

Understand human needs amid the rise of Artificial Intelligence

A first bridge between France & Singapore on Al

In partnership with ESSEC Business School







Artificial Intelligence is everyone's concern }

Cédric VILLANI - Deputy at the French National Assembly "Le Monde" – 9 September 2017

Who are we?

Live with AI is a non-profit foundation based in Singapore. The foundation gathers thought leaders, decision-makers, French, Singaporean, and international researchers to lead working groups and research projects on the positive impacts of artificial intelligence to our society. The Live with AI community takes advantage of a presence at the heart of the South-East Asia region and an access to several research laboratories to issue recommendations which can be immediately applied and tested among very diverse communities looking for technology disruption.

This report gathers first non-exhaustive different ideas and thoughts from our community and board members. Some are very practical, others are more philosophical, and we hope such points of view on a better future with AI will help decision makers and thought leaders debate more, and anticipate how we can collectively act as humans to lead together this fantastic transformation. All recommendations have been collectively ideated, debated and written.

www.livewithai.org

/LiveWithAl





M medium.com/@livewithai





I created LIVE WITH AI to collectively imagine how to leverage artificial intelligence in building a better future for our next generation. I am very optimistic and I believe any of us is responsible for participating to the sustainable AI transformation of our humanity

Pierre ROBINET Ogilvy Consulting APAC, Vice President & LIVE WITH AI co-founder

Artificial Intelligence (AI) has been created by human intelligence. It has become a tremendous resource for humanity and most of us live with AI on a daily basis. One of the major stakes is trust in this technology, and it is everyone's concern to better understand and leverage AI to improve our society and contribute to a better humanity. It is therefore our responsibility — us, specialists in the digital economy, intellectuals, economists and politicians — to conceive solutions which will allow us to shape a common future, where AI does not represent a threat but rather emancipation. It is up to us as citizens of the world to understand our role in that transformation. Should we educate our children to be polite to Alexa?!

To address such a challenge, we have to bet on education, and capitalize on our very human peculiarities. We need to **empower all citizens** and help them positively and **ethically** contribute to this revolution. And we also have to use our ability **to collectively act as humans**, leveraging the strength of our own 7 billion persons network in a world where networks drive the new platform economy. We need to build a world where human and machine will intelligently co-live and collaborate, where machine will empower and augment human, and where anyone homogeneously could assess such augmentation.

In order to enable voices to be heard in this debate, we created the LIVE WITH AI foundation. Deepening **French-Singaporean** relationships in **the Artificial Intel-ligence domain**, and fostering synergies between academia, research, students (**ESSEC**), business and entrepreneurs, we have conducted research to assess AI's impact on health, transportation, finance and our environment. We investigated major societal changes including ageing populations, new human-machine interfaces, content overload, rapid urbanization, social divide, and natural resources overuse, with a view to proposing actionable insights and a shared belief that we all have our part to play in leading the change.

This first report, co-created amongst **100 contributors** from both France and Singapore, captures 14 concrete points of view and actions we need to consider in order to understand and anticipate this new life empowered by artificial intelligence. Rather than a deep dive into one topic, we decided to combine in this single paper an array of different ideas and perspectives impacting our society, as we believe decision makers require a macro view of this global disruption. All of this would not have been possible without the valuable support from all our board members, mentors, and partners (AXA, LES ECHOS, ESSEC APAC, DIGITAL NEW DEAL FOUNDATION, OGILVY, SGINNOVATE, SAP, the LEE KWAN YEW CEN-TER FOR INNOVATIVE CITIES, FrenchTech Singapore). I would like to personally thank H.E. Mr Marc Abensour, France Ambassador to Singapore, H.E. Mr Zainal Arif MANTAHA, Singapore Ambassador to France for having trusted in the value of such a program, re-enforcing France and Singapore's collaboration during this 2018 France-Singapore Year of Innovation.



Arno PONS Digital New Deal Foundation, General Delegate

Despite what some may think, digital can no longer be considered a mere sector, as its transformational abilities have impacted human activities on a global scale. This ongoing – and upcoming – revolution calls into question competitive, economical, and geopolitical balances.

However, artificial intelligence is only the visible face of the current scientific and technological disruption: big tech companies have the unreasoning temptation to take over numerous fields of progress, whether that be genetics, astrophysics, energy, or all of the above. Artificial intelligence is thereby a new societal, economic, cultural and political deal we must address without taboo, and perhaps most importantly, without pessimism.

The thing we are especially worried about is the lack of international debate. For this reason, the *Digital New Deal Foundation* wishes to support the LWAI think tank to create necessary conditions for getting together and exchange views.

We firmly believe that it is essential to create a global collaboration: we have a lot to learn from and to share with Singapore. To this end, the Singaporean technological research at the forefront, combined with the humanists and European values we defend, may give rise to a particular view about Al.

The current forces structure raises fear about a European technological feudality; however, it also raises other questions we must answer if we don't want to give big tech companies the power and responsibility to design our future. Faced with the numerous aspects of Al's revolution, this debate must be embraced, not feared.

This is what drives our support to LWAI, whose constructive ambition and positive values are of great importance to us.



Steve LEONARD SGInnovate, Founding CEO

Globally, there is huge interest in how artificial intelligence systems will affect many aspects of our daily lives. Governments, universities and corporations around the world are committing billions of dollars to various fields that collectively form what is referred to as Al.

In Singapore, there has been a significant commitment of resource to Al-related research for years, and Singapore is now ranked second in the world by citation impact for some parts of Al systems. The Government's continued support includes a very significant allocation of funds in 2017 into Al Singapore, a collaboration of key stakeholders committed to accelerate Al-related projects in Singapore. SGInnovate is proud to be one of the founding partners.

There is no doubt that AI is a 'disruptor' in every sense of the word. We believe there are many positive uses cases in which AI will bring real and tangible benefits to humanity. Improving health-care outcomes, reducing traffic-related fatalities, ensuring better food production and distribution, and strengthening national security capabilities are all examples.

There really isn't a question of whether artificial intelligence systems will affect many aspects of our daily lives. The answer is clearly 'yes'. The focus now ought to be on ensuring the ethical and responsible use, across governments and corporations around the world, of the increasingly powerful AI.

The work being done by the Live with AI Foundation is important. By its very name, the Foundation is highlighting one of the greatest opportunities and challenges facing humanity in the years ahead, and that is how to 'Live with AI'. Congratulations on the completion of this report.



Kevyn YONG ESSEC Business School Asia Pacific, Dean

Artificial intelligence (AI) is poised to drive the next wave of disruptive innovation – that is, new technologies that make more widely accessible valued products and services, and in doing so, cause incumbent enterprises to fall (Christensen, 1997)^[1]. As such, many a report has highlighted the risk of digital technologies replacing humans in work and society (e.g. Chui, Manyika, & Miremadi, 2016)^[2]. This, in my view, is an un-necessarily bleak view of the future: primarily because we would have to have figured out perfectly how the human mind works and to build an AI that would perfectly simulate our perfect understanding of how the human mind works. This is an extremely challenging endeavor, if not impossible. As such, there is an emerging view that the real value to be created by AI is to augment – rather than replace – human cognition and creativity (e.g. Pecherskiy, 2017)^[2].

I believe that AI offers an opportunity for us to innovate like never before, to create new value not only for enterprises but, more importantly, for society at large. Specifically, I believe that new AI technologies should be designed to help innovators gain new insights into identifying the right kind of problems to be pursued by innovators, and in so doing, create new value for each and every individual in an organization, a community, and throughout society. To this end, I draw on research on data distortion, mental models, and collaboration dynamics to offer this thought on how AI might augment innovation: AI technology can be designed to mitigate the inherent biases of human cognition to help individuals and teams find and pursue the right problems to solve in search of innovation opportunities.

For this reason, ESSEC Business School is excited to partner with the LWAI think tank in Singapore to collaborate on projects aimed at developing new insights into how AI might help transform and create new innovation opportunities for enterprise and society. This report represents the first step in our collaboration, and I hope the ideas and perspectives presented in this report will provide some insights and new food for thought. Enjoy!



Jean DROUFFE AXA Insurance Pte Ltd (Singapore), CEO

AI as a business enabler and source of innovation

Over the past few years, AXA Group has heavily invested in becoming a data driven company and an innovation leader in the insurance sector globally. We created two Data Innovation Labs, in Paris and Singapore, gathering data scientists and researchers to identify how to create value, from a business perspective as well as for the benefits of society. AXA has long recognized the strategic importance of Singapore as a major development hub for AI in Asia.

When contacted by Live with AI, their mission to 'understand humans' needs towards the rise of AI and help our society to anticipate changes to better live with AI' perfectly resonated with AXA's own mission of 'empowering people to live a better life'. It was evident that AXA Singapore can contribute as a key partner of the initiative. Our AXA Research Fund is in parallel leading a Search Committee on Responsible AI, whose purpose is to promote research and scientific work on the topic by high potential mid-career scientists, practitioners, lawyers, and experts in all disciplines interested in the responsibility of challenging AI, and tackling social, economic and legal impacts of algorithms, techniques and mechanisms.

Artificial intelligence is already revolutionizing insurtech and fintech, opening up countless opportunities to rethink the traditional insurance business and customer experience. The best way to compete with new players is to collaborate in order to get the best of both worlds. This partnership culture lies in AXA's DNA. We proactively collaborate with startups, research labs and think tanks to continuously reinvent ourselves and offer relevant customer services. In Hong Kong, we launched Xtra by AXA, a health Chatbot which responds to inbound queries about health and wellness content. In Singapore, we deployed Shift Technology, an Al tool to detect patterns and flag fraudulent insurance claims which enables us to deliver better value to customers. Al will, for us insurers, offer different tools and approaches to allow enhanced financial and protection inclusion of our emerging customers in Asia. Through AI, we can advance our purpose of developing seamless insurance-as-a-service offers.

AXA recognizes the importance and value of harnessing collaborations with startups, supported by an effective investment strategy through our venture capital arm, AXA Venture Partners. To support this, we created a US\$450 million fund of which US\$80 million has already been invested in 30 startups around the world. The key to success in today's ever-changing world lies in collaborating to create an ecosystem centered on customer needs. Industries, corporations, government institutions, academics and startups need to work hand-in-hand to support individuals and enterprises to adapt to the use of algorithms and increase the Al literacy of the population.

Together, we have an important role to play in preparing society for the age of AI and supporting them through this transformation. On AXA's part, we have taken steps to materialize this commitment through our deep involvement in the France-Singapore Year of Innovation 2018, and we look forward to working closely with partners to shape the next frontier of human and machine intelligence.

Thank You to Our Partners



Live with AI is an independent initiative created at the occasion of the France-Singapore Year of Innovation 2018.



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16 JUNE Pitch to investors & mentors 201

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WAI set up

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15 JULY First framing of partnership programme



DIGITAL NEW DEAL FOUNDATION

SEPTEMBER Building up the community. Website is ready



30-31 OCTOBER First keynote at Al Summit Asia. Official visit of *Les Échos* in Singapore

14 DECEMBER Debate on Al at ESSEC APAC **9 MARCH** First Article in *Les Échos* Partnership with AXA

28 FEBRUARY LWAI receives the France - Singapore Year of Innovation Label



22 FEBRUARY Kick-off of IBEA students' project at ESSEC APAC

23 JANUARY LWAI presentation to French Minister for Higher Education, Research and Innovation F. VIDAL





5 JANUARY Partnership with ESSEC



2018 >>

Interview

LWAI Research

12 MARCH Official launch at ESSEC APAC -Roundtable "How to Live Better and Longer with AI?





FRENCH TECH Singapore

A One Year Journey Between France & Singapore on Artificial Intelligence

DIGITA

NEW DEA

5 APRIL Design Thinking Co-creation Session at SAP



Research with 29 companies

19 APRIL Final research project about AI presented by IBEA students at ESSEC APAC



LWAI Events

Thought Leadership/ Debates

MARCH

Partnership with SGInnovate & Lee Kuan Yew Center of Innovative Cities





12 APRIL

Roundtable -"How to Live Better in Cities Empowered with Al?"





Une école de PIME

19 & 25 APRIL Second & third articles in *Les Échos*



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ESSEC

Les Echos

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24 MAY

At Vivatechnology, Paris: Release of LWAI Report at the Singapore session

Contribution at the "Al for Good" panel

"Learn to live with AI in the future" panel at SAP lab

TECHNOLOGY



Let's start by understanding positive impacts AI will have on our society

Powered by ESSEC APAC / IBEA program

The tremendous penetration of technology in our life for the last 50 years has a direct impact on our society and human behaviour, sometimes for good, sometimes not. Artificial Intelligence, whatever form it takes, will continue to dramatically transform our society and could contribute, we believe, to positively impact our society model and help humans live better and longer. In partnership with ESSEC Business School Asia-Pacific, 5 LWAI members and 35 students from the International Business Education Alliance (IBEA) Bachelor program have conducted research to assess Al's impact on health, transportation, finance, and the environment. They interacted with 29 different companies, labs and experts who all brought their thoughts on the AI disruption. The group of students and mentors looked at major societal changes including ageing populations, new human-machine interfaces, content overload, rapid urbanization, social divide, and natural resources overuse, with a view to proposing actionable insights.

Societies are changing

While studying one semester at ESSEC Business School Asia-Pacific in Singapore, the 7 teams of students reflected on the societal implications due to the rise of Al.

First, we are moving towards a new shape of society, since, according to Frost & Sullivan analyst Harpreet Singh Buttar, "by 2025, AI systems could be involved in everything from population health management, to digital avatars capable of answering specific patient queries" ^[4]. Even if AI-systems are today invisible, the human-machine relation will establish itself as a major turn in our model of society in the coming years.

Secondly, we encounter difficulties in managing our resources. One-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year ^[5]; for instance, 50% of all produce in the United States is thrown away ^[6]. In a world in which millions of people are undernourished – from 777 million in 2015 to 815 million in 2016 ^[7]– these factors are an indication of the massive inefficiency of the current food system.

Furthermore, societies are going through fundamental demographic changes as the ageing of the population is now a reality. By 2030, Singapore is expected to be considered a "super-aged" country ^[8], where at least 20% of the population would be more than 65 years old. Western countries like Germany and Italy are

already dealing with this issue, and more nations are expected to join the club of the "super-aged countries" in the coming years. These figures raise numerous concerns about seniors' adaptation to new technologies, such as the Internet of Things being used to provide health care.

Finally, the strong digital divide continues to progress. Nearly 9 out of 10 young individuals not using the Internet live in Africa or Asia-Pacific ^[9]. As the accessibility of information has increased dramatically, are humans equipped with the skills to sift artificially generated and advertised articles, and think critically? Let's add to this that the internet and the social media have enabled the widespread of fraudulent content: only 42% of millennials check the accuracy of the content they are reading, while only 19% of Gen Xers do so. The stakes are high in terms of education.

Many startups are already impacting positively our society thanks to AI

There are several examples of startups using AI for good, as shown in our following illustration. For instance, <u>Gamaya</u>, an agricultural tech firm based in Switzerland, is using drones which are equipped with hyperspectral cameras to capture changes in water and fertilizer consumption, crop yields, and pests. <u>Stethee</u> is developing "the stethoscope of the future", which will allow doctors to "see" into a body. The tool, which employs computer vision and AI, will have been trained to know what to look out for by learning from millions of images – and provide analyses accordingly. Or the <u>Datarama</u> team, covering APAC, mines multilingual data sets with powerful algorithmic functions to assess customers' exposure to political risks.

When Artificial Intelligence already positively impacts our life

METRON

METRON turns Energy Efficiency from a static, reactive process into a dynamic, proactive strategy. Energy becomes something tangible – an asset that companies can measure, manage, procure and sell.

nauya

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NAVYA has launched the first AUTONOM CAB, the first robotised cab in production on the market. Autonomous, personalised, and shared, this unique mobility solution provides an answer to urban's mobility major challenges.

H³Dynamics

Producer of Internet-connected drones, robotics, and endurance power systems. Developed Dronebox, a connected drone launch platform that can deploy drones for specific tasks (for example, surveying) and have them return to it for storage and charging.

Innovative Binaries uses Big Data and Artificial Intelligence to provide predictive maintenance services for aircraft. Its software can be used to manage things such as airplane structural health, engine health, fuel, and hydraulics.

ViSENZE

ViSenze provides AI-based visual search and image recognition technologies that help retailers to improve revenue and conversion. A new personal shopping concierge for the ordinary people.

Borithm

Working with doctors, **BIORITHM** is dedicated to providing solutions for current and future medical problems, in particular in the fields of remote monitoring and wearable technology.



Remaining barriers

As barriers remain regarding the use of AI in specific domains, we must listen, reflect, and address some pain points identified in this research:

To be useful to all, AI needs to be accepted by everyone. Many of us have heard about the risk of dehumanization of relationships caused by AI. According to the 360° health survey conducted by Odoxa in 2018 in Paris (France) ^[10], 6 out of 10 French people would not be ready to interact with a robot in the field of health. The fear of liability in case of an accident shuffles the cards of responsibility; for instance, people doubt the possibility of analyzing the reasoning of the machine. Furthermore, Change Healthcare conducted a survey with more than 2,000 stakeholders on the healthcare system (among providers, vendors, government, and researchers); in this survey, security and privacy concerns were pointed as a primary factor that hinders digital and mobile health tools adoption in 2018. It is now our responsibility to anticipate new acceptability models for citizens.

To be useful to all, AI needs to be accessible to all. Yet, the particular example of India is revealing: even if India is the second largest online market with over 460 million internet users (more than 635 million expected by 2021), only 26 percent of the Indian population accessed the internet in 2015 ^[111]. Discrepancies regarding the access to internet in emerging countries have a direct effect on data creation, and, thereby, on the efficiency of AI and its accessibility to all. With the rise of AI comes also the question of education: it is of high importance to teach the fundamental skills needed in a digital environment (digital literacy, netiquette, etc.) and to raise awareness of the potentially harmful aspects of using the Internet and the power of algorithms.

Take actions

Delivering a lecture for the LWAI-ESSEC program in April 2018, Dr. Ayesha Khanna, CEO of <u>Addo.ai</u>, pointed out how crucial it is to create integrated ecosystems and share information and data along the entire value chain. There should never be one entity owning the entire data chain, and tackling the biggest challenges facing our society can only be successful if key players along the chain cooperate and act in concert.

Besides, it is capital to bet on human peculiarities, as Steve Hansen, a researcher in digital security, virtualization and cloud computing says: "the sentimental and emotional big data analysis will always require human intelligence as the machines lack emotional intelligence and decision-making abilities based on sentiments" ^[12]. At another level, our changing societies force us to rethink our education model. New educational and training strategies should be sought by students and companies: raising awareness among students about the functioning of AI and its impact on society, and encouraging companies to share and cooperate, will benefit globally to our society. The next chapter of this report presents fourteen points of view and recommendations from LIVE WITH AI advisory community, collectively written, highlighting how we can play a role in the transformation of our society for a better future.

We truly believe what both economists Max Roser and Esteban Ortiz-Ospina said in an article called « World Population Growth »: "How the world population is changing is of great importance for humanity's impact on the Earth's natural environment, but it also gives reasons to hope for a good future. This is because we have a bigger team of better educated people who can contribute to the solutions that improve global well-being."^[13]



14 recommendations to better live with Al

Executive summary

1 - A Creativity Quotient (CQ) to pull out our creativity of its artistic and communication field

Critical thinking and creativity are both human peculiarities that AI will have difficulties assimilating. Why don't we bet on these sustainable criteria to re-think the intelligence assessment?

2 - Living with AI: the importance of a transparent interaction

As AI is becoming more ambient every day, the lack of interaction fuels the fear of people. To reach the aim of a desirable AI, design processes must move from a solely technical activity, and engage more with social sciences.

3 - Reinvent civic education for the AI future

The impact of AI on both democracy and social life forces us to re-think civic education models. Empowering our students with regard to their online presence will benefit them – and their global society – in a positive way.

4 - "Insure" employee's value thanks to a "lifelong training" model

To face the massive automation of job tasks, companies will have to propose and fund new continuous training models, infused with human ingenuity, giving more place to new management modes, and focus on a self and continuous learning experience.

5 - Coming together on blockchain to change health worldwide intelligent perspective

More than the technical implementation of a global healthcare solution, we must seize the opportunity to "care for our neighbours"; And empowering citizens to share their health data through a secure and rewarded system, will benefit to our society at large.

6 – MindxAI: new strategy for the age of AI

Evidence is growing that prolonged use of AI and IT can reduce our human cognitive capacity to translate information into knowledge and know-how, thus posing a threat to professional judgement, organization governance, and societal health. Let's transform this threat into an opportunity that reaps the benefits of AI and IT while protecting and strengthening the cognitive capacities that matter to us, and in doing so, strengthen what makes us human.

7 – Artificial intelligence and advanced manufacturing: an opportunity to define purpose-driven organisations

The platform's industry powered by Al are not only more efficient and more effective: they will generate multiple opportunities to move from self-centered businesses to more responsible ones. Beyond moving from selling products to selling services, Corporate Social Responsibility is becoming essential to the reason for being a modern manufacturing company. An opportunity for advanced manufacturers to approach positively their Al transformation, giving a new role and mission to their employees.

8 - Leverage artificial intelligence to transform innovation journeys

New AI technologies could be designed to augment enterprise innovator's capabilities to find new insights into the right problems to solve, to break rules to create better rules, and in so doing, create new value for individuals, organizations, communities, and society at large.

9 - A more accessible AI-empowered world for all

As the penetration rate of internet users through mobile is increasing in emerging markets, let's move towards greated financial inclusion and help unemployed, unbanked or low-income people to get a sustainable access to financial services.

10 - Empowering everyone to plan for their financial future

The automation of the financial planning process thanks to robo-advisory will enable the improvement of customer profiling, risk assessment, and portfolio management, allowing everyone to plan for their future.

11 - We need to tone down our human imperfection to better govern with Artificial Intelligence

Al's negative externalities are often pointed out; nevertheless, we would be blind to avoid pointing out the human ones: cognitive bias and conflict of interests. Le'ts invent new smart algorithm relieving our human barriers.

12 - GDP/capita and purchasing power are insufficient tools in a world of AI and fast technological progress

As the GDP only calculates the wealth produced by a country without attempting to identify its source, let's imagine a new concept of "access power" which may assess the tremendous access our humanity will have to new AI-empowered services and goods.

13 - The confluence of Artificial Intelligence and political risk

Intelligent predictive AI and technology-enabled tools can generate but also debunk falsehoods and support gauging political risks. It's our responsibility to educate people towards such dangers and enable a vast machine learning network that allows any of us validate the information they read, and assess its credibility.

14 - Autonomous vehicle will drive shared mobility

The acceptance of shared mobility, that paves the way for autonomous vehicles – and its new beneficial uses – will require a mind-set change from people, manufacturers and active regulation from authorities.

HUMAN & MACHINE

A Creativity Quotient (CQ) to pull out our creativity of its artistic and communication field

Artificial intelligence (AI) is the topic of all current media debates, and political, economic and philosophic discussions. The recent best-sellers show that even the general public is strongly interested in it.

It is therefore the responsibility of thought leaders across the realms of technology, academia, economics and policy to envision a future where humans and AI coexist, where AI is not our undoing as so frequently imagined, but a means of liberation and empowerment.

The question is not to know why or when AI will overtake us, but to know how we can build the new world where we will together. More precisely, the stakes lie in knowing how to approach this duality, and to ensure that this competition between the two is translated into a constructive collaboration, and not into a destructive conflict.

To address these issues, we have to invest in education, remember our very human peculiarities, and remain positive.

Let us capitalize on our peculiarities

At a time when Google already allows its own artificial intelligence algorithms to independently produce new ones, it is incumbent for us to relearn how to learn, to imagine a continuous training which builds on our under-exploited strengths and our discernment, as powerfully shown in the work of neuroscientist Vivienne Ming regarding the benefits of an intelligent education guided by algorithms [14].

Human beings are still far from being overrun! Although our brain is better understood today, our strengths are far from being equaled: discernment, judgment, anticipation, emotion, empathy; for a long time still, the right brain and its secrets will stay ahead of the algorithmic intelligences which are emerging in every corner of the world.

IQ, short for intelligence quotient, aims to measure a person's reasoning ability, or as its name suggests, someone's intelligence. What, then, are natural, musical, interpersonal, linguistic, and spatial intelligence worth? Intelligence has many faces: the IQ test only assesses our logical capacities (which, by the way, AI will do better and faster than us). In order to invent new and progressive solutions, we should reach out to different fields, for instance pulling creativity out of the artistic and communication fields and engineering out of the technical field, to facilitate the birth of a new kind of holistic intelligence which is not only IQ score-related.

The cognitive transition is the real revolution which underlies the digital technology revolution, but it must not only happen based on scientific objective criteria (the progress of AI will necessarily be superior to ours), but rather on the more subjective criteria of Creativity and Imagination which will remain the privilege of humankind.

Without any doubts, AI can free us and offer new areas for human beings to explore if we apply it to our strengths. It falls to us to create a world where competitive creativity can become the new paradigm and allow people to potentially live their most authentic and fulfilled lives.

And... let's be positive!

Because we all have a share of responsibility, let's stop scaremongering. Certainly, the impact of technology can be terrible when it is ill-used; that is nothing new. But let's approach it in a different way and be pedagogical. For example, the brain will experience the same revolution because of robotization that the body did because of mechanization: human beings will dedicate their manual labor to what requires creativity, leaving the most painful tasks to the machines. Contrary to an impoverishment of human intelligence, Al could then offer us a higher collective standard of living, allowing the human group to devote themselves to artistic and intellectual pursuits, leaving robots to produce the necessary profits for us to be empowered to create true value.

What will allow us to reach that state of grace is our capacity to understand, to anticipate, and to dream! Let's dedicate ourselves to the discovery of these new territories, both intimate and universal, and let's use AI to transport us there! We can't allow the tech giants to determine our future on their own; we must learn by ourselves to live better with artificial intelligence, and collectively invent a world in that image; building upon a "sur-humanist" era as imagined by Nietzsche ^[15], rather than a "transhumanist" one.

Living with AI: the importance of a transparent interaction

The social acceptance of Artificial Intelligence (AI) is a challenge that should be undertaken by political and economic actors without complacency or half measures. Beware, however, of the misinterpretations: it is not about forcing a new technology in a manipulative way, but rather developing a technology which emerges from the social. In other words, to achieve social acceptability, we shouldn't be pushing technology into the social, but the social into technology.

Currently, AI is far from fulfilling the necessary conditions for its acceptance. This can be explained particularly by its opacity and its 'ethereal' character. Developing socially acceptable AI means making it interactive, universally accessible, transparent, and ensuring that there is permanent technical and ethical oversight.

Rescuing AI from the lack of interaction

Our relations with AI aren't always conscious: from data collection algorithms to product recommendation and facial recognition, many AI are implicitly embedded in our daily lives. These "shadow workers" govern a substantial part of our existence without offering us the possibility of interacting with them; Antoinette Rouvroy speaks of "algorithmic governmentality" ^[16]. Therefore, it is difficult to integrate them into any "art" of living, in which their place would be clearly identified, carefully circumscribed, and, above all, freely accepted. For AI to be truly accepted, it should not be designed as a Trojan horse or a black box, but rather offer interactions, allowing us to freely define ourselves in relation to it, and to develop a certain subjective practice.

That is not to undermine or underestimate the existing and potential enormous benefits of Al. In the medical field, Al makes it possible to carry out complex operations, with almost zero risk of error. With the help of Big Data, Al will enable the development of helpful diagnosis technologies. However, Al is also present in many non-therapeutic fields. In fact, one of the most preoccupying cases regards facial and emotional recognition algorithms. These devices may constitute a threat to our privacy and emotional intimacy without ever offering the possibility of an interaction, and therefore dismissing the option of a clear consent.

Consequently, taking steps towards the social acceptability of AI implies pulling it out of the shadows, allowing us to see it and interact with it.

owards behavioral and transparent machines.

The social robotics company <u>SPooN Artificial Creatures</u> is developing a technological humanism based on the "behavioralisation" of artefacts. *SPooN's* team members believe that technology should adapt to humans and not the contrary. This adaptation begins, among other things, with the development of an animal interaction with machines, aimed at reducing the cognitive load required to interact with them. In other words, *SPooN* seeks to reduce the cost in intellectual resources asked by its artificial creatures. The purpose of such a change is none other than the universalization of access to Als.

The first step they must take towards us is that of attention: artefacts must be endowed with the capacity of expressing attention revealing their *intentions*, so that we know when they perceive us and make it possible to anticipate the actions they "intend" to perform. As AI is becoming more and more *ambient* each day, it is necessary to inscribe a logic of *attentive and intentional environment*, giving it the ability to express its attention and intentions towards us. This idea is part of the research conducted on so-called artificial empathy. Among other things, the latter aims at generating in humans a feeling of being understood by machines, thus increasing their interactive value. Despite its various benefits, this idea must be the subject of ethical vigilance, in particular regarding the risk of causing an ontological confusion between humans and machines.

The second step towards this *behavioralisation* of the artefacts is that of socialization. We must be able to interact and communicate (verbally or non-verbally) with them without constantly going through an interface. Naturally, this socialization shouldn't be modelled to copy humans' sociality in every way; a human can lie and conceal their thoughts or intentions. The Al's behavioral artefact must not contain this possibility. In this mode of transparency, the robot or the Al must be able to give a formal notice to explain any made decision and collected data without our knowledge. The goal here is to allow humans to keep the Al's actions under control in all circumstances.

Some technologist philosophers in Business

Finally, it should be noted that the virtuous potential of these developments does not make them automatically acceptable. Any technology is a *pharmakon*, namely, a cure and a poison at the same time (like any medicine). For the curative dimension to take over, it is necessary to set up processes for the analysis and practice of artefacts that philosopher Bernard Stiegler names a *therapeutic* ^[12]. We must abandon the idea that technology is an exclusively technical activity; design processes must open up to more stakeholders than the classic engineer / developer / designer triptych. From this point of view, the French doctorate program "CIFRE" ("Industrial Agreement of Training through Research") is extremely relevant, and deserves to be developed in philosophy, but also in human and social sciences. If the objective is to direct the technical activity towards a socially desirable production, then philosophers should be legitimately and sustainably integrated into technical firms. Deep thinking must be done to ensure that those actors, who do not know each other, find common language and goals.

Bridging the gaps

And what if the bridge card game could help human and machine better collaborate?

> Thanks to games – ideal grounds for experimentation – computer science technologies have taken a quantum leap in the past couple of decades. The design of top-level computer programs dedicated to specific games have long been considered as milestones for computer science and Artificial Intelligence: Deep Blue for chess, Alphago for go, Libratus for poker. Although the designing of Alphago and Libratus are undoubtedly major scientific breakthroughs, there are question surrounding the applicability of their algorithms to real-life problems. And in real-life, where there are many situations and multiple protagonists, auto-generated decisions have to be explained to humans. We cannot imagine entrusting our life to a program that prescribes a treatment without being able to explain the rationale.

So, what if we could succeed in developing and AI capable of winning a game of bridge as a pair with a human?

There are similarities between the game bridge and real-life issues, be they financial or medical. Succeeding in developing such a "smart player" would open doors to solving issues that are much more important for humanity.

We are convinced that the game of bridge, being an incomplete information game, has to become the new "gaming" AI challenge. The day this challenge is met, we will take a big step forward in the promotion of an AI that keeps humans in the loop and provides us with explanations and augmented intelligence. <u>NukkAI</u> is a private AI-lab based in Paris where researchers from all over the world and from different AI communities have gathered to address this new fascinating challenge.

Rethinking the interaction between human and machine by overcoming the "black box" approach will have a huge impact on our lives and our minds. Cracking the bridge challenge would help us overcome the barriers to collaborating more with intelligent assistants.

EDUCATION



Reinvent civic education for the AI future

A working knowledge of democracy, and more importantly an understanding of it, are essential to its continuity. It is an objective OECD has set as its mission: educating students in democracy, public institutions and digital reading so they become fully engaged citizens. Beyond legal obligations which fall to citizens – that is, the respect of the rights of others (privacy, free expression) – their duties are formed to some extent by morality. Each citizen has an obligation to civility as they evolve in the collective dimension that we could call "life in society". With regard to this, civic education additionally aims to provide the skills young people need to integrate into society.

Concerns about the roles AI and big data will play in the near future have been raised by China's plans to introduce a "<u>social credit system</u>" by $2020_{[18]}$. This initiative aims to algorithmically assign a social credit to every Chinese citizen, in other terms a trustworthiness rate, based on their economic and social data. Such a decision has to be taken very seriously — do we want our children to live in a <u>Black Mirror</u> episode ^[19]? — and proves education has an important role to play in raising public awareness, particularly among young people.

As both democracy and community life will be impacted by AI, we must re-invent civic education to embrace the potentialities new technologies offer.

AI will affect our democracy in number ways

Many of these will be positive, including empowering states in defending their democracy by re-enforcing cyber-security tools and processes. Nonetheless, we know from the Women's Forum that there were around 707 million cybersecurity breaches in 2015, and 554 million in just the first half of 2016 ^[20]. Al will also contribute to improving transparency systems which will be valuable in defending foundational elements of democracy; monetary automated regulation, public transparency system, court transparency, legal task automatization, etc.

With regards to our new global society, the fast-paced development of **AI-related technologies will modify the composition of our global community**. We are moving toward a human-machine coexistence, as most famously demonstrated by <u>Sophia</u>, the human-like AI who has been granted citizenship in Saudi Arabia^[21]. Let's rethink the role of humans in this new artificial and human intelligence-driven society.

As current civic education is not adapted to this Al-empowered world, we must train the next generation to research, critically asses and use sources of information for civic, political and society-related purpose to limit the influence of fake news. We must empower them by teaching them how to interface properly with smart and autonomous machines. We need to provide them with the basics regarding data settings management and the right to forget. Our duty is to make them accountable for their online presence.

In a society where collective intelligence would bring more value than individual, self-serving decision-making, we must position civic education towards this collaboration between students, teachers, parents and external actors, and help each of them learn from their peers.

Civic education should not be restricted to one hour class per week, but focus on following what's happening and evolving with our time. Let's offer students the possibility to go outside the confines of school and engage with this new world with agility along their school curriculum, in order to help them design their future society.

It is not a question of "betting on Al" but rather a matter of embracing the potentialities Al offers to create a well-balanced human-machine new society and democracy. And it's our role as parents, teachers, and changemakers to empower our next generation to embrace rules and mindsets of this new democracy.
Privacy Literacy

Empower our students regarding rules of privacy online, as online information forms actionable systems of data

Digital Reading Literacy

Provide our students with the ability to base their opinions on relevant and reliable sources, as fake news endanger the shape of public opinion

A NEW CIVICS EDUCATION FORMULA TO BETTER LIVE WITH AI

Algorithm Literacy

Provide an understanding of the basic outcomes and impact of AI, as algorithms can be understood as a "new law", and understanding its ethical limits

Smart Machine Literacy

Understand new human-machine interfaces, as well as establishing rules and guidelines for a better coexistence

E-health Literacy

Provide basic e-health literacy to the younger generation, as the sharing of health data contributes to the progress of medicine and enables an environment for new health models

> Decentralized Literacy

Understand notions of decentralised infrastructure (such as blockchain) as they form the foundation of our future cross-border business and society interactions

"Insure" employee's value thanks to a "lifelong training" model

There are plenty of alarmist articles foreseeing the mass automation and displacement of our jobs. But only a few deal with a positive vision of AI, one that enables us to evolve, and force us to deeply re-think our training programs and management methods. Right now, research demonstrates that a person will likely change their professional role 10 to 15 times over the course of their career ^[22]. The comfortable time where a company had to precisely fill a job description and hire the ideal profile with the matching skills is over. Defining a job as a set of skills no longer makes any sense. However, companies do not seem to accept this harsh reality: according to Accenture, while 74% of companies are planning to significantly automate tasks within the next 3 years, only 3% plan to increase their investments in training courses ^[23]. How can we continue to place value in human employees in a society that moves towards automation?

Learning to learn

This labor revolution forces everyone to embrace a "learning to learn" process. Driven by progress in automation, human jobs will not disappear, but rather evolve, renew, and become more complex. A McKinsey study estimates that up to 375 million people will have to find another job by 2030 ^[24]. 14% of the global labor force will therefore have to acquire new skills. Only lifelong training can meet this need. AT&T fully understands the importance of future key skills, aligning the content of their training courses – created in partnership with Udacity – with these new requirements.

How can we integrate this mindset change in our training courses, and make "learning to learn" the founding principles of any education?

• Schools and universities must integrate this mindset in their methodologies: the concept of **productive failure**, the process of resolving a complex issue without prior training, help the brain become accustomed to finding innovative solutions.

• A "training pact", in which each employee defines their own training objectives, must be established. As companies must provide the necessary resources for training courses, it is the employee's responsibility to participate. For instance, AT&T granted each of its employees \$8,000, but did not impose time or result constraints.

• A "training insurance" could be integrated in payroll taxes, to allow employees to undergo the training they want.

Put back human ingenuity at the heart of our education

As AI will increase performance and reduce errors, let's see automation in a positive way! We must make the most of this revolution to focus on our human peculiarities. Our empathy, our subjective power of judgment, and our critical mind are all qualities that machines will never be able to replicate.

Our training courses must make our human particularities more attractive, and our job descriptions must ask for these specificities as well. This might be added to Tom Friedman's "STEM jobs" concept, that combine science, technology, engineering, mathematics: let's add **empathy**. Companies should not only hire on the basis of secure knowledge, but rather assess the creative and social abilities of a candidate.

Generalize the "Management" learning

The human-machine relationship is already a reality for companies. According to a study conducted by Genpact and the Fortune Knowledge Group, 45% of the companies surveyed forecast that their employees will be comfortable in working with machines within the next 3 years ^[25]. Employees must seize this opportunity as they move away from routine and administrative assignments, and devote time to more stimulating tasks, taking on greater responsibilities as they position themselves as the machine's manager. However, not all employees necessarily want this promotion. According to a report from the Harvard Business Review, only 34% of employees wish to become managers ^[26]. So how can we guide them towards these management positions?

New management frameworks have to be created to help employees managing machines. As the role of machines in companies is growing day after day, we must assess them – as we would do for any employee – and define performance criteria and clear objectives. To ensure a successful collaboration between humans and machines, employees in charge must follow specific training courses to learn how to create machine-thinking processes, to collect relevant data in order to nourish algorithms, to synthesize volumes of information generated by multiple systems, to interpret results with a critical mind, and finally, to draw meaningful and high-value conclusions for the company.

To give a taste for learning and new management, and to focus this new education on our empathy and critical skills, a change in mindset is essential. This revolutionary approach to our training courses will enable employees to retain high value in their newly automated, AI-empowered companies.

HEALTH & COGNITION

Coming together on blockchain to change health worldwide intelligent perspective

A tremendous change in healthcare is coming, due to the rise of AI across the entire health and wellness continuum. Positively affecting disease detection and drug discovery, AI also empowers humans' autonomy in illness managemen and helps everyone proactively manage their wellbeing. Because technologies could dramatically enhance the quality of healthcare while reducing the costs, it is our duty to make this goal a reality. Industries, states and citizens have to act collectively as they play different but equally important roles.

Let's contribute collectively to a new qualitative AI-driven system

As well described and explained in the *Living Digital 2040* book ^[27], digital technology has made health omnipresent and raises two fundamental questions:

1) How integrated must such technologies be in our lives to benefit our healthcare system? The more integrated they are, the more companies, cities and citizen could do for and with each other — and the more citizen privacy is at risk. Citizens are worried about what companies and cities would do with their personal health data.

2) How motivated will citizens be to contribute to such new connected health integrated system? As said in *Living Digital 2040*, "all the personalized technologies, information, and data matters little if citizens are not motivated to manage their own health".

We, as citizens, need to nourish algorithms with qualitative and accurate data which might be efficiently re-used in bio science and advanced medicine. But how do we safeguard the quality of our health data, and finally get fewer, more useful pools of data rather than multiple and miscorrelated data sets?

We need to act collectively as the healthcare ecosystem evolves toward a community-based model. As described in <u>Project Baseline</u>^[28], supported by Google, when people come together and take action, they can change the course of humanity. We can impact the health of millions of people by sharing our personal health history. However, do we really want to let private digital giants lead this new system?

Why a worldwide *blockchain* marketplace may enable such a new Al-driven nealthcare model?

First, we believe the empowerment of citizens will help them overcome the privacy barrier and take control of their health data. It requires strong e-health literacy and new specific platforms.

Second, we need more integrated systems: governments must enable their Electronic Medical Record (EMR) system and work on the interoperability of their national systems with cities, companies and healthcare professionals. The Singaporean new HEMR is one good example: any Singaporean can now access their health records by logging into a national <u>health-portal</u>^[29]. But does that mean governments would need to entirely manage citizen health data? Or is it worth de-correlating hosting and cybersecurity solutions reponsibility with platforms where AI may operate?

Last but not least, we need to focus on independence and integrity as well as on protecting ourselves from identity <u>theft</u>^[30]. For those reasons, we believe blockchain technology could be very valuable. For instance, the Estonian healthcare initiative, where medical records are tracked, allows patients know who looked at their record and when: you control your own data, and have transparency about the medical care you are getting.

We would therefore prefer a <u>United Nations controlled meta-model in the</u> <u>blockchain</u>^[31], which may stimulate, and enable a global and interoperable health system within local organizations, interfacing with all locally-driven EHR (Electronic Medical Records), government-driven medical system, private tokenized models (private clinics, practices, pharma companies, etc...) and protecting citizen data at their individual levels. Such a new healthcare model would combine two potent primitives: independent and private machine learning, which allows for training to be done on sensitive private data without revealing it, and blockchain-based incentives, which could allow these systems to attract the best data and models to make them smarter.

All of that being said, we must first foster the right conditions, where governments could furnish citizens with a secure and encrypted cloud platform for their health data. We envision a world where personal health data is accessed through a decentralized blockchain marketplace, enriched with such a United-Nation meta-model to insure integrity and value. Where countries and private companies may operate their own smart integrated models by accessing this blockchain meta-model independently (while giving humans appropriate transparency). A world where the Al-driven contribution of the healthcare industry would be tokenized to incentive the value brought to our society. A world where sharing your data is not mandatory, but where any personal action would be dynamically identified in the marketplace and rewarded. A world where we can all contribute to a better, smarter healthcare system empowered with Al without loosing our integrity, independence, and human values.

Mind **x** AI: a new strategy for the age of AI

Can we become more human in the Age of AI? What would such a strategy look like? Many experts speculate the future could be one of abundance and equity across economy and society. Many others believe it could be one of societ struggles and splinters, as people and much of what they do are overtaken by AI advances that "devour human intelligence" ^[32]. The jury is still out on which scenario will prevail. As spelt out in *What is Artificial Intelligence: Villani Mission on Artificial Intelligence - March 2018* ^[33], such "speculative topics" are "a tricky matter". Business and government leaders will thus find it hard to be definitive about the strategies needed for these different scenarios.

Human Cognitive Capacities: A Concrete, Immediate Long-Term Threat

But there is one area where business and government leaders can be clear about the strategies needed: combating the negative impact of AI and IT on our human cognitive capacities. AI has improved the speed, accuracy and efficiency of how people think and work. Its prolonged use, however, also weakens our human cognitive abilities over time. By automating our cognitive tasks such as problem-solving and decision-making, we are reducing our own unassisted ability to "translate information into knowledge and knowledge into know-how".^[24].

In the recently published book *Living Digital 2040: Future of Work, Education and Healthcare* (the outcome of a Singapore National Research Foundation- and Ministry of National Development-funded Future of Cities project at the Lee Kuan Yew Centre for Innovative Cities/Singapore University of Technology and Design), we found emerging and empirical evidence about this technological threat to our human cognitive capabilities.

This evidence is concrete, growing, and spans a spectrum of capabilities (see Table 1 below):

Area	Example of Al/IT solutions	How human cognitive capabilities affected negatively (and why it matters)
Strategy	Constant use of computational systems that analyse, suggest, propose, advise and guide users through courses of action	Reduced individual and organizational understanding of the competitive situation, thus becoming less able to strategize for the future
Audit and accounting	Growing use and even reliance on automat- ed models and solutions	Experts show de-skilling effect over time due to over-reliance, and novices do not acquire the necessary foundational domain expertise; both increase the risks of weaker governance within organizations, especially as issues become increasingly complex
Skills mastery (driving and architecture used as representative examples	 Navigation: use of GPS for driving navigation Architectural practice: use of Computer-Aided Design (CAD) software 	 Regular reliance on GPS results in atrophy in the driver's hippocampus over time; this could pose a long term health issue as reduced hippocampus activity is associated with higher Alzheimer's risks Architects show reduced sense of scale in their designs with constant CAD use; this could diminish their ability to meet the design needs of cities and clients over time

 Table 1 – Increasing Evidence of How AI and IT Affect Human Cognitive Capabilities and the

 Potential Consequences [1]

As Table 1 clearly shows, the negative impact on our human cognitive capacities has broader implications on our organizations (e.g. corporate governance) and society (e.g. health). They affect our lives, our work and social institutions. And the consequences are both immediate and long term. The short term insidious diminishing of our capacities can lead to long term serious ramifications on people, companies, and cities. [2]

We need to tackle the threat today to safeguard our tomorrow.

A New Strategy: Mind x Al

To do so, we cannot rely on what we have always done. To combat this new in cipient threat arising in the Age of AI, we need new strategies. In the follow-up research work since *Living Digital 2040: Future of Work, Education and Healthcare*, we propose one such strategy: MindxAI.

MindxAI is a strategy of designing and re-designing technologies and innovations to protect the human and organizational cognitive capacities that matter to us. That can be a trait that distinguishes us from machines (such as the human touch that only a caring teacher or a caregiver can give), or a core competency that gives a company its competitive advantage, or an integrated policy cum socio-technical system that makes a city smart. Business and government leaders will have to make hard decisions about what makes their citizens, workforce, companies, cities and countries special, and use AI in ways that strengthen that.



This MindxAI strategy has three guiding principles:

[1] Table 1 summarizes findings from accounting, financial trading, way-finding / GPS / navigation, architectural practice, game playing, programming, reading, memory (and photography and online search), and spelling. References for these are found at the end of the report.

[2] As above.

ase Study – GPS 2.0: MindxAl Strategy in Action

To understand how the MindxAI strategy works, we developed <u>GPS 2.0</u> – an artefact-from-the-future which helps us see what future everyday products might look like so that we can better appreciate how social, economic and technological trends affect the way we live ^[35] – to illustrate the three guiding principles (see Figure 2 below).

1. Re-assess: the conventional GPS provides turn-by-turn instructions, which a driver can follow almost mindlessly. As highlighted earlier, regular reliance on this for navigation reduces hippocampus activity with potential long term risks of Alzheimer's.

2. Re-design: GPS 2.0 re-imagines what an improved MindxAI GPS might look like:

- Instead of turn-by-turn instructions, drivers are given visual and spatial cues e.g. "turn right at the red building", or "turn left at the Ferris"
- "wheel after the flyover", thus protecting the driver's cognitive and spatial sense of the city
- The driver has the option to toggle between GPS 2.0 and the conventional GPS, in the event he is in a rush and needs quick turn-by-turn instructions

3. Revise: analytics and gamification are provided to help the driver see if his navigation is improving over time, together with encouragement to continue use of this mode of interaction.



GPS 2.0 might be a simple example, but it clearly shows how business and government leaders can use such a MindxAI strategy to combat the negative impact of AI and IT on our cognitive capacities.

The strategy is also timely. As <u>AI for Humanity</u> – the French Strategy for Artificial Intelligence – points out, we must start "...looking into the complementarity between humans and artificial intelligence... [and] it is vital to find a complementarity set-up that does not alienate [people] but instead allows for the development of truly human capabilities." ^[26]

The MindxAI strategy does so by compelling business and government leaders to first decide what human cognitive capacities matter to us and should be protected. Only after that do we develop the AI solutions that strengthen those capabilities while reaping the benefits of technological efficiency and productivity for companies and cities.

MindxAl ensures that even as Al continues to replace, relegate, and even devour many human tasks, our ultimate destination is NOT one where all human tasks are taken away, but one where only those that should be taken away, are taken away. As Antoine de Saint-Exupéry wrote in *Wind*, *Sand*, *and Stars*,

"In anything at all, perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away..."

Seen through that lens, MindxAl then is much more than a strategy to protect our human cognitive capacities. It is also a profound hope – that by strengthening our human cognitive capacities, we are also strengthening what makes us human.

It is about becoming more human in the Age of Al.

BUSINESS

60%

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Artificial intelligence and advanced manufacturing: an opportunity to define purpose-driven organisations

The rise of AI helps move industry 4.0 value to new heights

Industrial production must adapt to "mass personalization", fast product innovation, strong price competition, stricter compliance and higher quality requirements. Industries must use the comprehensive set of Industry 4.0's technology solutions to think of engineering, production, IT and business as systems to shorten cycle times, improve products quality and manufacture customized products on a global scale. Al is already at the heart of that industry and business revolution, bringing the next level of automation and effectiveness, from "Thingsto-Action."

Imagine the system of an Intelligent Enterprise which anticipates failures of equipment, has full visibility on various spare parts inventories, monitors the whole transportation journey, understands the manufacturer's equipment maintenance modus operandi and can check technicians' availability for new work order internally and externally, all in real time and autonomously, taking decisions based on cost, time, or customer satisfaction.

Successful transformation must address social fears

Companies can only implement the required end-to-end intelligent scenarios based on real time connectivity between people, business processes and things if they consciously and constantly fight against many centripetal forces induced by companies' silos.

Besides, manufacturing employees are legitimately concerned by the potential substitution of their positions by intelligent machines and systems. Manufacturing companies must focus on the new co-operation between men and machines. Workers will need to be upskilled to provide value-added tasks in production using Al. By demonstrating concretely how new processes and human workface complement each other, companies can diminish anxiety and increase engagement around technology. They must highlight the benefits of digital technology and augmented workforce, for a better well-being at work.

Manufacturer need to control and enable their ecosystem's platform

Machine learning is at the heart of any automation transformation. But beyond automation, the key transformation relies on the shift from product manufacturer to service provider. Al will contribute to this transformation by helping advanced manufacturers becoming the enabler of their ecosystem's platform, and help them play a role in this new data-driven industry.

Such platforms will bring value and resource optimization we could not imagine before, higher than the sum of the internal optimizations of each party in the value chain. They will force manufacturing companies to redefine their reason for being.

Digital giants are already entering all industries, including manufacturing, to rule with data. Can they win the industry platform battle? Who will be able to leverage the core data currently held by manufacturers, this treasure trove, to run sophisticated end-to-end industry scenarios that could benefit society as a whole rather than just companies' best interests? Who is finally best positioned to bring and maintain trust among all stakeholders taking part in each industry platform?

A good illustration is the Landlog platform launched by <u>Komatsu</u>. Specializing in heavy duty construction and mining equipment, Komatsu joined forces with <u>SAP, NTT Docomo</u>, and <u>Optim</u> to create a new cloud-based Internet of Things and AI/ML platform. In a context of massive skilled-labor shortage, this "smart construction platform" aims to centrally collect data from machinery, people, drones, and fields to optimize construction processes, significantly improving resource utilization and safety standards, while also reducing the impact on environment. "Landlog" sees an incredible appetite from all stakeholders in the construction industry to join the platform and contribute to these higher purposes.

Leverage new platform business model and the rise of Artificial Intelligence to re-define your sustainability social engagement.

The 17 rules for sustainable development released by United Nations [3] and the newly released report from Nicole Notat and Jean-Dominique Senard to the French ministers of economy and finance, ecology, and work illustrate the importance companies need to place in their social engagement in society, even asking companies to define their "social mission" in their core status.

The industry platforms powered by AI are not only more efficient and more effective: they will generate multiple opportunities to move from self-centered businesses to more responsible ones. Beyond moving from selling products to selling services, Corporate Social Responsibility is becoming essential to the reason for being a modern manufacturing company. And we believe such a new mission will help advanced manufacturers approach positively their AI transformation, giving a new role and mission to their employees.

We call upon all companies to deepen their discussions regarding the creation of Al-powered industry platforms. We do think it will help them re-define their business purpose as well as lead their transformation with huge benefit to society. Social purpose and Al are complementary.

^[3] Placed at the end of the report.

Leverage Artificial Intelligence to transform innovation journeys

In this age of digital disruption, enterprise innovation is more important than ever before – if not completely necessary for survival. New AI technologies could be designed to help enterprise innovators gain new insights into identifying the right kind of problems to be pursued, and in so doing, create new value for each and every individual in an organization, a community, and throughout society.

Problem finding and innovation

Creativity is best achieved by continuously reframing a problem to find the right problem to solve (Csikszentmihalyi, 1990) ^[37]. It turns out that finding the right problem to solve is actually quite difficult – in large part because it is not natural. For one, the natural tendency is to jump straight to brainstorming when confronted with a problem. The natural tendency to brainstorm immediately, rather than engaging in problem finding, reflects a subjective understanding of the problem biased by the limitations of the individual perspective, and therefore inhibits innovation. To mitigate this inherent bias, firms have strategically approached innovation with data, expertise, and collaboration.

Data distortion

First, firms collect data to mitigate the bias inherent in problem finding. Collecting data is based on the premise that the more data that you can collect about your target market or consumer, the deeper your customer insight is likely to be. However, research has shown that we tend to collect information that is consistent with our initial or emerging preferences (e.g. Russo, Carlson, Meloy, and Yong, 2008; Russo & Yong, 2011)^[38]. That is, our natural tendency is to collect and emphasize data that strengthens or confirms our initial biased understanding of the problem, rather than data that provides an alternative understanding of the problem. To this end, AI can be developed to support non-biased data collection to foster effective problem finding. For instance, Clayton Christensen developed "The Theory of Jobs to be Done", in which he argues that enterprises will be significantly more successful with their innovations if they build their strategic plans for innovation around "finding the right job" for their product (Christensen et al., 2007)^[39]. They should focus on understanding the situation within which a customer is employing an existing product or would value a new product to get a certain "job done". Thus, AI might be designed with a gaussian mixture model algorithm characteristic of unsupervised learning, to augment the cognition underpinning data collection for innovation by aiding the innovator to develop deeper (and more accurate) insights about the kind of "jobs" that a customer needs done; in doing so, the innovator is able to strategically identify and decide which opportunities for innovation to pursue and develop.

Mental models

Second, firms recruit innovators with the right expertise. Gavetti et al. (2005)_[40] posit the innovator's representation of his firm's competitive position is formed by an analogy between his/her previous experiences and the situation at hand to identify viable competitive advantages. They further posit that how good an innovator's internal mental representation is varies with the breadth of expertise. However, recent empirical research analyzing the careers of innovators shows that the breadth of expertise inhibits innovation at early stages of an innovator's career because the mental models of early career innovators do not have the requisite depth to push the boundaries of the status quo (Mannucci & Yong, forthcoming)^[41]. Conversely, expertise breadth is necessary for innovation at latter stages of an innovator's career as the mental models of late career innovators are at risk of inflexibility and therefore resistant to alternative perspectives. To this end, AI can be developed to support imbalanced mental models to foster effective problem finding. For instance, in a study of inventor-entrepreneurs who commercialized their own inventions, Thomas Åstebro and Kevyn Yong found that entrepreneurial success – defined in terms of both invention guality and entrepreneurial earnings - were best achieved by individual entrepreneurs whose prior employment experience was characterized by a high occupational variety combined with low industry variety (Åstebro & Yong, 2016)^[42]. They argued that this configuration of prior employment experiences provides the right balance of knowledge breadth and depth; specifically, occupational variety provides enough diversity in experiences such that the inventor-entrepreneur is able to engage in divergent thinking to produce new inventions, and the lack of industry variety provides enough depth in learning the industry such that the inventor-entrepreneur is able to engage in convergent thinking to produce commercially viable inventions. Thus, AI might be designed with a recommender system algorithm characteristic of unsupervised learning to augment the cognition underlying an innovator's ability to engage in divergent and convergent thinking by aiding the innovator to enhance their existing knowledge base to achieve the right balance of knowledge breadth and depth to generate the highest quality inventions that are commercially successful.

Collaboration dynamics

Third, firms assemble innovation teams to maximize diversity in expertise and knowledge. However, Baer et al. (2013) ^[43] theorize that heterogeneous information sets, cognitive structures, and goals in innovation teams create representational gaps that impede successful strategic problem formulation, measured by comprehensiveness and relevance. Comprehensiveness is "the extent to which alternative, relevant problem formulations are identified with respect to an initial symptom or web of symptoms" (p. 199). Relevance is the extent to which each alternative formulation illustrates "at least one mechanism that causes one or more of the identified symptoms" (p.200). As such, research suggests that innovation teams – characterized by diversity in expertise and knowledge – achieve comprehensiveness and relevance when team members are able to constructively challenge each other's opinions and ideas in such a way that individual team members are able to engage in less biased information processing to achieve

a multifaceted understanding of the problem at hand (Yong, Sauer, & Mannix, 2014)_[44].

To this end, AI can be developed to support collaboration dynamics to foster effective problem formulation in innovation teams. For instance, in a study of routines at a fast-growing retail enterprise operating a chain of approximately 400 stores geographically dispersed nationwide, Scott Sonenshein discovered how this enterprise used routines to establish a clear organizational identity and foster creativity across all the stores (Sonenshein, 2016) 451. That is, customers can walk into any store in any geographical location and instantly recognize the brand, and yet the customer gets a unique shopping experience that can only be found in that particular store. The retail enterprise achieves this by establishing a set of routines that guides store employees on which actions are to be standardized (e.g. the jewelry display should be placed at the front of the store) and on which actions they have the freedom to express their creativity (e.g. there is no restriction on which pieces of jewelry to be displayed and how they are to be displayed). Sonenshein introduces the concept of familiar novelty to explain how routines can be designed to foster innovation in a geographically dispersed enterprise. Thus, unsupervised learning algorithms like K-means clustering, gaussian mixture models, or recommender systems might be designed to augment the cognition underlying an innovator's ability to and expressing the innovator's creativity.

ECONOMY & FINANCE

A new approach to deliver financial services in emerging markets

The adoption of cell phones in emerging and developing economies has generated an unprecedented amount of data - currently, in Southeast Asia, the penetration rate of <u>internet users</u> is around 53% ^[46]. Thanks to machine learning tech niques combined with a thorough analysis, the insights extracted can help to make faster and more accurate decisions in sectors including health, agriculture, and financial services. Russian President Vladimir Putin said "Artificial intelligence is the future, not only for Russia, but for all humankind. (...) Whoever becomes the leader in this sphere will become the <u>ruler of the world</u>" ^[47]. For all countries – whether they are at the developed or developing stage – getting data, processing it and making it actionable are the key challenges of our century.

Understanding the needs to empower the underbanked

As underbanked and unbanked populations do not have bank records or credit history, financial institutions experience difficulties in defining a credit risk. Thanks to technology, we can now help unemployed or low-income individuals to get loans, insurance access to payment services, and fund transfers. For instance, Lenddo uses non-traditional data, specifically from social media, to provide credit scoring and verification for the emerging middle-class. Thanks to alternative, unstructured data from browsers, telcos and social networks, financial institutions can therefore define a more accurate credit scoring system.

Overcome the specific challenges of emerging markets

Even if mobile penetration has exploded in emerging markets – <u>Myanmar figures</u>^[48] rose from approximately 5 to over 18 million current users and smartphone users will increase soon enough in <u>Pakistan</u>^[49] – education is key to make all segments of the population aware that access to financial services can empower them.

As banks will soon be able to reach these populations, it is important that they have appropriate financial literacy. For instance, in India, a growing number of banks are <u>targeting women</u>^[50] to educate them in personal finance. Furthermore, to adapt to the diversity of languages, financial services have to work on digital solutions to promote local content and bring the vast majority of non-English-speakers online. It is also worth noting that there is a competition between these banks and telecommunication actors, which have huge customer bases and are moving to obtain licenses in order to operate financial services such as payment or insurance. For instance, telcos are well positioned to provide financial services in emerging markets, as MTN and Orange did in Africa.

low should we leverage AI?

Natural-language processing (NLP) might help to overcome the language barrier. Through the use of intelligent systems which are able to translate many languages and dialects – for instance, India has 22 major languages – we think we could better engage with customers, foster a more personal relationship and address the financial literacy issue. In the coming years, NLP might eventually play a part in alleviating the cultural barriers to access to education that locks the potential of emerging markets. In a specific context, NLP has already proven to be able to translate, in realtime, English to Chinese. Skype's initiative to release a new translation tool that can interpret live speech in real time should be explored across many languages and tested to assess its robustness.

To provide these financial solutions, we need to create applications that can be part of our daily lives, offering a wide scope of services on a day-to-day basis: order goods or services, transfer money, make an appointment for a medical check-up, paying bills or traffic fines, etc. The quality and various data collected will provide valuable insights about lifestyles and a holistic view of consumer trends and interests: it will be key in the whole process of credit scoring.

We could set up an integrated ecosystem, where a large scope of services can be provided (ecommerce, transportation, hobbies) to create tailor-made products to the specificities of emerging markets. Such a single platform, focused on services aggregation and available globally, could offer to the individual (leveraging the huge access to data sources):

- A matching tool to the financial institutions' offerings, based on a better understanding of the profiles.

- Advisor Finbot to educate and understand these financial products, to build a smart financial plan.

It is our duty to invent systems which do not strengthen the digital existing divide, but heal it. To do so, we need to also invest in new Al-related systems accessible to all, especially the emerging middle class.



Empowering everyone to plan for their financial future

According to a survey from <u>Blackrock</u> in 2016, 72% of Singaporeans are "very or somewhat concerned about being able to live comfortably in retirement," ^[51] while 70% of the French respondents <u>surveyed in 2016 by Deloitte</u> ^[52] think that the current retirement funding system based on inter-generational solidarity winnot last.

According to these figures, when it comes to retirement, governments fail to address their citizens' needs. Therefore, many are left on their own when planning for their future. Add to this the various additional financial uncertainties families encounter, such as purchasing a house, children's education costs, health issues, accidents, or unemployment. And yet the private sector still has its own flaws: it is opaque, complicated and often biased, as financial advisors are mostly commission-based.

As technology, data and algorithms can be used to enhance our human abilities, how can Augmented Intelligence make financial planning more accessible to all?

Robo-advisory consists of the automation of the financial planning process: customer profiling, goal setting, risk assessment, insurance policies recommendations, portfolio optimization and periodic rebalancing based on market conditions to stay aligned with financial goals. Customer profiling and portfolio management are two areas of financial planning that can be significantly improved with Augmented Intelligence.

Today's **customer profiling** and risk assessment are ridiculously lengthy, unsophisticated, inefficient processes, and fail to protect novice investors from themselves. It relies solely on the judgment of a human advisor. But here is what can be done to the process more accurate, objective and efficient:

1) Build quantitative behavioral economic models using decision games that reveal true preferences and calculate risk tolerance and loss aversion scores.

2) Identify patterns in financial plans from people with similar socio-economic backgrounds and benchmark customers against their own peer group.

3) Make this process better over time through machine learning, by correlating the decisions made by each customer along the advisory journey.

ortfolio management can also be enhanced and optimized: assets allocation s based on the client risk profile and interests. Such portfolios, composed of diverse securities, need to be tracked against market events which represents tremendous challenges. As <u>Blackrock</u> puts it: "in a world that now sees an average of 4,000 brokerage reports a day comprising 36,000 pages in 53 languages, advanced text analysis is a necessity." [51] In particular, neural networks used in natural language processing provide new opportunities to augment traditional quantitative financial analysis with qualitative insights derived from the ingestion and processing of market news at scale such as sentiment analysis, institutional investors' decision-making patterns and market trends. This creates unique differentiation opportunities for both incumbents and new businesses by providing hedge fund grade tools directly to end-consumers or to financial advisors and wealth managers to help maximize profits for their customers. It also opens a new door for advisory services pricing models based on true investment performance as opposed to commission-based, asset under management-based or fee-based models.

Moving to hybrid or fully automated advisory services with Augmented Intelligence requires removing some barriers and revisiting regulations and licensing schemes:

1) Incentives and commissions should be revisited to encourage performance-based pricing and direct sale of products in a fairer and more transparent and open manner.

2) The "duty of care" should apply to robots and algorithms through an "Explained Al": even if an automated task requires little explanation, automated reasoning requires proper explanations to be trustworthy, traceable and auditable.

3) Investors will have to overcome a psychological barrier to invest their life long savings in some obscure start-ups, or may instead sometimes favor less sophisticated but more reputable institutions.

To conclude, technology should not replace advisory human capital, but rather augment its intelligence, abilities and productivity to serve customers better, making financial planning more accessible to all.

GEOPOLITICS

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Artificial Intelligence is now starting to form part of leadership teams and have a formal seat at board tables and other governing entities. "<u>Tieto</u>, for instance, was the first Nordic company to appoint Artificial Intelligence to the leadership team of the new data-driven businesses unit"^[53].

We are about to experience a paradigm shift in world governance and decision-making driven by AI — for the better. This will help us transition towards a future where key societal, geopolitical and economic decisions are augmented beyond our human abilities, eliminating bias, conflicts of interests, and many other imperfections which currently plague most of our governance bodies, getting in the way of collectively solving global challenges.

The future is already there...

Very soon, we will all look back and find it ridiculous that most governance bodies – boards of directors as well as large public institutions – did not have an Al as part of their executive team. A number of economists, futurists and analysts seem to support this view and many initiatives on the ground are evidencing this. These include new disaster response systems leveraging drones, sensors, and satellites powered by Al ^[54]; environmental relief teams leveraging Al to tackle climate change, water security, preserve bio-diversity, and protect our oceans ^[55]; precision farming fueling the green revolution and tackling some of the inequalities our world has been facing around food ^[56]; tailored education for all thanks to deep learning and machine learning ^[57]; and, healthcare and disease management using Al in individualized and preventative medicine ^[58]. The question is not whether Al will increasingly play a role in world governance, but rather what practical problems those governing bodies are facing, and which of those problems Al can help us solve.

Governance is plagued by cognitive bias, conflicts of interest and other human factors

The root cause behind ineffective governance and decision-making could be summarized as follows. The world governance system itself is ineffectively optimized, not reliable and in most instances unfair preserving the self-interest of a few at the cost of many. Decision-making is not informed by facts and data, but often influenced by conflicts of interest and the biases of decision-makers "around the table." Public policies are not formulated properly or intelligently because of a lack of predictive ability, and insufficient or outdated data. Public infrastructure is not optimized, poorly managed and also subject to widespread corruption ^[59]. As world governance too often falls victim to all of our human imperfections, Al will help us highlight those issues and re-introduce objectivity across the system. What's more, the biggest constraint to unlock seems to be at the top, namely global leaders and governing bodies.

The possibilities become endless with optimal and global governance systems supported by AI

Al can help our governing bodies in the following:

- Effective collaboration across governing agencies by optimizing systems, designing better interfaces and sharing relevant information.

- Formulating better public policies, as with Al governments can more easily identify individuals, entities, regions, or other factors in the greatest need of assistance or at the highest risk of a particular issue.

- Optimising and automating public services to improve the daily life of millions of citizens.

- Improving public infrastructure and eliminating corruption.

- Saving up to 30% of public servants' time by focusing on more value-adding tasks – "<u>Al could free up 30 percent of the government workforce's time</u> within five to seven years" according to a Deloitte report^[60].

As today, decisions made by our governing bodies seem to lead to suboptimal outputs regarding allocation of resources and funding toward global issues affecting millions of lives, we must seize the opportunity AI offers and invest heavily to optimize our governing systems.

As our decision-makers are responsible for key societal, geo-political, and economic decisions globally, regionally, and institutionally, they should be able to ensure total independence. However, ongoing difficulties in tackling issues demonstrate the opposite.

For all these reasons, we believe AI will help us abolish the "human bias", limitations, excessive subjectivity, conflict of interests, and other imperfections, which currently plague most of our governance bodies, be it at a company or institutional level. We must use AI to design a more equitable world, by removing all of the human factors that get in the way. Why GDP/Capita and purchasing power are insufficient tools in a world of Al and fast technological progress

Gross Domestic Product (GDP) is a metric refined by John Maynard Keynes in the 1940s to measure the economic output of a country. It is also used as a proxy for "economic power", while GDP/capita is widely construed as a measure of standard of living, and even sometimes welfare.

GDP has many flaws: the more non-renewable natural resources a country depletes, the more prisons it builds, the more drugs and paid sex it consumes, the greater its GDP. Add to this that GDP does not take into account pollution generated in the process, nor activities that actually benefit the economy, like stay-athome parents helping their child with their homework, or someone caring for an elderly relative.

GDP/capita does not say anything about income distribution, is imperfectly correlated with purchasing power, and does not speak to productivity variations between countries, nor how physically and mentally demanding different kinds of work actually are. We are confusing the ends with the means.

Technological progress and AI make things worse

Gains in performance, or in quality, are not well taken into account by GDP. The recorded music industry, which revenues have plummeted since the advent of the Internet, contributes much less than before to GDP. And yet technologies have made it possible to more easily acess music than ever before, anywhere, any time. Many services that were cost prohibitive before are now free - like calling a relative on the other side of the world. That last activity has largely disappeared from our calculation of standard of living as measured by GDP/pax or purchasing power. Another example involves our digital devices and computers. Even if the best ones don't cost a great deal less than before, they are tremendously more powerful in terms of memory, computing power, and resolution. The story is the same with cars: looking at the inflation-adjusted price of a car in the US for the past 50 years ^[61], it has remained the same! Nevertheless, in the meantime, the guality of cars has dramatically improved as they have become safer, more fuel-efficient, and more comfortable. Some advances in GDP measurements were made in the past couple of decades, for instance with hedonic prices.^[62], but it's still far from perfect.

The rise of AI heralds a world of abundance

With only a touch of human help, smart and dexterous robots fueled by quasi unlimited solar energy will likely be able to make and maintain other robots and transportation systems, and produce and distribute all the goods and services we might need. In such a world of abundance, we will have access to more than we can consume (or even spoil), as our ability and time to do so will likely be inferior to the ability of smart robots to build, produce, fix, repair and recycle. The pace of progress in robotics, 3D printing, AI, nanotechnologies, biotechnologies, vertical farms and aeroponics, energy and space technologies, among others, give credibility to this science fiction scenario. All the more so if we assume human population will stagnate (as seems likely by 2050 according to demographers) while the robotic population can scale to whatever extent is needed to maintain the abundance.

So we should not rule this scenario, which would be a total game changer for humankind. We, or our children, may live to see it.

Time to move away from GDP/capita and purchasing power?

In such a world, with nearly unlimited – not to say free – robot labor, matter, and energy, wouldn't the very notions of price, purchasing power and GDP likely be disrupted?

In an ever more digitized and Al-enabled world, we must reconsider how to best keep track of the evolution of living standards. As the concepts of GDP/capita and even purchasing power accumulate flaws, why not using the new concept of **"access power**" to measure the evolution over time of the quality and array of all goods and services available for a given income, including free services?

Day by day, we can access more and more products and services for less and less money, sometimes even for free. All things considered, for many of us, it feels like our "access power" keeps increasing, even if it's unfortunately not globally shared yet. This concept definitely calls for more clarity and research, however it should make for a more optimistic conversation about Al.





A variety of artificial intelligence (AI) tools can be used to encourage political mobilization, including those which have been previously excluded from the process due to lack of access to information. Politicians can also harness data on these previously distant groups and understand better how to meet their needs.

However, armed with psychographic data – data that defines psychological attributes like personality, values, interests or even lifestyle – political campaigners can train a predictive data model to uncover their party or political affiliation and even identify types of Facebook user behavior. This is the dark side of data that we recently observed through the scandal of Cambridge Analytica driving a targeted campaign for US President Donald Trump.

Real-world political implications

Al can thereby be used as a tool – or a weapon – for groups looking to gain political advantage. The CA "breach", as Mark Zuckerberg described it, was a testament to the powers and possibilities of using publicly-available online data to influence and manipulate human behavior when coupled with intelligent predictive AI and technology-enabled tools like notifications and micro-targeted ads. For example, predictive models can be built based on your user behavior online in order to display information, articles or advertisements that you are inclined towards, using recommendation engines^[63] or programmatic advertising^[64]. Today, AI and machine learning techniques can be developed to analyse massive amounts of voter demographic data, identify patterns and even predict the <u>likelihood of a</u> <u>bill getting passed</u> based on algorithmic assessments of the text in the bill^[65]. As people are becoming less discerning regarding what they read online, and more susceptible to manipulative ideas and messages, these new techniques have the potential to be very dangerous for our democracy.

Using AI for good

The underlying AI technology is not intrinsically harmful. The very same algorithmic tools that can be used to mislead can also be used in a more legitimate way; for example, political bots can be programmed to debunk falsehoods, like UK-based start-up <u>Factmata</u>^[66], which provides a real-time quality and credibility score to web content, facilitated by natural language processing. In a similar way, micro-targeting campaigns can also be used to educate voters, instead of misleading or manipulating them.

New-age political risk analysis

As political factors have traditionally been hard to identify and quantify, leading many firms to depend on static or ad-hoc risk consulting reports when making critical business decisions in real-time, Al's ability to digest complex information could be applied to further understand and analyse political risk. Risk managers can now account for political exposure and geopolitical risk events, tracking and predicting outcomes that will impact business and investment decisions. For instance, Datarama^[67] is mining huge data sets and creating algorithmic functions that allow users to identify their exposure to political risk. Firms can also use AI to gauge broader political risk – for instance, New York-based <u>GeoQuant</u>^[68] has developed a machine learning model to identify, track and price political risks based on real time events.

Fake news, new AI approaches

Circulating false information can not only sway user behavior, but also damage diplomatic relations between countries and lead to rising tensions between global powers. Because fake news can be generated en masse, and validated by being shared over and over again, we need to leverage the power of the individual consumer. What if we could apply unsupervised machine learning techniques to flag out fake news? It is possible to generate a vast machine learning network that allows all users to validate the information they read, and assess its credibility. With enough user validation, a credibility score might be assigned to each website.

User education is essential to making this process effective. Following the successful example of Wikipedia, a crowd-sourced mechanism would ensure that the user validation process is trusted and verified. Similarly, users can be better trained to root out the nuances of fake news, and users that are defter at identifying fake news could be granted a "super administrator" status in order to maintain the integrity of the machine learning training set and credibility scoring system.

Future of political risk analysis

We believe that political risk analysis, long understood as a realm governed by "gut feeling", can now boil down to specific data and algorithms that can ultimately be computed via AI. We are convinced that involving citizens and the general public in the process of using AI for good will help them take ownership of their publicly-available data. We should therefore continue to stay ahead of the curve and implement the right digital strategies early on.

TRANSPORTATION





Autonomous vehicle will drive shared mobility

With the rise of gig economy players such as Uber in the US, Didi in China or Grab in South East Asia, it is now possible to enjoy commuting from A to B without the burden of owning and driving a car. The world of mobility as a service is still in its infancy, with vehicles becoming smarter and more connected than ever thanks to the introduction of Artificial Intelligence. The car 'brain' now relies on deep learning technology to review camera and GPS data in real-time, and predict the best route to bring people to their destination. In the meantime a vast amount of algorithms also estimate the probability of actions being taken by other drivers or surrounding vehicles.

How AI driven cars will impact our life and society?

The urban mobility revolution has already started. In Singapore, the number of rental cars on the road spiked from 15,000 in 2012, the year before Grab was launched, to around 70,000 in 2017 ^[69]. In this new paradigm, business models would most probably switch from a private ownership to a usage based model, where major mobility operators would own a fleet of autonomous cars and operate them in a manner akin to Uber.

According to research from Ohio University ^[70], self-driving cars could help reduce greenhouse gas emissions by up to 60%, a significant improvement to pollution issues in major cities. Advanced driverless cars are predicted to cut down accidents by 90%, which would shrink accidents cost. Moreover, with less time spent on speeding and "driving under influence" charging, law enforcement could then focus on other matters impacting the community.

Freeing up the time spent on driving a car would also increase efficiency and convenience in the lives of commuters. With the route, speed and driving behavior optimization of self-driving cars, congestion is expected to decrease. And the automation of vehicles would also offer a hitherto unprecedented level of independence for elderly citizens and those with disabilities.

If accidents were to drop by 90%, it would disrupt the entire value chain of car repair, forcing workshops and dealers to reinvent themselves and find alternative source of revenues. At the same time, the car as we know it will involve much more electronics, and so autonomous vehicle maintenance would require a different type of skill set – more software-related – than a traditional mechanic. From truck and taxi drivers to logisticians, repair workshops, and manufacturers, a broad array of jobs look set to be impacted by the introduction of autonomous

vehicles, leading to the transformation of the unskilled workforce into these more software-related jobs. The traditional automotive industry needs to rethink its existing business models, which currently rely on margin from the volume of cars sold, to remain relevant in a world of shared mobility dominated by digital platforms where service and experience are the new products and data the new money.

Autonomous cars need a change of mindset.

Authorities to allow massive autonomous vehicle trials

In February 2017, the Singaporean government amended the Road Traffic Act to better regulate the trials of autonomous vehicles currently being rolled out into the city-state. Technology developers will have to adhere to a suite of rules when they trial vehicles on the roads, including time and space limits on trials, standards for the design of autonomous vehicles, and requirements for developers to share data with the Land Transport Authority (LTA). More recently, French President Macron also announced that France will allow autonomous vehicle on open roads.

Even if this measure is a step in the right direction, authorities around the world need to follow the same path. It is only by testing in real-life and at scale that we will begin finding answers to questions regarding liability in case of an accident, empowering machines to be more accurate in their diagnostics and decisions, working on interfaces between manufacturers, insurers and smart cities, and finally better serve citizens in their mobility.

A new business model to enable Manufacturers open their data

As the entire transport process will need to be reviewed from scratch, manufacturers and authorities will have a duty to cooperate and collaborate. If regulators authorize massive autonomous vehicle experiments in real-life situations, manufacturers should open up their ecosystems and share the data generated during those trials: interconnectedness and interdependency will be essential in inventing a new, continuous and seamless type of mobility in cities empowered with Al. However this would require a solide new business model enabling that shift to a more transparent system. Why manufactures would share their data when keeping the entire responsibility in case of accidents? A standardized open source operating system might be a good start in such a business model transition and manufacturers would need to look beyond simple connected experiences (infotainment) and imagine any type of data they would be able to share in common, before digital giants would take the lead on such operating systems.

People will only accept AI if we demonstrate its numerous uses

The rise of autonomous vehicles will not only revolutionize our daily commute; it is going to revolutionise global transportation entirely. And it will be up to us to be at the forefront of that change, incorporating these new ways of doing things into our lives. Adoption will happen with time, but we can already start learning how to better live in a more convenient society equipped with autonomous vehicles and smart road systems. These technologies present tremendous business opportunities: as showcased at CES 2018, within a few years we would be shopping on the go with an autonomous retailer coming to pick us up at your doorstep. We need to be using these disruptive concepts to help people truly understand the value that new technologies and services will bring to their lives. Autonomous vehicles must take up the challenge of acceptance: it is through experimentations and concrete demonstrations that people will accept the move to smart transportation.



How to move forward?


Three essential components to ignite a data culture

by Florian Douetteau, CEO @ Dataiku

Today's businesses collect more data from more sources than ever before, and yet many (if not most) struggle to establish a culture of collecting insights and obtaining real value from that data throughout the company. In other words, despite devoting plenty of time and resources to collecting data, in many cases, it goes largely unused - or at least, extremely underused.

In a time where movement into enterprise Artificial Intelligence (AI) has already begun, many companies find themselves woefully behind and unprepared for the ramifications when it comes to data systems and teams. This story has rung true again and again in working with enterprises large and small across a variety of industries for the past five years. And yet, there are some who succeed. How do they manage to truly build a culture around using real-time data on a large scale?

Spoiler alert: it won't happen spontaneously. But it's also not impossible; igniting a data culture takes just a few essential components, plus a little bit of elbow grease (read: organizational initiative).

Taking a Step Back: The Challenge

Before getting into the specific components, it's important to take a step back and understand why organizations struggle with getting value from data.

In the beginning, digital-native tech companies (like Google, Apple, Facebook, and Amazon—GAFA) created value from data essentially by applying advanced machine learning techniques to a few key problems (how to make ads relevant, recommendations effective, etc.). Their problems were technically fairly challenging, but the means to solve them was fairly simple: hire 50 PhDs and talented engineers, and you're bound to succeed. Traditional enterprises, on the contrary, have a murkier path to success because they have to transform and optimize existing products and services step-by-step, and their business problems are not only technically difficult, but also difficult to work with. As a consequence, these organizations need to adopt a more systemic approach, looking for productivity gains in the same way one looks for productivity gains in a factory.

Component 1: Set Up a Reuse Methodology

This means setting processes so that data and results can be effectively shared from one project to another. In a typical organization, 80 percent of data projects are started from scratch in an attempt to control what's happening.

That's because reuse requires some documentation and discipline. But it's also essential. How can you maintain a predictive model through time if you're not 100 percent sure that your very initial data parsing components are correct and transmit the data effectively?

Along these lines, one of the most important things about machine learning is that it needs to be "end-to-end" in order to be relevant. How you connect your data collection, data transformation, feature engineering, and machine learning components is key.

Of course, there's an IT side of this, which relates to how machine learning by-products will be applied in production once they leave the comfort of the data science lab. There's also a governance side of it, because implementing machine learning on top of a stack that is not integrated well enough will lead to high maintenance costs over time.

But the bottom line is that the underlying process for data science, machine learning and AI projects matters, and setting up an underlying system that is transparent (yet secure) enough to allow for reuse and smooth end-to-end processing is essential.

Component 2: Ensure Multiple Profiles Can Work on Data Projects Together

In lots of domains, machine learning requires a mix of business expertise and technological expertise to be applied efficiently. In some situations, tools can compensate for technological expertise, and business experts can start using machine learning algorithms by themselves. In other situations, it's the reverse: business expertise is accessible enough through meaningful documentation for a technology expert to build relevant models.

But in most situations, the complexity of the problem requires a business expert and a tech expert to collaborate. What's more important is that almost no machine learning by-product (model, data, etc.) is static. As it evolves, the person that adapts it to new business constraints might not be the person that created it initially. People collaborate across time. As a consequence, either because of complexity or governance requirements, collaboration is key for all real-life machine learning applications.

So how do enterprises actually make sure people can work together? It goes much deeper than simply talking to one another via email or a company chat platform. Companies who are serious about creating a data culture make sure they have a tool for the whole team that can facilitate this type of collaboration (and, ideally, this tool facilitates component #1 as well).

Key questions to ask when looking for a tool that facilitates collaboration:

- Can everybody in the company not just the data team or data scientists, but really everybody use the platform in a relevant capacity?
- Can people really understand what's happening with a specific data project even if they haven't built it themselves?
- Can people who need to, be fairly independent in front of a new project?

Component 3: Have a Way to Deploy to Production at Scale

Data science can't happen inside a vacuum - in order to truly have a culture of using data in real time, teams need to be able to regularly push things out into the world (whether the project is external- or internal-facing) instead of working in a sandbox and not having any real impact on the business.

This component is actually quite simple in principle, but can be difficult to execute. In working with hundreds of companies, this tends to be the component that is forgotten or cast aside the most. But being able to to actually deploy data projects seamlessly and quickly is critical to scaling insights from data.

Conclusion & Get Started

Without a doubt, the amount of data will only continue to rise. And those that scale their insights along with it will come out on top, so there's no time to waste in getting started. By focusing on tackling these three components, the path to enterprise AI shortens, and sustaining a data culture moves into the realm of possibility without having to constantly tend the fire. What are you waiting for?

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Conclusion

There is a need to look beyond reports and lobbying actions and **take action**, **collectively**. We have started pulling together some first ideas over the last few months and have ended with 14 point of views which now need to be turned into valuable and measurable innovations. So, we are already investigating how to start prototyping some concrete projects serving our ambition, by partnering with universities, and collaborating with corporate labs interested in sustainable Al-driven innovation.

Along this journey we have also often highlighted that developing countries can gain from the benefit of AI but they also face the highest risk of being left behind. And as very well described in the <u>#Aiforgood global summit report</u> ^[72], Artificial Intelligence can help solve humanity's greatest challenge by capitalizing on the unprecedented quantities of data now generated on sentient behavior, human health, commerce, communications, migration and more... and will be central to the achievement of the 17 sustainable development goals (SDGs) defined by the United Nations. Micro-finance or micro-insurrance accessible to more humans, positive impact on climate related to the rise of autonomous vehicle, access to a better qualitative healthcare system are some good examples presented in this report. Some first initiative (like the <u>Pulse Lab Kumpala</u> ^[73]) already measure SDGs progress. And we need more of those ones. What if we could **measure** the role of AI in such progression and even more **the value humans empowered with AI could bring to the 17 SDGs?** This augmented human notion and the AI - Human complementarity need to be valorized to be better understood.

Last but not least, as previously highlighted, <u>LIVE WITH AI</u> members have a common belief AI is everyone's concern and there is an urgent need to collectively act to lead such a AI-driven transformation of our society. For that reason, we would like to start **empowering all of us on earth who takes in this journey** and support individuals in their achievement. By supporting some of them financially, by empowering them with our network, by giving visibility to their actions, by educating our citizens on valuable benefits such technologies could bring to our society, by leading our own sustainable innovation projects, we may contribute ourselves, to our energy and influence level, to the achievement of those 17 SDGs and help human be empowered, and live better with Artificial Intelligence.



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