should accept immigration. This is a huge political issue. What kind of immigration? How should it be managed? It even goes a step further (although I did not address this issue this morning). What is the cost of a robot versus the cost of a human? We have to think of the tradeoff between hiring a robot and hiring a person. Today, we often prefer a robot because it is cheaper and it does not go on strike. But in some cases, we may prefer a human being despite the higher cost.

Earlier, I gave you an example of a gas station. Many people are ready to pay a little more for having somebody put the gasoline into their cars. But how much is a little more? One cent per liter? Or is it 20 cents? This may depend on whom you ask. We all need to ask ourselves when we would be happy to be taken care of by a robot and in what cases we would like to interact with a human. Think of the American Express example that I gave. Am I willing to pay for a gold card so that I always have a person to talk to? Or do I prefer to save a little and spend a weekend in Slovenia? In that case, I would have to settle for a basic American Express card and deal with robots. I think that this is a social question. How strong is our desire to interact with human beings?

NEBOJŠA BJELOTOMIĆ

It is not only a social question, but an economic one, too. Societies are built in different ways. You talked about paying with cards. But every Chinese would talk about WeChat. It is an application that they use for payments. In their society, cards and other Western gadgets of that kind do not make sense. They have other tools. If we adopt something similar and get rid of automatic bank tellers, bank cards, and everything else that we have, that will have a huge effect on our economy. WhatsApp was bought by Facebook and hidden under the table, while at the same time the messaging platform WeChat become extremely popular in China. This is not simply a social phenomenon but also an economic one. We have some structures that we need to use as a scaffolding. We cannot destroy them overnight just because somewhere there is a more effective way of doing things. This is the economic component of the matter.

DOMINIQUE TURCQ

Mark, you said that you tried to have a human dimension in your recruitment process. Can you provide some details of how you do that? How do you recruit your people?



MARK PLEŠKO

This is what we do best. We have thought a lot about the nature of our competitive advantage. Are we really good at writing software, or are we strong in the market, or is it something else? We found that what we do best is recruiting people. That is our greatest strength. The thing is that that is not very easy to monetize. If you have a huge market share it is easy but if you do not, it is not. You may have lots of good people, but you need to get some business for them. And still we decided that this does not matter. If this is what we are good at, we should be doing more of it and then think of other things around it. Recruitment is our core competence. We started working with students at the university. They took summer jobs with us and we tested them. But we also do it the old-fashioned way. How did the masters know which apprentices were good or bad 500 years ago? They did not have job interviews back then. The masters looked at how the apprentices worked and assessed them. They would say, “You are not doing a good job. You are clumsy”. That is the best way to find good people. You have to have them work with you for a couple of months.

We provide our own training. We use the word “academy” for that. We like bombastic words because they sound nice. The name that we use for it is “Cosy Academy” but in fact it is an on-the-job training course, lasting from one to three months. A mentor spends about 40 hours with a trainee and finds out if he is lazy or not, whether he understands what we do, and whether he learns quickly. Based on that, we decide whether to offer this person a job or not.

I may have sounded old-fashioned to you because I criticized artificial intelligence. That is not quite true. It is just that human beings have been around for a very long time. Basically, most things have already been invented. When we were in school, we were told in our chemistry and physics classes that Aristotle and other Greek thinkers had already thought of what we were

studying. And it is possible that even before the Greeks the Chinese had made the same discoveries. There is a lot of eternal wisdom. But technology changes, and we have to change with it.

Neuroscience is now helping us deal with people. We are beginning to understand why these old wisdoms were there. And they are still here. It would help a lot if you applied those old wisdoms. By the way, it is easy. My grandfather went to school for a year and then worked as a shepherd in the mountains. And still, he had wisdom and I got it from him.

DOMINIQUE TURCQ

And how do you motivate people to apply for a job with your company? How do you give them a sense of purpose?

MARK PLEŠKO

We work with highly educated young people. The general perception in Slovenia is that our salaries are low and the taxes are high. Therefore, it is much better in America. Highly educated people need money to live a decent life. There is no doubt about that. But they also need a different motivation to be satisfied. They need a mission. I think we give a mission to our people. Not only because we cure cancer. We give people a feeling that they are part of a team where everybody respects everybody else.

DANICA PURG

Mark, can you explain how you kill cancer? People do not know. Can you tell us more about that?

MARK PLEŠKO

There are three main ways to cure cancer. One is surgery. The second one is chemotherapy. The third one is radiotherapy. The latter uses X-rays. Instead of these, you can also use protons. They are also nuclear particles but they are much more efficient. They are charged particles and it is possible to focus them and use them like a microscopic scalpel. The method was invented in 1948 by a Nobel prizewinner, but at that time the technology was not good enough. Even now it is still in its infancy and no more than 0.5 or 0.7 percent of all treatments rely on this method. But we hope that it is going to be used more widely. Our goal is to improve the technology as much as the laws of physics allow.

We are currently trying to set up a center in Slovenia where this kind of treatment would be available. We have been talking to the government and other stakeholders about that. For now, we do not know where the funding might come from but we are optimistic.

DOMINIQUE TURCQ

What about you, Manfred? How do you attract young people? How do you select them and what sense of purpose do you give them?

MANFRED STERN

Attracting talented people is one of the most important elements of our business. We have a lot of large competitors who are trying to do the same. When students who have studied engineering graduate from their universities, they will probably consider Siemens or Bosch as their first employer. We decided to set up a robot-building facility in Slovenia because it is a country of two million people. It is a small country and its people are highly committed. We also have a very good relationship with the Slovene government. For these reasons, we decided to attract Slovenes and we found that this is much easier than attracting Germans in Germany. The outcome now proves that this was a good decision. We have the Yaskawa Academy, which trains our recruits.

DOMINIQUE TURCQ

Today, people do not want to work in big cities like Paris or London. They prefer to be in mid-sized communities where they have not only a nice job but also good quality of life. This is a significant change because only 10 years ago people would have preferred a large city, like Paris.

Nebojša, how do you attract your people and what sense of purpose do you give them?

NEBOJŠA BJELOTOMIĆ

We are looking for experts in the field of information technology. The demand for them is unbelievably high and the supply is incredibly low. If you are an information technology expert, everybody wants to hire you. It is not enough to give these people a good salary and a car. You have to give them a story. Talking about recruitment, we are almost in the business of story-telling. When you see a bright mathematician doing a PhD who looks like a prospective employee,

you have to give him a story. I would not go as far as talking about a sense of purpose, though. I think that you have to give him a story. We talk about making a product. This year, I told my marketing department that employee branding must be a key activity for us. Right now we have a campaign going on in Serbia, asking "Are you ready to run a full circle or are you just part of a code?" We have an outsourcing community consisting of people who do jobs for companies abroad for huge amounts of money. But they work on outsourcing jobs and do not really see the product of their work. We say, "If you come and work with us, you are going to participate in the whole design cycle and make a finished product". This approach generates a lot of interest on the part of young people.

In Serbia, we have traditionally been good in agriculture. We produce raspberries and corn and export agricultural products for others who make something out of them. Now we are telling our people that we are finally going to make a complete product and sell it abroad. We are going to sell it all over the world. This story works well with young people. It challenges them.

To make a product and launch it abroad it is not enough to be a good engineer. You have to understand accounting, finance, marketing, and sales. A lot of our employees are getting an opportunity to work across different fields. Young people do not want to be stuck in a particular rut. The people that they work with are also important to them. They care about what they are working on and they are interested in technology. They are so smart that they can figure out what is coming up two or five years from now. And they always think, "If I take this job, what will I do next?" They are capable of managing their careers, whereas when I was their age we would choose a famous company. I think that they are actually avoiding the large and famous companies so that they can get a chance to be in the thick of the battle immediately. This is what we try to do, and we present it to them in the form of a good story.

DOMINIQUE TURCQ

I have one last question before we open up the floor. We have discussed many issues. Regulation is one of the most important ones. What kind of regulation do you think that we should have in mind for the next 10 years? How do you see the issue of regulation?

MANFRED STERN

I strongly believe that we need more regulation. The reason is that the impact of upcoming technology on society is going to be very significant. Therefore, it is just natural that we need more regulation. It was mentioned that the shareholder

approach is being replaced by the stakeholder approach. This is a good thing, but it is more or less voluntary. Besides, some companies may be using it primarily as a marketing tool. It looks nice if you demonstrate corporate social responsibility but, at the same time, you may strive to maximize company profitability.

We have discussed some potentially good outcomes of artificial intelligence but some philosophers have different views on super-intelligence. If we are not careful, we might get to a point of no return. We can imagine a scenario in which super-intelligence controls us rather than the other way around. You may smile and call this horror fiction, but it is certainly a potential outcome in the future and we need to be aware of that.

I mentioned quantum supremacy. It also needs to be regulated. Without regulation, society could collapse. The ultimate question is about the primacy of politics or primacy of the economy. I think that they used to complement each other. But if we continue to pursue what is good for particular companies and have no regulation for that, we can produce a major disaster for society.

I am not sure what kind of regulation we need. I do not know how much regulation we should have either. We live in democracies and we need to find some sort of compromise with upcoming technologies. Do we need more non-government organisations to be involved? Do we need more philosophers? Do we need more direct democracy? On the other hand, the problem is that if you have too many people arguing with you, you would not be able to develop your company. I believe that this is one of the most important dilemmas. We need to discuss it carefully, hoping to find the right balance in the solution that we adopt.

DOMINIQUE TURCQ

You brought up the question of democracy. It is a very important question. You said that we need more regulation, but it should be created democratically. But we may wonder whether democratic decision-making is here to stay.

MARK PLEŠKO

Basically, I agree with what was said but let me be a little provocative again. I think that as the world changes increasingly rapidly, social pressure will become increasingly strong. As a physicist, I would say that when you feel pressure, you have to let off some of the steam. You should not let off too much because if you do that, you will not be able to cook your stew. You have to let it off at just the right amount. For the regulators, this is a walk on a tightrope. If they do not get this right and the regulation that they create is too loose, some people will get extremely rich whereas others will be left behind and will be very

unhappy. The result will be social unrest. But if regulation is too tight, there will be no progress.

I am sometimes asked what I would recommend to the government. I say, "I am just an entrepreneur. I buy for 10 and I sell for 20 and make a profit. But I do not understand politics. It is a job for politicians". Let me finish with a provocation. Manfred, you make robots, right? At some point, you will make a robot that can make another robot. What would the value of work be in that case? I can buy a robot and have it make money for me. If you compete against me, I will just let my robot make more robots. At the end, robots will be producing everything. And what will be the value of what they produce? I think that what we need is not new regulation but a reinvention of society. We have to reinvent the value and meaning of work and money. It is going to be very difficult.

NEBOJŠA BJELOTOMIĆ

I am very worried about what is going on. I completely agree that we need a lot of regulation. There are two very bad things that are happening. One of them is fake news. Whenever you say something, no matter what, there will be 10 people out there who will immediately try to discredit you. It is becoming hard to figure out who is an authority on what. Therefore, it is very hard to have a meaningful discussion. And without a meaningful discussion, how do we get the right amount of regulation? This trend is very worrisome.

Second, Europe was built on the notion of a social contract. We have a social contract about the way that we live. What we have seen in the past 20 years is pretty much a betrayal of the social contract. We see that people are not equal anymore. Artificial intelligence and digitalization will obviously be profitable to a chosen few. The question will be how you get to be one of the chosen few. Are we going to go back to the time of the bourgeois French Revolution with people singing La Marseillaise in the streets? This is going to be very tricky. Regulation will be essential because it can put people at ease. I think that it is very important to have lectures like the one that Dominique gave today. People need to be told what is happening and they need to understand that it cannot be stopped even if it looks mad. But we have always had wisdom. Thousands of years ago, people had prophets. They were the smart guys of that time. Then, this wisdom has become available to increasingly large numbers of people. Now we have millions who have wisdom. I think that Europe has been quite good at creating societies where wisdom is widely available. Now artificial intelligence and everything that comes with it can reduce the availability of wisdom and in that sense recreate society in a very negative way.

DANICA PURG

I think that people need wisdom but they do not have it. They have knowledge but that is not wisdom.

NEBOJŠA BJELOTOMIĆ

You are right. You can call it information. But they do not know how to use it properly. So it is even worse. A piece of information needs to be transformed into knowledge and then into wisdom. And this should involve a lot of people so that we can preserve the way of life that we have. The Thirty Years' War was important because it separated the church from the state. If we play our cards as smart as that, we will win. But information without wisdom and the breaking of the social contract means big trouble on the horizon.

MARK PLEŠKO

That was fantastic. I just want to put the cherry on top. Wisdom is not just knowledge and experience. It also includes ethics. This is very important to remember. Monkeys and apes have their own ethics, even though it is different from ours. It regulates the balance between the egoism of the individual and the benefit of the community. We, humans, have a different kind of community. It is our society. Therefore we have a different kind of ethics. I think that what Nebojša said is crucial. If we get it right, we may be able to get to the next step of our evolution. It is not going to be easy but we must try.

DOMINIQUE TURCQ

Let us go back to what we said about the Internet in the 80s and mid-90s. Everybody was enthusiastic about it. We thought it would bring us knowledge and we would become wiser and make better decisions. But we ended up with fake news and large-scale discrediting of expertise. This is a real issue today.

NEBOJŠA BJELOTOMIĆ

One of the expectations of the Internet was that it would deliver anything that people might want. "We will be able to cater to any interest. If you like jazz from the 1930s, you will get it. You will get anything you want". Instead of that, we now have people who have read only three books and that is it.

DOMINIQUE TURCQ

The point on the value of work was really important. I think we have to take

that point at least one step further than robots versus work. It is us who killed the man at the gas station because we wanted to slash two cents off the price of a litre of gas. That was good for us.

MARK PLEŠKO

If I may make a comment on the topic of ethics that came up a while ago, I would say that the Ten Commandments are a pretty good starting point. They are valid in any society that you might think of. I am sharing my own experience. We have companies in China and in Japan, and we deal with different cultures. This demonstrates that you can solve the same problem in different ways. I am a physicist and I like to look for solutions. The question is how to bring millions of people together and have them live together in a meaningful way without killing each other. There is a Western solution to this as well as an Asian solution. Maybe there is an African one, too. These differences are a fact. But the basics are the same everywhere. This suggests to me that we can live together. By the way, I have no problem with the Chinese Communist Party. They have always had an emperor. Now the emperor is the party leader. They have always had a different way of doing things. If you want elections, that is fine. Let us go and vote. But ultimately there will always be a couple of people at the top of the social hierarchy who are running the show. And we can find some common ethics.

NEBOJŠA BJELOTOMIĆ

I would also like to give an answer to this difficult question. Human values are very similar. If you ask parents what they expect from their children, you will get similar answers all over the world. The basic ethics are always the same. You can build different things on top of this but the foundation is the same. If they wake you up in the middle of the night, you know what you want for yourself and your dearest ones. If you spread this to the people around you and they spread it further, we will have a very normal society. It is not very difficult to achieve. It just takes a good conversation.

MANFRED STERN

Essentially, I agree with Mark's comments. Ultimately it is a question of basics: how you want to be treated and how you want to organize your society. The issue that I see is that we need a common understanding between countries, but some countries or organizations may disregard the commonly accepted rules. Their principle seems to be, "Others may have rules but I will go my own way". This can have a devastating impact on everybody. In my view, the most

challenging task is to find a solution to this in the future. Would you trust North Korea to produce artificial intelligence? Would you trust Google? We need a shared standard that everybody should stick to in the future. Does the United Nations organization have the power and the means to do something about this? We have lots of questions without answers. The risk that the technologies of the future are posing is becoming critical. We are getting lots of benefits from them, but we cannot ignore the risks. Therefore we must consider how society can deal with these issues and find a compromise.

DOMINIQUE TURCQ

I think that this is one of the most complicated questions that we can ask. I tend to be optimistic because of the fact that there are some global fundamentals. Richard Dawkins is a famous atheist. He asked the same question all over the world, approaching people of very different religions. He came to the conclusion that we all have the same values. Therefore, we have some reasons to be pessimistic and a lot of reasons to be optimistic. For example, young people around the world are uniting and urging us to do something to stop climate change. Different countries do not have the same means to achieve that, but there is some shared understanding of the problem. The bad thing is that some values can be altered by a specific economic or ideological system. I can give you a very down-to-earth example that has nothing to do with technology. How do you give a salesman incentives? Do you give him a percentage of the total amount that he sells, or of the profits from the products that he sells, or do you pay him on the basis of consumer satisfaction? Here you have a real down-to-earth, basic ethical question.

If you base the payment on total sales, the salesman may sell something very expensive to somebody who does not need it. If you pay him on the basis of profit, he will sell old stuff so as to get a large margin. If you incentivize him on customer satisfaction, he will try to listen to the customers and understand them so as to sell them what they need. This is a real ethical question. In our companies, we come across these issues on a daily basis. This brings up the old question of why we want to make a profit. To generate return on the investment of the shareholders? If so, we would pick the first or second options. But if we are pursuing a societal goal, we would go for the second option.

ARNOLD WALRAVENS

I would like to make an encouraging remark. Danica asked whether we will keep kissing and making love in the future. I think that artificial intelligence

will help us become more competitive and perform better. I also have a question about leadership. It is a good thing that the Minister of Culture was here. Books and films about the future suggest that technology is going to be the privilege of a small group of people. They will have robots serving them and there will be some human beings behaving like robots. And then there will be a lot of underprivileged people intent on destroying all these new technologies. I am not quite sure that these science fiction stories will really unfold in this way. But some elements look quite realistic. So far, technology has not helped reduce the gap between the rich and the poor. I am afraid that if we continue along the same path, the new technologies will have a tendency to enlarge that gap between those who can afford everything and those who have little. This is a leadership issue. I would like the panel members to tell us whether they have any ideas how this development can be avoided.

NEBOJŠA BJELOTOMIĆ

I can tell you a nice story about this. One of my shareholders likes to say that in human history horses were the first to disappear. Now the digital revolution is going to make us disappear. According to him, in 1915 there were about 26 million horses because they were needed to pull carriages. By the early 1960s, there were only three million left. If you take a very dark view, the whole advance of technology will divide society even further. However, most of the science fiction that you mentioned targets young people who like to think about rebellion. And in the books that they like to read, the rebels win. That does not mean that things will really happen in that way. This is a very dark view that may not quite be realistic.

Think of all the disasters that happened in the last 2000 years. Mankind has somehow managed to care about neighbors. Even people at the top of society care about those at the bottom, not because they need them very much but because they are humans. I think that humans have evolved the ability to worry about everybody. So people who are pursuing good causes will move society in a way that gives everybody a chance.

MARK PLEŠKO

I am a pessimist and an optimist at the same time. I believe in the power of the middle class. Societies with a strong middle class are egalitarian. Even in China, the Communist Party needs to take care of all Chinese citizens so that they are happy with it. I think that this is the positive factor. There are fewer people now who are illiterate and hungry. Life is getting better because of the

widespread use of technology. It is true that the richest people in the world are stinking rich. For people like Bill Gates a billion dollars here and a billion there do not make a difference. But he cannot eat his money. And the amount of wealth held by people like him is peanuts compared to the world's total wealth. This is part of the game. Movie stars must make a lot of money so that little kids want to become movie stars. That is what keeps the engine running. That is why I am positive.

But I am afraid that the opposite could happen. Because of genetic modifications and the advances in neuroscience some people might feel so different from others that they do not care anymore. That is the problem. If we are to have these neural enhancements, they should be performed on middle-class people, not on the wealthiest individuals. Where do pharmaceutical companies get their money from? From the richest people who can afford genetic treatment, or from the masses who need a pain-killer? I think that we need a strong middle class that drives the need for these inventions and can pay for them. That will keep society stable.

NEBOJŠA BJELOTOMIĆ

The United States cares about the well-born, well-to-do and well-educated. But if you are in the Balkans, you cannot be well-born because we destroyed everything. For the same reason it is very hard to be well-to-do. This leaves only one option: to be well-educated. This is a major prop for the middle class, in my view. Therefore, education is very important and good education should be available to anyone. That is what builds a strong middle class and helps people become entrepreneurs.

There is another way to approach this issue. You can have progressive taxation and then you can do away with billionaires like Bill Gates.

MARK PLEŠKO

Some countries are better than others at this. Look at the Nordic model. They are very successful because people in the public sector consider it their mission to help their fellow citizens. We set up a company in Sweden and experienced this first-hand. They really tried to help us. This is a major point. We are talking about people working for the people. A robot in the public sector would never deliver that.

DOMINIQUE TURCQ

I think that this point about senior officials is extremely important because it

is linked to the regulation point that we addressed earlier. Senior public officials have one huge advantage over the whole private sector. They are not affected by the so-called agency theory. According to this theory, which goes back to the 70s, senior company executives are paid based on the profit that they generate for shareholders. In other words, they are shareholder agencies. There is no such thing in the public sector. There is no bonus for a gross domestic product increase. That is a great strength. In the private sector, this is a real issue. If you and your team are paid on the basis of the profit that you distribute to shareholders, you will try to distribute as much as possible to the shareholders. We have a huge change to make.

NEBOJŠA BJELOTOMIĆ

I think that this is a very important linchpin in this discussion. There are companies and there is the public sector. I think that academia is the important linchpin. The private and the public sector need academia to produce people who have skills that help businesses stay competitive. On the other hand, public officials want private companies to be successful so that they pay taxes. The academic world has a very important role to play. It should be engaging everybody in discussions like the one that we are having today.

Now, the academic world wants to have better buildings, more students, and so forth. It is the private and public sectors that provide the funds for this. That creates a full circle. Professors from universities sometimes ask me how many stipends I will give them for their students. That is fine. A public sector official may ask for funds for a building. We provide those funds and in return they provide us with what we do not have the skills and the time to produce. This has to be done in collaboration, and there has to be a circle.

IGOR ŽULA

I come from the Slovenian Logistics Association. Before I ask a question, I would like to make a comment. We have been talking about the ethical and environmental issues that the new technologies generate. All these discussions started from the perspective of our own generation. We are going in a predetermined direction. We can deviate a little, to the left or to the right, but we certainly cannot go in reverse. I have a 16-year-old son and a 14-year-old daughter. I had a discussion with them the other day. My son said, "Dad, I am sorry but your generation made a big mess of this world and I am sure that your generation will not fix anything".

It was stated today that digitalization is something normal. Artificial intelligence will also become normal when my son is old enough to be able to

make important decisions. I strongly believe that our ethical and environmental norms are seen quite differently by my son's generation.

So, can you tell me whether my family looks strange? Or is this also happening in Germany, Serbia, and other places?

NEBOJŠA BJELOTOMIĆ

Wouldn't you be worried if your son were not rebellious, thinking that everything that your generation has done is wrong? Anyway, for the next 20 or 30 years, it will still be you carrying the weight, while he is studying. So, we still have time to fix things. I think that this cycle is happening all the time and in every household. Sixteen- and seventeen-year-olds become rebellious and start thinking what could be done better.

My child is much younger. I am afraid that when he grows up I will not be able to talk to kids his age. Will they be willing to sit at a table and talk to me or would I have to send them text messages? Or perhaps they will send me brain waves that I will have to decode? You have to consider yourself lucky if you can sit and look your son in the eyes. Who knows what the world will look like when my child is your son's age? What will we be doing then? My main concern is whether I will be skillful enough to communicate with him.

I think that society gets better by means of these discussions. We have to discuss our hopes, and goals, and desires, and try to move in the same direction.

DOMINIQUE TURCQ

Your last point raises another philosophical question. Are we responsible for the unknown consequences of what we are doing today? Is your child justified in saying that you are responsible for climate change? This is a philosophical question. Yes, our generation has done a lot of harm to the Earth. Yes, we are trying to solve this problem. But are we responsible?

Now we are going to modify our kids. We are going to create artificial intelligence and consume a lot of energy. Can we say that you will be responsible for what happens 50 or 100 years from now? This is a real issue. How far does our responsibility for future generations go? Are we responsible for things that we cannot predict?

NEBOJŠA BJELOTOMIĆ

Can I make a joke about this? DNA tests for the establishment of paternity are illegal in France. The Napoleonic Code says that whoever is bringing up a child is the father. So France has just been consistent for 200 years.

DOMINIQUE TURCQ

I would like to thank our panel and make just a few concluding remarks. This was a great panel and the discussion was incredibly interesting. I would like to make another comment on science fiction. It is a very interesting topic. Science fiction authors, journalists, and fake news writers share the same principle. You have to scare people in order to sell. A science fiction movie that depicts a beautiful future will not sell. Nobody wants to see it. But if it shows a grim future, it will be a big success. This is interesting for two reasons. First, there is a commercial element here. So we need an immune system that protects us from bad movies, and fake news that journalists and others create. But how can we build such an immune system? We need academia for that purpose. We need education. We need reflexes. We need the ability to think twice when we see fake news or a science fiction movie. Is it realistic or just entertainment? We need this in our immune system.

We do not necessarily have the right education system, and our brains are easy to manipulate. Therefore we are running a big risk. When you hear something shocking, you may be disgusted. That is how you might feel if I told you that somebody has spent a lot of money on something stupid. The word “disgusted” is strange. Why? Because the place where we perceive injustice in our brain is extremely close to the spot where we feel disgust, like after having something bad to eat. This human characteristic can be used for the purpose of political manipulation. You tell people that a particular politician is a disgusting person and people are disgusted. This is one of the big dangers of democracy. If you have too many people disgusted by a few politicians, the people may go out on the street. So we must create an immune system for people around us: our children, our students, and our colleagues. That is our responsibility. I use the phrase “immune system” on purpose. Fake news spreads in society exactly like a virus. You need to have a shot for flu but also one for fake news.

Every time you see some news that makes you angry or disgusted, and makes you feel like spreading it further, be careful. It is as simple as that. Think twice and then decide whether you really believe it and like it.

One thing that came out of these discussions very clearly, and was particularly prominent at the round table, is definitely the changing view on why

corporations should exist. There used to be a relatively simple view, which dominated from 1945 to about 2000. Corporations existed to make money. The more money a corporation made, the better it looked. This perception is fading. Corporations are now expected to play a different role. Therefore we should measure their external impact on society and the environment. We have to pay attention to the externalities that a corporation is producing.

There was something else that emerged from this round table. I would like to thank all three panelists because they were all very clear about this. What I have in mind is the question of whether a leader has a scientific responsibility. Nobody talks about it but it exists. Each of you mentioned it. We have a scientific responsibility and the higher we are in the organizational hierarchy, the greater it is.

The third thing that came out of all these discussions is the notion of human proximity. How can we get closer to each other? How can we evaluate the work of people who work closely with others, such as nurses and salesmen? This is an economic and ethical question.

Artificial intelligence, neuroscience, biology, and quantum physics can sound scary. We have seen a lot of movies that show how they can produce frightful things. But I also perceive a lot of enthusiasm. These developments excite people. They can enrich mankind. They can cure cancer. That is a great purpose. Let us strive to have more positive elements in our lives. This depends on us, individually and collectively. I mentioned this in the morning and I really insist on it. We can have ordinary good, not just ordinary evil. How do we define ordinary good? In some cases, it could mean going to a gas station and using the services of a person. You can have somebody wipe your windshield and fill your car with gas. Why not? This is ordinary good. We do not have to be extremely philosophical. Here again, academia has a big role to play. Let us develop our ordinary good.

There is also another reason for optimism. We are all concerned about the future of our society. We know that we have to be aware of what is happening. We see a lot of environmentalist activity going on around the world. There is a worldwide movement asking our society to change and to redefine its goals and purposes. Our generation has a bit of difficulty dealing with this. For many of us it is too late. Then let us help the younger generation carry the flame and go further.

Leaders have to become much more strategic. We need more value and less cost reduction. Let us leave the world of cost reduction and go into the world of added value. This is not easy, by the way. It is a very difficult switch. Let us accept that our organizations need to be revised. There are plenty of ways to do that. We can change the values, the structures, the systems, the operations,

and everything that we share. Let us stick to the notion of corporate social responsibility and what it means in practice. We need to include solidarity in it. It is a very important value for the world. And we need to develop our thinking.

These are the conclusions that I have arrived at after today's discussions. Thank you very much.

Dominique Turcq

Dominique Turcq is Founder of the Boostzone Institute and studied at the French Grande Ecole HEC and at the Universities of Kobe and Osaka in Japan. He holds a Doctorate in Management from HEC and a PhD in Corporate Sociology from the Sorbonne Paris. His career spans life in academia (HEC, INSEAD, IIST in Japan), in consulting (McKinsey&Company), in business (Sony and Manpower Inc. where he was Senior Vice President for strategy and a member of the executive team) and in administration (Ministry of Trade, Ministry of Industry, Central Planning Commission in France). He has broad international experience, having lived and worked in countries as varied as Algeria, Belgium, the US, Japan, India, China and Germany.

His most recent book is titled „Travailler à l'ère post-digitale“ (Working in post-digital era; 2019) and his book „Augmented Management“ (2016) looks at the trends companies should be aware of and the skills that individuals should develop to be better equipped to deal with the future.

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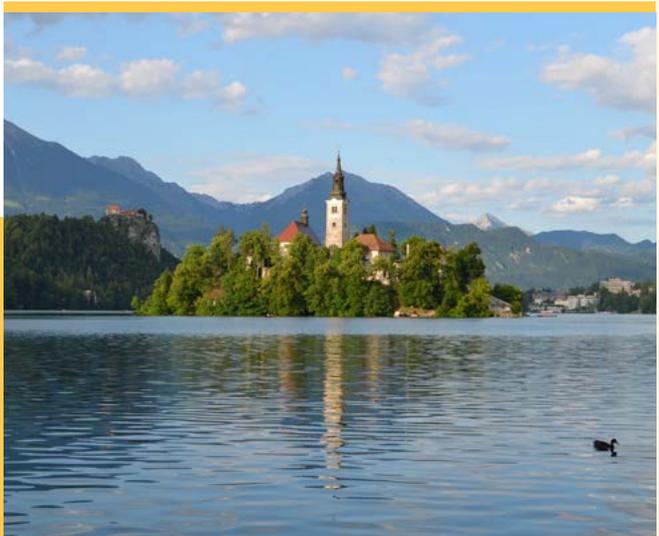
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