Faster than the future

Facing the digital age

Digital Future Society
About Digital Future Society

Digital Future Society is a non-profit transnational initiative that engages policymakers, civic society organisations, academic experts and entrepreneurs from around the world to explore, experiment and explain how technologies can be designed, used and governed in ways that create the conditions for a more inclusive and equitable society.

Our aim is to help policymakers identify, understand and prioritise key challenges and opportunities now and in the next ten years in the areas of public innovation, digital trust and equitable growth.

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The 2020 is a year that will go down in history. The impact of the health crisis caused by the COVID-19 pandemic is generating unprecedented social and economic transformations that will definitively modify our way of understanding the world, of facing up to the challenges we have ahead as a society.

The world has changed, and it has changed forever. The power of the collective experience that we have lived through this year as a community, as a species, places us before a new starting point. An urgent need to which we have been forced without warning, and which forces us as citizens, as a country, to adapt to the new rules of this global scenario.

The lockdown and the new social distancing measures aimed at protecting citizens from the coronavirus have brought an unprecedented shock to the world economy in the last century. Never before in modern history we have experienced a context similar to the present one.

The slow down of the economy and the restrictions of mobility have brought dramatic consequences for millions of people around the world. A collective effort guided by solidarity and the common benefit that requires solutions and new transformative policies in which states will play a key role.

It is time for governments to regard the trust of citizens, to be seen once again as the fundamental instrument for improving people’s living conditions. It is time to build a common future that guarantees a way out of the crisis.

It is time to build a common future that guarantees a way out of the crisis, that listens to the people, their needs and their concern, in order to make them come true through a common and solidary effort.

In the task of building a sustainable and inclusive project for the country, with the aim of emerging from this crisis stronger as a country, the Spanish Government has a clear priority: the digital transformation. If we have learnt something from the crisis we have experienced, it is that the digital world is not about the future, but rather a reality of the present that affects and conditions all aspects of our lives.

The pandemic has accelerated the arrival of the digital revolution in our societies in an unimaginable way just some months back. Progress predicted for years to come has become reality in just a few weeks. Digitalisation is here to stay, changing the way we work, consume, inform ourselves and get in touch with our beloved ones.

The book you are holding in your hands aims to serve as a guide for the reader to shed some light on the challenges and opportunities that the irruption of this new digital era means for our society. Through a review of the most outstanding aspects of this process of digital transformation and of the disruptive technologies that are leading innovation in the so-called ‘Fourth Industrial Revolution’, the different authors of each chapter try to glimpse the context that in the coming years will determine the scope of the changes to come.

In a work of reflection and study of the possibilities that technology offers for the construction of a better and more advanced society, but also a look at the ethical aspects and the dangers and challenges that technological development implies, whose depth and speed are unprecedented.

This book has the fundamental objective of drawing a context to the current technological revolution through a detailed and specialised analysis of the areas in which the most transcendental and relevant advances in this new paradigm are being developed. A new paradigm for which we, at the Secretary of State for Digitalisation and Artificial Intelligence, see as a challenge to face from the commitment to the progress of our country. The citizens more than ever demand the response of their governments, and herein lies what we are determined to face up to this renewal of our productive structure and society, keeping always the highest standards to protect the fundamental values and rights of citizens and the responsibility towards society and the environment.
There are many uncertainties and unknown threats to come, but there are also new opportunities and spaces for our self-reconstruction as a society with a clear priority that must stand out: putting people right at the core of any advance.

The COVID-19 pandemic has accelerated in an unprecedented and unexpected way the digital transformation of our societies, but also the presentation of social gaps deepening inequalities to unprecedented levels.

For this reason, we understand that there can be no way out of the crisis without a construction of a transversal and inclusive economy. An objective for which digitisation must act as a basic tool that allows the population to access the new opportunities that technology offers on an equal basis of digital opportunities.

This context has accelerated all the processes related in one way or another to digitalisation. The opening of a digital gap, even deeper than the one already existed months ago, is unfortunately one of the great problems associated with the acceleration of the technological revolution and its impact on the lives of citizens. A very pressing and urgent challenge, one that we must face, could have incalculable consequences for the progress of our country and our welfare states.

That is why inequalities derived from asymmetric digitisation, such as the territorial, educational and gender gaps, must be a priority for the transformation of the productive, economic and social system that we should face. This is not only on our minds during this process and, therefore, one of the basic points of the Digital 2030 Plan, Spain’s national strategy for the digital transformation.

Beyond the great advances and innovations at the highest level, which are fundamental for the progress of our companies and institutions, we believe in technology as an instrument to change and make peoples’ lives better. To create spaces to offer new horizons to people, to show technology as something distant and inaccessible. To improve the living conditions of sectors of the population for whom training in digital skills can mean the opportunity they need to develop in a digital environment that is increasingly representing a growing percentage of the GDP of the most developed countries.

The benefits of the digital transformation of our economy and society, as the Spanish Government is betting, will only be possible through an inclusive and sustainable strategy that generates wealth and well-being in all areas of society. We cannot take any technological advance for granted and leave people outside. We must make this advancement accessible to the whole population through the knowledge and skills needed to do so.

We are also facing a revolution on many levels, in which we must value aspects derived from technological advancement which will be and already are of vital importance for our development as a community and respect for a series of fundamental values in societies such as those of today. The analysis of such profound transformations as those we are experiencing these days from an ethical perspective and respect for citizens’ rights also means the greatest guarantee to erase the barriers of access of the most vulnerable population to the new opportunities that technology offers on the basis of equal opportunities.

To improve the living conditions of sectors of the population for whom training in digital skills can mean the opportunity they need to develop in a digital environment that is increasingly representing a growing percentage of the GDP of the most developed countries. The challenge is exciting, and sharing it is undoubtedly the best way to complete a journey that will mark our lives and the future of humanity.

The digital future is already here. It is time to decide how we tackle the enormous challenges that the transformation of all areas of life will force us to face as citizens and part of society. This is a path that we must travel together, leaving no one behind and facing the fact that technological progress means, above all, social progress.

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The different authors highlight phenomena that today occupy a fundamental part of the government’s agenda, and whose presentation in public debate and in the daily lives of all the readers of this manual is necessary.

We are talking about phenomena such as the transformation of the world of information, the challenges of access to knowledge and the transcendental changes in the model of consumption of cultural products and multimedia content, which are increasingly related to the inexorable flow of information that the expansion of the Internet has made possible.

Aspects such as privacy on the Internet, respect for the digital rights of citizens, or the right to information and the vigorous control of fake news, are crucial debates we as society must face in the near future. That is why the government has launched a participative process to create a Digital Rights Charter for Spain, opening the debate about which rights must be updated and updated to protect ourselves in the digital spaces in which we are protected in our common life.

In this intellectual effort, which governments have the duty and responsibility to support and promote through initiatives that encourage in-depth and fruitful work, public-private collaboration and cooperation between the different states within this framework. The work of entities such as the Digital Future Society must be used by institutions and public entities as a starting point to obtain valuable information that consolidates a comprehensive knowledge of the most important issues with regard to the development of the digital transformation that we need, based on the in-depth analysis of each of the sides of the phenomena that we see in the future.

The digital future already arrives, it is time to decide how to tackle the enormous challenges that the transformation of all areas of life will force us to face as citizens and part of society. This is a path that we must travel together, leaving no one behind and facing the fact that technological progress means, above all, social progress.

It is our duty and the responsibility of governments to prepare for the future, and for the present we are already living, being aware of all the resources and tools we have at our disposal to build a sustainable and inclusive digital transformation. A task for which it is essential to generate new spaces for reflection, for collective thinking that will allow us to know and understand the phenomena that will connect academic and intellectual work with a clear and determined idea to improve people’s lives.

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Preface 2
by Carlos Grau

The digital emergency is a reality that we must tackle together without further delay. We at Digital Future Society define this concept as the situation that has been generated by an asymmetrical and accelerated digital transformation that requires urgent measures to be taken in order to guarantee equity and inclusion, the protection of human and digital rights, and reduce the environmental footprint. A reality that demonstrates the international community, governments, companies and civil society become aware of the crisis, in order to take action before the consequences are irreversible.

The growth rate of disruptive and innovative technologies such as Artificial Intelligence, machine learning, Blockchain, augmented reality, Big Data, the Internet of Things, 5G phones, etc. must not preclude a few of the technologies that have not yet taken centre stage. Two examples include an unprecedented transformation of the world. Technology has revolutionised the global economy, industry and business models, society, in areas of innovation and communication, and such important sectors as health and education, not to mention the impact that technology has had on the sustainability of planet Earth.

Technological advancement is a two-sided coin. On the one hand, it offers wide-ranging possibilities as far as opportunities and inclusion are concerned, given that technology entails access to information, science and education. In this way, gender productivity is fostered, promoting transparency and trust in the places that are otherwise uncertain.

The world is changing at an overwhelming speed, and only technology is able to keep pace with it. Technology opens a door to handling crises in a very efficient and preventive manner. The pandemic is a good example. Technology is not an end in itself: it is a tool that can enable us to determine what type of society we want to be. Technology is an accelerator that favours greater communication and new experiences, but in these times of accelerated change, there is a need not to forget to place human beings at the centre, and to anticipate the challenges and opportunities of this new paradigm. Let's face the climate of accelerated change, think in terms of not just stopping the phenomenon but preventing it, and in our anticipation of the challenges, concentrate on the opportunities that it entails.

Technology also has a clear impact on the environment. The digital transformation entails, in certain cases, an increase in energy consumption due to the increased use of devices, distribution networks and data processing centres, but the use of large amounts of data and Artificial Intelligence, and the promotion of new models of sustainable mobility can contribute to new technologies that mitigate the negative effects of climate change.

As I have pointed out, the digital emergency brings with it a major series of challenges that we have to deal with. In this regard, the implementation and unequal impact of technology. At Mobile World Capital Barcelona, under the auspices of the Digital Future Society programme, we shed the spotlight on those areas we can influence, putting forward proposals and recommendations with the purpose of finding solutions to the complex questions posed by the digital era, which are also addressed in this book from the perspectives of international experts.

The exponential growth of disruptive technologies, a product of the Fourth Industrial Revolution, and their impact on the economy and society have brought major benefits to people, but also many challenges and dilemmas in terms of security, equity, ethics, human rights and the protection of the environment. Is this new digital era. Although technological advances have not been adopted equally everywhere on the planet, their impacts have however affected humanity as a whole, widening gaps and causing significant economic and social imbalances in rights and opportunities between citizens of different countries.

We must primarily place the person at the centre, in an inclusive and diverse way. The new forms of employment are showing how current labour regulations, social protection plans and taxonomies are designed for traditional forms of employment. Once again, legislation is lagging behind reality. Employment with digital platforms is increasing globally at a higher speed than we had anticipated, and in the field we have immense opportunities to transform labour relationships and define new roles and responsibilities in a more equitable way.

Finally, another key aspect is data governance. In a world that is increasingly more dependent on data-based algorithms, that choose and make decisions on behalf of human beings, policy makers must guarantee the existence of appropriate regulatory frameworks and data governance mechanisms, so that professionals and end-users of these data can understand, respect and exercise their fundamental human rights. It is in this field that ethical criteria must take precedence when designing and deploying Artificial Intelligence algorithms, which must primarily place the person at the centre, in an inclusive and diverse way.

In this context of technological revolution, the digital transformation plans are key to the achievement of these goals, because it is a lever that moves the economy and the society of the 21st century. Technologically it is a tool that can enable us to determine what type of society we want to be. In this scenario of technological revolution, the digital transformation plans are key to the achievement of these goals, because it is a lever that moves the economy and the society of the 21st century.
An example of this is the positive effect that emerging technologies can have on our achieving the Sustainable Development Goals (SDG) promoted by the United Nations. In relation to the goals of eradicating poverty and hunger, the digital economy is helping many low-income people to access financial services for the first time, a crucial step in lifting themselves out of poverty. ICT also helps farmers to increase the efficiency of their crops and their commercial productivity. As far as gender equality is concerned, digitisation can give women a greater voice in their environment and around the world, as well as offering new opportunities for their economic empowerment. With regard to health, Big Data and Artificial Intelligence can help us to observe, analyse trends and prevent and create projections against the outbreak of diseases and the use of health services, as well as to generate knowledge and policies. When it comes to education, mobile devices allow students to access educational resources anywhere and anytime, which helps to eliminate economic barriers, gender gaps, and other differences between rural and urban environments. In order to mitigate the effects of the climate emergency, satellite images are crucial in understanding what state the Earth is in, to sharing climate information, making forecasts and using early alert systems in order to better adapt to the consequences of climate change.

It is our duty, as institutions and citizens, to choose values that are going to allow us to advance towards a completely digital society, but not at any cost. We must build an equitable, sustainable and human society. If we are to reduce the discrimination caused by the digital emergency, the solution lies in strengthening societies and empowering citizens. Citizen empowerment through media literacy is key to building digital confidence and, in line with the SDG.

The spirit that must guide us is that of collaborative work, debate and agreements, focusing on innovation, ethics and, above all else, more inclusive.

The digital emergency, just like the climate emergency, is a global phenomenon that affects everyone. In order to face the ethical and social dilemma found in such issues as privacy, inclusion, and the empowerment of the most vulnerable sectors of society, we must seek a balance between technological advancement and humanity, respecting privacy, influencing the progress of society, raising all citizens in digital skills, and using technology to improve people's quality of life.

To do so, we must place people at the centre of technological development. This idea, which has been referred to as technological or techno-ethical humanism, is all about endowing the different agents in the ecosystem with the tools they need to ensure that the growth of the new digital society is as inclusive and equitable as possible, in line with the SDG.

In order to face the digital emergency, can undoubtedly help us to together build a society that is more humanistic, ethical and, above all else, more inclusive.
The Golden Age at our doorstep
Smart, Sustainable and Global Growth
By Carlota Pérez and Andrés Schafer
The digital era has captivated human imagination not only with its exploits, but also with the dangers it entails. Dazzled by the brilliance of technology, we find it hard to glimpse its true potential for completely changing everything from our everyday lives to public policy. At some point in every technological revolution, a new paradigm begins to prevail. It is a moment of vertigo.
Chapter 01

Four (and a half) chapters

The Great Depression of the nineteen-thirties was epitomised in Charlie Chaplin’s film Modern Times (1936). The mustard-yellow comedy recounts the misfortunes of Chaplin’s Tramp character along with his companion, the Gamin (Paulette Goddard), a victim of unemployment, depression and repression of the poor against the well-to-do, who are depicted as heartless and callous. The narrative is filled with references to unemployment, destitution and disillusionment. In one scene, our two undeniably diverse protagonists decide to get married after she (who is penniless) inside their hideaway in through their hand in hand of the window to be left in the freezing huts of a closer new world. Dreams are, however, just dreams and the outcome of the story remains open. In the end, the two lovers only have each other. They walk hand in hand down a bountiful life in a modest suburban home from which they need only to reach an industrial environment. This was the Belle Epoque of Lautrec, Renoir and Monet.

The second chapter, from 1850 onwards, led to the Victorian boom of coal, steam, iron and railways and saw the elevation of a cultured, entrepreneurial middle class in the new burgeoning cities. The third chapter was the era of steel, heavy engineering and transcontinental navigation that led to the first globalization under the Pax Britannica, while the United States and Germany made a deep in the bourgeoisie. The fourth could be extended to skilled workers and the world of art, culture and entertainment. This was the same old thing, but rather the one that creates disruption. What we call an uncertainty about our future. At that time, 25% of wealth was concentrated in the hands of the richest 1% of the United States. That proportion is virtually identical today. The International Monetary Fund (IMF) has concluded that we are facing the worst recession since the Great Depression since the Covid-19 pandemic. Seeing the shockwaves of the pandemic, the world is at a historic moment. We are now facing the worst recession since the Great Depression. But the pandemic is unsettling. We are now at a similar moment, marked by great uncertainties about our future. The world is at a historic moment. We are now facing the worst recession since the Great Depression. But the pandemic is unsettling. We are now at a similar moment, marked by great uncertainties about our future. The world is at a historic moment. We are now facing the worst recession since the Great Depression. But the pandemic is unsettling. We are now at a similar moment, marked by great uncertainties about our future. The world is at a historic moment. We are now facing the worst recession since the Great Depression. But the pandemic is unsettling. We are now at a similar moment, marked by great uncertainties about our future.
Chapter 01

01 The Golden Age At Our Doorstep

... have been three crises with potential for change in the resolution period of the digital revolution. The first was the bursting of the dot.com bubble in the year 2000, the second the bust of the real estate market in the US from 2006, Quantitative Easing (QE), which then came to the rescue, before the hope that everything would return to how it used to be. These funds, however, mainly revealed the financial crisis and inflated the price of assets; real estate, shares and corporate debt while increasing inequality and social instability, in every respect, it was a balloon ready to pop. The spark came from an unexpected place: the Covid-19 pandemic, which originated in China, the world’s new factory...
Cheap computing and information are the enablers of the current paradigm, just as cheap energy and materials enabled the previous paradigm. It is not just creativity of concepts and internal but also of Artificial Intelligence. Today’s digital economy is driven by a global supply chain with a clear trend towards Digitalization, Big Data, Blockchain and a virtually endless series of axes, as digital technology can be implemented from food production to biomaterials, from healthcare services, to what we might expect at all levels. This means a new quantitative and qualitative leap for productivities. As in previous occasions in the leap that will enable reordering the sectors that were displaced during the instalment period of the advanced countries plus, possibly this time, the majority of the developing world.

A new oligarchy established for the new paradigm will only seek if demand has the necessary characteristics and volume. For this to happen, a powerful understanding of the characteristics of the digital economy is needed. The solution involves establishing a positive-sum game for all. Instead of looking for a new technological potential, the focus should be on the new technological potential. Without looking for new technologies and potentials, the focus should be on how the current technologies and potentials can be used more efficiently and effectively. This is the essence of the digital economy.

Currently, the digital economy is not the same as the traditional economy. Because of this, the digital economy offers new opportunities for businesses and individuals. This is the main reason why the digital economy is considered a new paradigm.

The digital economy is driven by a global supply chain with a clear trend towards Digitalization, Big Data, Blockchain and a virtually endless series of axes, as digital technology can be implemented from food production to biomaterials, from healthcare services, to what we might expect at all levels. This means a new quantitative and qualitative leap for productivities. As in previous occasions in the leap that will enable reordering the sectors that were displaced during the instalment period of the advanced countries plus, possibly this time, the majority of the developing world.

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The ICT paradigm has led to more horizontal organisations and more sectoral enterprises. This has made it possible to be more flexible and streamlined, but neither governments nor citizens appear to fully understand their new technological environment. The State needs to adopt new agile organisational models in which citizens are seen as producers, rather than consumers, and have access to the full range of services. To paraphrase Tim O’Reilly, the government should become a platform that provides both data and web services that allow citizens to participate in democratic politics (Government 2.0).

This, however, is just part of the story. As happened with previous technological revolutions, national states and multilateral institutions need to adjust to the basic assumptions and the logic of the new digital paradigm. They need to adapt to new forms of participation and the design of policies. Our challenge is to find a planetary system, where climate change, epidemics, migrations and trade are global and affect us all. These require a new global governance framework with regulatory and taxing power to make a smart, green, global and fair growth model sustainable and possible.

The digital paradigm is our greatest opportunity now for potential for networking and participation continues to challenge the capacity for democratic participation, and the capacity for demonstrating the way we fill our needs on a healthy planet is essential, it is our job to find this lost treasure.
Chapter 01

01 THE GOLDEN AGE AT OUR DOORSTEP

CARLOTA PÉREZ

British-Venezuelan interdisciplinary researcher dedicated to the study of the socioeconomic impact of major technological changes. Author of the influential book Technological Revolutions and Financial Capital, currently Honorary Professor at the Institute for Innovation and Public Purpose (IIPPUCL) as well as at SPRU, University of Sussex, both in the UK. Carlota is also a visiting professor at the Baruch Institute in Tel Aviv and an Honorary Visiting Professor at the Institute of Economics (IEE). Since the 1980s, Carlota has worked globally as a consultant and speaker. Her current research project examines the role historically played by governments in shaping the context for innovation.

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ANDRÉS SCHÄFER

Journalist and filmmaker with professional experience in Venezuela and Germany. Current contributor to El Estímulo, Andrés has been a writer and editor for other media in Caracas, such as EcoVo Magazine, El Mundo, Economía y Negocios, and Punto Fijo. He has also published in the magazine Letras Libres in Mexico, the Magazine Fórum at Brazil and Colombia in the US, addressing from the chronicle and the literary essay to the new economy and the digital age. Former member of the Editorial Board of El Pitazo. PTVS (Televisión y Sociedad), he created El Guachimán Electoral, an alliance of media and NGOs in Venezuela for citizen observation of elections. Andrés has been a director of corporate film, advertising and documentaries, script consultant, sound engineer and editor. He was teacher in the management workshop of the National School of Audiovisual Media in Mérida, Venezuela.

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The new surveillance society: Your data

By Jennifer Kite-Powell and Marijke Roosen
In 2017, Pulitzer-prize winning journalist Ronan Farrow tracked down a breadcrumb trail of clues to discover Harvey Weinstein’s use of private surveillance to spy on journalists to intimidate, threaten and coerce them to not run unflattering stories on him.

Farrow’s 2020 book and 2019 podcast of the same name, Catch and Kill, details the lengths these and other monetized players went to in order to stifle written and private inquiries.

This kind of private surveillance is dark. It’s threatening. You aren’t aware of it or how it works, or in the most extreme cases, murdered like journalist Javier Valdez Cárdenas who was shot in Mexico outside of his newspaper, RioDoce. Valdez Cárdenas covered drug trafficking and organized crime in Mexico.

How big is private surveillance? Big and global. This is the age of the smartphone and you can be surveilled to track who you want spied on, the smartphone tracking industry is on the rise.

The New York Times’ special feature, One Nation, Tracked, looked at the digital epidemic of phone tracking in the Privacy Project, which is a dataset of more than 50 billion location pings from the smartphones of more than 12 million Americans as they moved through several major cities. Each ping to the phone shows the precise location of the user even in the Pentagon. Fortunately, it’s legal to track, collect and sell this information.

Not just in the US, but in most of the world as well. It’s become a profitable trade to track humans and that activity is both legal and lawless.

In Farrow’s podcast, John Scott-Railton, a senior researcher at the Citizen Lab in Toronto called this type of surveillance ‘checkbook surveillance’—meaning if you have the money and don’t want to be accountable, you can acquire private surveillance.

“There will come a time when it isn’t ‘They’re spying on me through my phone’ anymore. Eventually, it will be ‘My phone is spying on me’.”

Philip K. Dick, Author
Citizen Lab investigates and researches the tactics which are being used to silence journalists and dissidents. Checkbook surveillance isn’t about stopping crimes, it’s just about subversive surveillance. In the Weinstein case, the producer hired Israeli private intelligence firm Black Cube to stalk journalists and suppress their stories. Black Cube calls their line of work, ‘creative intelligence.’

Anyone can acquire information now - even the dark forces of an Israeli-based ‘creative intelligence agency’ on US soil like Black Cube. But how we leave the rabbit hole once we collectively gone when it comes to data acquisition in today’s always-on world? Pretty far.

We are living in a surveillance state where we see all Big Brother now. From your laptop’s webcam to dashboard cameras in cars and our trusty smart home security devices, not to mention the GPS in your smartphones, surveillance tripped over itself and has become provided by each of us as individuals.

Us. Them. And you. Surveillance by governments and now by each other on each other.

With an expected 6.4 billion smart home devices in use by the end of 2023, homes will be saturated with smart devices and virtual assistants. And, with Google and Amazon publicly acknowledging, they follow their users’ conversations in their homes. Everyone is listening.

The rise of voice and Artificial Intelligence (AI), the Internet of Things (IoT) gives devices like Alexa and Ring the ability to obtain information passively as we open and shut our refrigerator, jog around the block, turn off and on our lights. It can listen silently, see and then send all that dossier to corporate masters.

We have arrived at the precise point where we are under surveillance physically, and our data is surveilled not for the prevention of crime, but for profit by big tech and corporations and by governments to eradicate and control policies within their borders.

The research report Data Age 2025 has predicted that data will from 33 to 175 zettabytes by 2025. This goes way past gigabytes, terabytes and petabytes. To put the sheer size of the data into perspective, 175 zettabytes on a DVD would create a stack of DVDs that could circle the Earth 222 times.

We will come back to this later, but first we have to look at how we got here.

I spy

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In our always-on digital lives, how do we regulate, oversee, or legislate the unerring use of personal data globally? At what point do consumers okay some data being out there and other data being private? Let’s go back to the 1990s when the first search engine, Archie, began searching FTP sites to create an index of downloadable files, the only result was a listing, not the content of the search due to storage limitations. One year later, an MIT student developed Veronica (1990), which searched file names and titles in Gopher index systems, and Jughead in 1993 (which added the same as Veronica but only searched online services).

Jumping to 1994, Yahoo introduced the first iteration of search as we know it today, which was web pages with a human-created description in the URL. From there, web crawlers to Lycos which went live with 56,000 documents in November 1994, which had advanced search capabilities. Then something happened that brought us where we are today in 1998. Google created a project called Backrub, a search engine that used backlinks for search. There were two key features of Backrub which paved the way for search as we know today: one, Backrub ranked pages using citation notation which meant that any mention of a website on another site would count as a vote toward the mentioned site, and two, a website’s “authority” or reliability came from how many people linked to that site, and how trustworthy the linking sites were.

At that time, the other players, Lycos, AOL, AskJeeves and Inktomi Hotbot didn’t believe the citation notation model would work. And, it wasn’t until 1998, following Microsoft’s launch of MSN Search did we see the giant we know today, as Google made its way into search. It was now a race to process and rank information in a world of first-party and third-party cookies which tracked our every move.

We had crossed the Rubicon. It was now a race to process and rank information in a world of first-party and third-party cookies which tracked our every move. The more the consumer searched, the more information Google and other search engines acquired. Social media sites like Facebook entered the public domain officially in 2007 and short three years later, were already admitting to privacy mistakes within the platform. Now more than a decade later, the company continues to dodge global data and user privacy issues.

“Back to the future”

“The New Surveillance Society: Your Data”

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Good old fashioned surveillance

Why do we find the world of 1984 so fascinating? Is it because people are still afraid of too much personal privacy? Or is it Orwell’s Big Brother world that we fear more than anything? And if we do, is the problem a lack of control over our lives? Or is it that Orwell’s Big Brother is just too close to home to be comfortable as we live in a digital world?

Defining surveillance in the 21st century is not a straight line. Traditional surveillance has been relegated to closed caption television (CCTV) and electronic identification (e-ID) installed by governments to protect citizens, subdue criminal activity, or monitor and control large groups of people. In this book, Benjamin H. Grover said the problem with the surveillance state is that it hard to track someone’s movements using CCTV — especially if they’re on foot.

Aaronovitch said part of the problem with CCTV is that the cameras all belong to different people for different reasons. Westminster Council has a network for traffic violations, the Oxford Street Trading Association has a huge network around the streets and political protests, individual shops have their own systems, as do pubs, clubs and buses. When you walk around London it is important to remember that Big Brother is watching you, or he could be having a piss, or reading the paper or helping redirect traffic around a car accident or maybe he is just forgetting to turn the bloody thing on.

With government surveillance, consumers have little or no control over this part of their lives. It’s part of being a global citizen. There are no secrets from the government. Research shows that the use of CCTV is often based according to cultural stereotypes and subjective prejudices. This turns CCTV into a tool for social control, and it’s not just limited to the country where it’s installed. When it comes to more surveilled countries by CCTV cameras installed, the 2019 data showed that China and the US were the top two countries for citizen surveillance. And despite China having four times more CCTV cameras than the United States, the US has the highest number of CCTV cameras per person in the world at 15.28 per 100 people versus China’s 12.64 per 100 people.

The same saturation formula applies to Germany and the UK which come in third and fourth respectively with Germany having more CCTV cameras, but less CCTV surveillance per person and the UK having less CCTV camera but more monitoring per person.

However, more surveillance is happening at a CCTV camera.

Shawn Gua, CEO of Umbo Computer Vision which makes an AI-powered video security system in Taiwan said we have no emotional connection with them. And that with so many surveillance cameras, we don’t feel more or less secure when we see the cameras and that’s a huge disconnect.

Government surveillance has spilled over into information gathering on both consumers and citizens.

In China, DHI reported that leaked Chinese government records showed detailed surveillance reports on… Public records and how they’re published in the most detectable way. This comes on the heels of the Chinese government’s decision not only to rank the trustworthiness of its citizens through data on every one of their activities. Chinese authorities create scores on citizens by taking into account how is person crosses a street, political comments on social media, purchasing behavior or where and when they spend their money.

A new 2019 law in China one mandates that a citizen who registered a new SIM card must also submit a facial recognition scan.

According to Steven Feldman with the Carnegie Endowment for International Peace, AI surveillance technology has spread quickly, and here’s what global experts expected. The research showed that at 76 of the 176 countries we asked are using AI technology for surveillance. They use include smart city and safe city platforms (56 countries), facial recognition (64 countries) and smart parking (63 countries).

Governments are using AI surveillance to track and control their citizens, even when those citizens don’t have access to the cloud. In a disturbing dystopian reality, Lincoln Taylor, Assistant Professor of Data Ethics, Law and Policy at the Tilburg Institute for Law, Technology, and Society (TILT), stated that even though close to half of the world’s population has no or limited access to the internet, these populations are being targeted by AI surveillance.

“Your may not be able to reach the connected world, but it can certainly reach you.”

In 1984, the destruction of privacy was a means to an end, a tool for enforcing discipline to the dictates of the authorities. But in our global society in 2020, there is a global appetite for research and reaction to the surveillance state.

In the US, university students from the University of California presented the use of facial recognition for security surveillance on campus in Los Angeles. Eight for the future, the students used digital rights group coordinating the actions against facial recognition in schools. Meanwhile the facial recognition software vendors to the California faculty members and officials, where many people of changed were modified.

And, in August 2018, the General Data Protection Authority fined the basketball education board of Delaware University $120,000 for a 2014 breach. The fine is among the most significant using AI surveillance technology to monitor the attendance of students at their High School because it violated the GDPR.
Our homes are now exposed to big tech and potential criminals who have access to our most intimate information. The rise of voice and AI and IoT has the capacity to obtain information passively as we open and shut our refrigerator, jog around the block, turn off and on our lights. It can just silently listen and see. And here’s something disquieting, in December 2019, Amazon Ring sales almost tripled despite the hacks, security breaches and assaults consumers experienced with Ring. In fact, New York Times reporter Brian Chen said the people just don’t care that their Ring devices are spying on them.

At the start of the new decade, security researchers discovered that Ring’s apps contained hidden code which shared customer data with third-party marketers. The Electronic Frontier Foundation (EFF) said Ring’s stated pattern of behavior that focuses on integrating exposure to any security of breaches but still benefited from massive volumes of customer data available to them through the device. In December 2019, hackers hijacked the Ring cameras of multiple families and used the devices’ speakers to verbally assault some of them.

William Budington, a technologist for EFF who helped discover the trackers embedded inside Ring’s apps said in the New York Times that Ring had done ‘precious little to address the broader threats to privacy that their devices enable.’

In California, the Los Angeles Police Department and three other local law enforcement agencies are using automated license plate readers (ALPR). According to the EFF, the California State Auditor’s office determined that the data collected by the ALPRs was not being used to target public safety or target immigrant populations.

The elephant in the room is choice. As consumers and citizens, do we fight against surveillance when we don’t freely choose it? How far are we willing to go in the transfer of our personal data in exchange for apps that simplify our activity personally, professionally and socially?

But, when we do make the choice, are we more willing to give up our privacy if we have the choice versus when the choice is made for us? Is it okay if we reveal so much about ourselves to a billion dollar company versus a world where we choose what to share and what not to share.

This is surveillance in a hyper-connected world and another iteration of the global surveillance society we live in.

The new surveillance state

The evolution of surveillance has taken us in several directions in the last three decades - governmental and private surveillance to where we are today, consumer surveillance - the surveillance triangle and in the middle is our privacy.

The services they afford us have changed our lives. And they’re engrained. We begin giving them our information, providing yet another glimpse into our lives. And when you turn to obey, and to write for an appointment, use Google voice to make a call, or a car, we’re probably already told them it’s on the way.

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It’s the new world order where our 24/7 digital lives - computers, smartphones, tablets, wearables and smart appliances - are collected and analyzed by one-to-one interactions to establish behavioral patterns, which are sold and traded. Do we have the right to protect our information online? And if we lose our digital privacy, have we lost our freedom?

Doing business and living online has become second nature to consumers around the world.

In 2020, doing business and living online has become second nature to consumers around the world. We’ve collectively spent three decades surfing and searching the web with abandon. There was little or no awareness of the digital footprint we were leaving behind which has become yet another iteration of the global surveillance society we live in. Privacy was the last thing on our minds.

This violent death of consumer privacy came at the hands of the companies that consumers willingly or unknowingly gave their data to. But, does it mean we’ve reached our privacy tipping point?

Mike Feibus, principal analyst at Feibus Tech says he’s come to the conclusion that there won’t be a tipping point at least not in the conventional sense where there’s some egregious breach of trust that motivates us to say “enough is enough,” and cut off the Internet giants from our lives. Feibus believes that consumers already have plenty of ammunition if it was going to happen it would have happened already.

This an evolving trend that has changed our lives. And there’s no going back. We began giving them our information, providing yet another glimpse into our lives. And when you turn to obey, and to write for an appointment, use Google voice to make a call, or a car, we’re probably already told them it’s on the way.

There are only two things that will change things - someone will come up with a better way, and we’ll migrate to that. Or the government will introduce legislation with teeth, and force the Internet giants to change themselves.

The thin end of the surveillance wedge

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Chapter 02

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In this new surveillance state, how far are citizens willing to go in the transfer of their personal data in exchange for apps that simplify their activities personally, professionally and socially?

The United Nations has laid out its 2030 Initiative and sustainable development goals to transform our world. Some of those goals include promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; and promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

Is the tide turning from the corporate elites? Tim Cook, CEO of Apple has called for stronger privacy regulation in 2019 saying that consumers deserve control over their digital lives. And the New York Times ended the use of ad exchanges and behavioral targeting in Europe after the GDPR came online.

In the power-to-the-people corner, a Dutch district court ruled against an identification scheme called System Risk Indicator (SyRI) because of serious data privacy and human rights concerns.

SyRI is considered a landmark privacy case because the court ruled that it violates the European Convention of Human Rights and had no limits to what data can be used with no transparency on how the data is being used.

But perhaps the most vocal voice of regulating data for citizens is Margrethe Vestager, a Danish social liberal politician and Executive Vice President of the European Commission for a Europe Fit for the Digital Age.

Vestager told Time “This idea of services for free is fiction… people pay quite a lot with their data for the services they get. I would like to have a Facebook in which I pay a fee each month. But I would have no tracking and advertising and the full benefits of privacy.”

Vestager wants to reign in how tech “companies suck up personal data,” which she believes stifles competition. Since immunity is not an option, Vestager says the EU has appointed outside advisers to help with new regulations. This, she says, is not too soon or urgent. Vestager says “We are at the end of the beginning of an industrial revolution, tech is changing our entire society.”

Technology affords us the freedom to be a global citizen, but that doesn’t mean citizens should have to give up privacy online. Creating a new equilibrium or balance of power where consumers can choose privacy on their own terms could be the way forward in our digital future.

The 2030 Initiative

Surely, protecting citizens digital rights is part of that recipe to transform our world. Allowing consumers and global citizens to have control over their digital lives is paramount to creating a resilient infrastructure that can create sustainable industry.

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Post-truth, fake news and alternative facts

By Aurélie Filippetti and Christian Salmon
The two words “fake news” point to everything bad about our democracies. The explosion may seem digital, yet it is as a trillion thread screen and something that has become a powerful democratic and an aid to a new narratives and stories, some more believable than others. Suspicion was the rule. It was to counter this discredit that the Obama campaign launched its core message: the hope of a change that one could believe in. Obama was entrusted with a task to which he was apparently abandoned by Washington politicians in desperation: to bring repute to the presidential office, something would require more than just fancy rhetoric. Obama’s campaign was both a technological framing, timing and networking, or a kind of a magic square. The age of radio and a narrative success. It managed to fulfil four different functions: storyline, more than just fancy rhetoric. Obama’s campaign was both a technological framing, timing and networking, or a kind of a magic square. 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Suspicion has now invaded the economy of discourse. The narrator has been discredited. The plot has been exposed. The term “fake news” not only refers to the proliferation of “fake news” on social media, but is also the object of suspicion itself.

All sources are flawed. All authors—whether political, scientific or religious—are described as liars. This is an irreversible process. The legitimacy of a narrative is devalued as soon as the narrator is exposed as discredited. Just as inflation undermines confidence in currency, the proliferation of stories has undermined trust in narratives. The destruction of affects stems from personal experience, particularly during the 2008 crisis. The credibility of all official accounts, whether on social media or elsewhere, is now itself subject to suspicion. The shortening of messages has turned the logic of confrontation, rather than the story. Noise on social media has given rise to the buzz-maker in place of the mythmaker.

The system of globalized information has reached a point of entropy and now produces only disbelief. It is not so much that lies have become the norm and the truth is prohibited or disregarded, but rather that the lie and the truth now cannot be distinguished from each other. It is not so much that sources are discredited or information, but rather that the ghosts that seek to convince us of their veracity are subject to manipulation. The collapse of confidence in language is no longer due only to the strategic effects of manipulation, but also to the appearance of a new discursive regime that keeps all discourse in belief mode. As Evgeny Morozov states: “an economy ruled by online advertising has produced its own theory of truth: truth is whatever produces most eyeballs.”

No one is spared. All sources of discourse are flawed. All ‘authors’—whether inside politics, or even scientific or literary circles—are described as liars and all are carried away by the noise of discredit. Just as social forms of currency, data proliferation has raised the credibility of all narraoes.

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Chapter 03

POST-TRUTH, FAKE NEWS AND ALTERNATIVE FACTS

Chapter 03

credibility must not be undermined and what is said should
be something of substance, and not just a list of excess. The
political agenda. It also changes the conditions of parrhesia;
and bad parrhesia, as noted by Michel Foucault in his work
on this Greek concept of “speaking frankly” or “speaking
truthfully”. Communication here did not complement
the words that the financial markets were expecting. The
 EFCS or good parrhesia, which at the time of the disclosure
of action on the 18th of March —described by the press
as “dramatic” and “unprecedented” —was essentially a
confirmation of what the markets expected: the ECB
would become performative: “we will act to prevent the
possibility of a status quo regarding the difference in
interest rates among European countries, which could ultimately
lead to a fragmentation of the Eurozone, with the later
resulting in a crisis that would become performative.”

This pandemic is coupled with a financial crisis, in which
discourse is highly significant because the heads of the
financial and economic authorities publicly state in
their capacity as spokespersons what is necessary to tell
countries, the markets’ interpretative capacity worked flat
out unilaterally, it is possible to say the words that the financial
markets were expecting. The

his mistake simply amounted
to stating what is obvious to anyone familiar with the financial markets, it does not have the
necessary tools to be a last resort lender for a member state. This is
the most important flaw of the Eurozone. However, it had been
pointed out since the 1980s that European macroeconomic policy
considered to be speaking truly or not bearing the costs
that come with the mismanagement of initiatives that were
hoped for. Lagarde’s most important task was not

and the markets publicly announce their resolve in order to
ally without paying the price themselves.

This is what she achieved on the 18th of
March and the analysis of her abrupt turn caused by a
statement was described as “professional misconduct”

An example of this may be observed in the discourse at the
start of the global Coronavirus crisis. This is the first
globalized and not just international crisis. Financial
crisis are the result of the process of incremental de-internationalization
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the economies.
Within the empire of the Big Five tech giants

The economy follows the economics of discipline and the economy of discipline now follows the laws of the financial markets: volatility, rational, aleatoric forms of social control. But in these new forms of social control, the degree of rationality is constant, the rate of accumulation, the speed of economic cycles. A new economy of discipline has replaced the old one, and it follows the laws of the financial markets. In this new economy, the degree of discipline is constant, the rate of accumulation, the speed of economic cycles. A new economy of discipline has replaced the old one, and it follows the laws of the financial markets.

The New Surveillance Society: Your Data

Chapter 02

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Chapter 03

In this surveillance economy, people are consumers and their news goes online, like wire stories that follow you from the Internet. This is a surveillance economy of information, in which we are constantly watched and informed. They are a new form of prison, the prison of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants. It is a new type of empire, the empire of the Big Five tech giants.
Chapter 03

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Artificial Intelligence and ethics

The most important question is: How will technology change our society – and what do we have to do to preserve our ability to choose the future that will benefit us all?

By Joanna Bryson and Martin Eisenlauer
Chapter 03

Artificial Intelligence (AI) and the idea of thinking machines have fascinated people for a long time. Authors and directors gave the public their vision of thinking and feeling machines, long before engineers did. Science fiction made a deep impact on how artificial intelligence is perceived and discussed today. Most of these artistic visions gave the readers and viewers the impression that sentient machines are possible, and something to be feared or at least to be wary of.

So, the public discussion is fueled by unrealistic hopes and expectations, including anxiety and doubts. There are many fact-free preconceptions about how our future and the future of AI will look like. In this chapter, we will take a more factual look at this discussion and answer some of the most pressing questions around Artificial Intelligence and the ethics debate surrounding it.
AI – from fiction to fear?

Chapter 04

04 ARTIFICIAL INTELLIGENCE AND ETHICS

First stories of sentient machines date back to ancient Greece, where Homer describes independently acting creatures that were crafted by the god Hephaestus in his poem “The Iliad”. With the rise of science fiction and the start of the digital revolution stories of robots and Artificial Intelligence became more and more popular. Movies like Metropolis (1927), 2001. A Space Odyssey (1968), Terminator (1984), or The Matrix (1999) drew a dystopian picture of a not so distant future, where humans fall victim to a sentient and independent Artificial Intelligence. “The current non-fiction debate about Artificial Intelligence is sometimes driven by the fear of a future where machines outdo humans on their own, and no longer need humans. A group of famous tech-experts including Microsoft founder Bill Gates and Elon Musk have expressed concern about the evolution of Artificial Intelligence and the lack of value for AI systems. Theoretical physicist Stephen Hawking warned before his death: “The development of full Artificial Intelligence could spell the end of the human race. Once humans develop Artificial Intelligence, it will take off on its own and nobody else will be able to stop it.” An even increasing rate, humans who are limited by slow biological evolution, couldn’t compete and would be superseded.”

From these fears of being subjugated by machines in some distant future, there are also concerns about the short-term effects of new growing efficienies of machines that could outpace other artificial systems. Firing among them is the fear of being able to machines and AI, and the underlying concern that the development of AI will change the way our society is built, with the current foundation of work being the main source of both income and for many self-definition. A study on customer trust, commissioned by Salesforce in 2018, shows that over half (55%) of customers would buy from a company that uses Artificial Intelligence to improve their experiences. More than half (61%) of those customers who have already experienced personalization by Artificial Intelligence systems are “very satisfied” with the experience, and 60% percent are concerned that the use of Artificial Intelligence poses a serious risk to the safety of their personal data.

What exactly is AI?

Before we delve into this deeply philosophical discussion, let’s take a look at what we are actually talking about. Wikipedia defines Artificial Intelligence as “the intelligence demonstrated by machines in contrast to the natural intelligence displayed by humans or animals”, thus linking the definition of AI to the broader concept of human intelligence, which is often defined as “the ability to perceive or infer information, to store it as knowledge to be applied towards adaptive behavior within an environment or context.”

“Artificial Intelligence was first proposed as a scientific endeavour in 1956, and has since been recognised as a scientific field.”

Pool, Mawerth and Gobi, authors of Computational Intelligence: A Logical Approach provide the following scientific definition of AI: “Computational intelligence is the study of the design of intelligent agents. An agent is something that acts in an environment—it does something. Agents include worms, dogs, thermostats, airplanes, humans, organisations, and society. An intelligent agent is a system that acts intelligently. What it does is appropriate for its circumstances and its goal. It is flexible to changing environments and changing goals, drawn from experience, and it makes appropriate choices given perceptual limitations and finite computation. The central scientific goal of computational intelligence is to understand the principles that make intelligent behavior possible, in natural or artificial systems. The main hypothesis is that reasoning is computation. The central engineering goal is to specify methods for the design of useful, intelligent agents.”

The European Union defines AI as “Systems that display intelligent behavior by understanding their environment and taking actions— with some degree of autonomy—to achieve specific goals.” It elaborates: “AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or internet of Things applications).”

At least one of us, L.-D. ordinarly defines AI more simply. Intelligence has been defined since the late 19th century as the capacity to choose an appropriate action for a given context, and Artificial Intelligence is simply, when the agent making that computation is deliberately constructed by a human or an organisation of humans.

Artificial Intelligence was first proposed as a scientific endeavour in 1956, and has since been recognised as a scientific field. That field has experienced several waves of rapid growth followed by sudden setbacks and stalling. Recent popular culture has contributed to the enormous growth in public discussions of the technology behind AI. The main drivers of these discussions are systems like Apple Siri, IBM Watson or Amazon Alexa, which are conspicuously human-like in that they use language to communicate, and are also called Artificial Intelligence by their proponents. Others are motivated by the fact that AI systems have beaten human champions at chess, then go, and others are driven by the suggestion that AI has been used to manipulate the outcomes of elections in leading democracies, or has been demonstrated to propagate biases like sexism and racism found in the data used to train the systems.
Looking at fiction, the popular assumption is that Artificial Intelligences will soon rival the abilities of the human brain. The assumption is that subsequently Artificial Intelligences will develop consciousness, maybe even personalities and sub-consciousness like the one’s humans possess. Following that line of thinking some already call for human rights and/or fundamental rights for these supposed digital persons.

In reality, systems containing AI are far removed from the human brain and body, despite in some cases having similar or superior computational or cognitive powers. Current vendors of AI-solutions like Amazon or Google enforce this trend, by trying to make their products seem as human as possible. Advertisements for products using Artificial Intelligence show these systems to act and behave like humans. From Amazon’s Alexa to IBM’s Watson – most AI-systems are portrayed as virtual beings living in a computer, who have almost-human characteristics and even quirks. This in turn increases the attachment between customer and product, and also reduces their obligation towards a product seen to be taking care of itself.

In reality, systems containing AI are far removed from the human brain and body, despite in some cases having similar or superior computational or cognitive powers. Comparisons between computers and brains usually are very crude and do not do justice to human thinking. There are extreme differences between the brain and current computers. A study of Stanford University estimates, that a human brain consists of about 200 billion neurons, which would give it a storage capacity of about one petabyte of data. That is about a thousand times more than even advanced PC-systems use today. The computational power the human brain is estimated to be about one trillion, which is about ten times the performance of the world’s fastest supercomputer in 2018, or about three million times the computing power of a current i7-CPU from Intel.

Apart from the computational capabilities of the human brain, it is also linked to a complex system of hormones and other chemicals that influence its performance, and also the development of the things we can personally experience, feelings and all the other things which characterize a living organism. All these are not inherently programmed into AI. AI is the opposite – we have built language into it, but we cannot give direct mental experience of the world to it. We can, however, make it appear human-like by training the mental behavior of humans.

Even though machines will never be or feel human, we have already built systems capable of expressing human failacies.

AI researcher Rodney Brooks concludes in a blog post titled “Artificial Intelligence is a tool, not a threat”: “I think it is a mistake to be worrying about us developing malevolent AI anytime in the next few hundred years. I think the worry stems from a fundamental error in not distinguishing the difference between the very real recent advances in a particular aspect of AI, and the enormity and complexity of building sentient volitional intelligence.”

We would go further. We are not going to build machines that are in themselves human—unless we consider clones to be machines, which doesn’t seem right. Clones are animals, and cloning humans is illegal, but a human clone would certainly be human. On the other hand, even though machines will never be or feel human, we have already built systems capable of expressing human failacies like prejudice, or human malevolence like ransomware. The important thing to realize is that it is not the machines that we should consider to be expressing these failitudes or malevolence, but rather that machines are a means through which human intentions or human culture can be expressed by the manufacturers, owners, and operators of these machines.
Even though machines will never be or feel human, we have already built systems capable of expressing human fallacies.
JB has made a number of arguments against presenting machines as people. In a 2010 book chapter, Robots should be slaves, she argues that humanizing technology would be immoral, not because of humans, but because of the technology. She argues that given that technological products will be owned by someone, it would be immoral to make them to have human experience even were that to be possible. Her point is, that technological products will always be owned, that the point of ownership is to develop products that are owned by someone, so we can’t have someone who owns a robot and who is the human being that has the experience. Why should a robot be frustrated, if it fails at a task it’s asked to do? And why should it act emotional because of this frustration. Why should it be programmed to show human-like emotions if it’s not going to be a human? A robot will only show human-like emotions if it’s programmed to. Why should a robot be frustrated, if it fails at a task it’s asked to do? And why should it act emotional because of this frustration? Why should we program it to be grouchy or abusive? What seems to be natural is natural; it’s a consequence of how we have evolved. But as designers, we have conscious choices not available to “the blind watchmaker” of evolution.

In a more recent paper, JB argues that even if we program AI to make moral decisions, we should consider the humans who did the programming or chose to execute the moral agents—the ones who are responsible. To her, it seems reasonable to hold both humans responsible; we can change the humans, or put them in jail, and this will make them act in a different way. With machines, the connection between reward or punishment or action is not the same as it would be for any animal. Again, it’s whatever we program it to be. JB concludes: “We are obliged to make robots we are not obliged to… We are obliged not to the robots, but to our society, to educate consumers and producers alike to their real obligations with respect to robotics.”

“Joseph Weizenbaum, one of the fathers of modern Artificial Intelligence also saw a distinct separation between human and artificial decision-making in the difference between making a decision and a choice.”

Computer scientist Joseph Weizenbaum, one of the fathers of modern Artificial Intelligence also saw a distinct separation between human and artificial decision-making in the difference between making a decision and a choice. To him, a decision is a fact-based, computational activity, whereas a choice is a judgment based on facts and factors like emotions that cannot be quantified. Weizenbaum concluded that researching AI devalues human life, because it reduces the human mind to nothing more than a very complex computer program. More importantly, he said that humans were fooled by the complexity of the programs. Weizenbaum saw no way out of this dilemma, but given AI research has continued since then, we must find one.
Transparency and liability

The main points of regulation, and thus contention, for Artificial Intelligence are not questions of morality or ethics for or by the machines themselves, but transparency, accountability, and liability.

Transparency is about understanding why a system using Artificial Intelligence comes to the results it generates. This can be useful to improve human judgment to make the decisions intelligent and ensure fairness, balance, and discrimination. One example of unwanted, and likely unfair results was Apple’s practice of giving higher credit volumes to male customers. This very clearly demonstrates why it is important to be able to find out how a system using AI arrives at its decisions. Considering the widespread proliferation of AI-based systems throughout all industries, non-transparent decisions could have wide-ranging effects on society, from healthcare to finances and overall socioeconomic outcomes. Of course, we won’t always be able to predict all the outcomes of human laws or decisions even without AI. But the goal of transparency for AI is to ensure we can find out which human is accountable for how the system was built, how much it was tested, when it was deployed, and how it was used and maintained.

Some people are concerned ironically that the push for more transparency in the programming of Artificial Intelligence has led to something that is called the transparency paradox. This describes the problem that the better documented an AI system is, the higher is the chance of the whole system being hacked. Small changes in the parameters could lead to huge changes in the outcome—something particularly dangerous in every part of decision-making processes is fled open. Others say that open souring of AI code is the only way to ensure that it is reliable and is not secretly plotted from the ground up. More eyes would be able to spot errors and vulnerabilities.

These arguments overlook that transparency and accountability are required in many other industries, without these kinds of problems emerging. Transparency doesn’t necessarily mean that everyone will know or understand every aspect of how a system works. First, it may only be necessary to have enough information to ensure good practice is followed and that no one has deliberately committed crimes or been negligent with a system. Secondly, in many industries inspection is only done by trusted third parties, typically the government, when there is a suspicion of wrongdoing. This is what happens, for example, in medicine, pharmaceuticals, and manufacturing.

Digital technology may always be violated if it lacks adequate cybersecurity. If a system is able to learn, it can also be attacked by distorted training data.

There are indications that hackers can take advantage of regulations to force systems like machine vision work, to place tricks and traps for their algorithms, which then lead to disruptions. There is no question that we need to be mindful about vulnerabilities of systems we put intelligence into, and what kinds of systems we connect to the Internet where they can be most easily assaulted.

Another problem of transparency (at least a study at Berkeley claims) is that it is possible to steal the results of AI research by using the explanations given in the result may lead companies to be invited to be very secretive. On the other hand, this creates a problem known as the transparency paradox. The solution may be simply the rule of law, and good defense of intellectual property.

In this context the subject of trustworthy or responsible AI has emerged, meaning that recent additions to the AI field are being governed by a system of technical standards, called Trustworthy AI. The concept is to ensure that systems are built with transparency as the main guideline. “Trustworthy AI will be our north star,” said Pekka Ala-Pietilä, chairman of the High-Level Expert Group on Artificial Intelligence (AI HLG) of the European Union.

In their Guidelines for a Trustworthy AI the HLG defines the following factors for a system to be deemed trustworthy: human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity and fairness, societal and environmental well-being, and accountability. The last of which brings us to the second main ethics problem for Artificial Intelligence: liability.

So the need for transparency in itself is not the biggest ethical question for programmers. Nevertheless, concerns about systems being hacked are well placed.
The parameters for developing, operating and managing AI-based systems differ very much from market to market.

Liability: Who exactly is to blame?

The question with probably the widest-reaching consequences is that of liability, or put more simply: Who is to blame if something goes wrong?

The European Union tries to foster the development of Artificial Intelligence, but also understands that it has to regulate problems arising from its deployment. In a paper titled Liability for Artificial Intelligence and other emerging digital technologies the Union’s Expert Group on Liability and New Technologies sum up their efforts: “Artificial Intelligence and other emerging digital technologies, such as the Internet of Things or distributed ledger technologies, have the potential to transform our societies and economies for the better. However, their rollout must come with sufficient safeguards, to minimize the risk of harm these technologies may cause, such as bodily injury or other harm.

This paper includes guidelines for a lot of the possible scenarios in which Artificial Intelligences can cause damage. The Experts follow the view of these systems being tools or machines, that are operated by humans or companies, and liability for any problems lies with these owners, developers, or operators.

The Expert Group puts a lot of extra responsibility on the operators to protect the rights of customers and users of their systems. They stipulate compulsory liability insurance for manufacturers of digital products and suggest logging features that document how an autonomous system or other use of AI arrives at its decisions. Finally, they conclude: “It is not necessary to give devices or autonomous systems a legal personality, as the harm these may cause can and should be attributable to existing persons or bodies.”

This complies with the view established in Article 12 of the United Nations Convention on the Use of Electronic Communications in International Contracts, which stipulates that the person (whether natural or legal) on whose behalf a computer was programmed should ultimately be responsible for any message generated by the machine.

This view is very consumer-friendly. It might be seen as presuming that there is always only one liable party, but in reality those might be dozens. An example: The responsibility for the malfunctions of an autonomous car may lie with the car manufacturer, the software programmers of the AI driving, the proprietor of sensors and mapping services, the company that provides data for the vehicles systems, network connectivity or even the influence of a hacker. Again this is the same as for any sector where for example a bank will be held liable for the actions of its bankers and for having insufficient security. Even though the consumer has ultimately be only one party liable under European law, every legal claim may spark a myriad of further legal actions.

Apart from that, there are also markets that apply totally different standards of liability – or none at all. Some markets are woefully under-regulated when it comes to the consequences of digital systems or Artificial Intelligence. Others —or sometimes the same country in different circumstances, like the USA— put very strong penalties on even minor infringements, which makes the operation of critical systems a rather risky venture for companies.

The parameters for developing, operating and managing AI-based systems differ very much from market to market – though the companies offering them often develop these systems for a global rollout.

For this reason, efforts like the General Data Protection Regulation (GDPR) of the EU, although initially seen as a constraint, in fact provide massive benefits to corporations by clearly spelling out a harmonized system of regulations that allow them to do business in many countries with the same products. Such cooperation —both between countries and with companies— is essential for governing technology that so easily transcends borders.
Conclusion: Ethical questions are not centered on technology

Artificial intelligence and ethics are deeply entwined. At least, when you look into a distant future, where machines have learned to think and develop a conscience—which according to some of the world’s leading AI-experts may never come to pass. JB is relatively isolated in arguing that machines are already conscious in that they have explicit memory of events, but that this has less ethical consequence than being human, and subject to human accountability.

Today’s ethical questions surrounding artificial intelligence are centered on legal and technological issues. When you take away the mystique and supernatural thinking of the movies and novels, AI deployment is really every-day technology. An autonomous system is not a sentient being. Even very complicated systems like the adversarial cars orai corporations and governments, do not and cannot require ethics beyond what humans are already impose on each other. Our obligation is to ensure transparency so that we can keep each other safe and sound.

The real ethical questions facing today’s society is how we use the options given to us not by the AI itself but by the power given to us by technology like Big Data, quantification of formerly unquantified events, surveillance and digitisation.

Excursion: AI and War

Today’s weapon systems offer a chilling glimpse into the future. Drones can be piloted from a thousand mile away, sensor systems lock onto objects automatically, and weapons track their targets automatically with a precision that no human could ever hope to attain. The leap into a future where autonomous robots are sent into battle, seems imminent.

At first glance, the idea of a soldier helper – meaning soldiers would not have to die in battle, but leading ordinary tasks like for Stuart Peach, Chairman of the NATO Military Committee, does not believe in a cleaner war. At the Munich Security Conference, he explained: “War remains violent and dangerous. The idea that there is risk-free war is not true and has never been true”. Humans will always experience war, the question is which ones, and who will stop it?

By the end of February 2020, the US Department of Defence has given itself a series of so-called ethical principles for the use of systems that involve artificial intelligence. Defense Secretary Mark T. Esper introduced three, “AI technology will change much about the battlefield of the future, but nothing will change America’s steadfast commitment to responsible and lawful behavior.”

The most current technological question is not whether Artificial Intelligence should be granted basic human rights. Even if such rights were a good way to define an AI system, building a system that requires such a difficult sum of defense would be a violation of our moral duty to ourselves, and possibly also to such systems, for the sake of more safety, lesser trouble, and reduced risk. The most important question is which decisions do we have to do in order to preserve our ability to choose the future that will benefit us all.
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The gig economy: exploring competing narratives

By Jeremias Adams-Prassl and Tim Wallace
The gig economy has exploded into public consciousness over the past decade. Conceptually it is not new — the ‘gig’ refers to musicians taking their income one show at a time, and can be applied to any number of freelancers and self-employed workers. In the modern sense, however, it typically means workers operating through digital platforms, offering services online to anyone who wants them — locally, in the form of odd jobs, take or food delivery; or globally, such as web design, survey completion or data handling.

At first glance it appears wildly popular. After all if nobody had a use for gigs, the system would not exist.

It seems hard to imagine that Uber, for instance, could have become the multi-billion dollar behemoth of ride hailing less than 10 years after it sold its first trip if it were not popular with, or useful to, investors, customers and drivers alike. The notion of flexibility for workers (caught in with tight working hours) was indicated by the majority of people who want to work on a different schedule to the usual nine-to-five hours.

The gig economy seems perfectly suited to their needs.

Yet the extraordinary growth of the online model has brought with it important and as yet unresolved questions about how the system operates.

These questions have only become more pressing as the coronavirus pandemic sweeps the world with dire economic consequences, particularly for workers with limited financial resources and partial or even non-existent labour market protection.

From workers’ rights to the nature of competition with incumbents, this chapter explores the rise of the gig economy, the moral and legal quandaries it throws up, and its future as a major component of modern life.
Tensions lie across any innovation. Incumbents fear insurgents. Workers must take a leap of faith to work in an upstart business or industry. And consumers have to break with those companies and services they know if they are to try something new. In the gig economy, new technology has introduced competition with exhilarating—or perhaps terrifying—speed. Local markets have become globalised at an unprecedented pace, while global players have begun to offer hyper-localised services. The very nature of employment appears to be shifting from formal, regular, and disciplined to self-employed, worker-led and highly flexible. These are revolutions which might never be undone.

Once valuable flexibility has been won—fitting work around family life, say, or enjoying the variety of several different types of employment each week—it could be difficult to persuade workers to go back to long and rigid hours with a more conventional employer. Employers who benefit from no longer having to provide a raft of benefits might be reluctant to return to costly workforce entitlements. The social order could even be overthrown. That, at least, was Daniel Defoe’s reaction when his travels around Britain in the 1720s showed him the effects of the boom in the price paid to wool spinners.

Surging demand meant earnings of spinners doubled or tripled in a few years. This type of work could be carried out at home on a schedule to suit the spinner. It was part of the putting out system, in which small tasks which were part of a larger production process could be done by workers at home. Crucially, they were able to take as much or as little work as they wished—very much like the promise held out to workers in the modern gig economy. As a result, Defoe wrote, farmers struggled to find milkmaids or labourers, manufacturers could not tempt hands into the factories, and the rich found servants reluctant to live in with them and work full-time. Cruel, unpleasant or excessively demanding masters found workers could no longer be compelled into work by poverty. Worst of all, in Defoe’s telling, these spinners did not work as hard as before; instead of spinning all day, every day, they would use their new flexibility and higher earnings to take time off. “This prosperity introduces sloth, idleness, drunkenness, and all manner of wickedness,” he wrote. His response was to propose more regulation of the labour market, all in favour of employers rather than their workers, in line with his moral sympathies.

Defoe was writing on the eve of the industrial revolution, just before widespread mechanisation led to the adoption of more modern standardised working days in which factory workers were compelled to match the speed of machines, rather than the daily lives of their masters or of nature. The putting out system of spinners, their own preferences between flexible work and financial reward, was not a new invention. Indeed, it was not a new idea even in Defoe’s era. Evidence exists for this type of work throughout history from ancient Babylon to Japan’s Tonya organisations. Nor did it die with industrialisation.

A different variant was seen in dockyards through the 19th century with stevedores hired for half a day at a time to load and unload ships. It meant taking work as and when both the employer and the worker wanted it. The break in the middle of the day allowed the employer to weed out any dock hands deemed to be working poorly. The equivalent in a modern-day online market system is the gig economy.

The gig economy is undeniably back. Its new form is radical and has changed industries almost overnight. But it is not unique to this era, nor an entirely innovative form of work. Those tensions between employers’ demands and employees’ desires, between quantity of work and quality of life, and between rights are every bit as pressing today as they were in Defoe’s time.
Digital revolution

The gig economy’s latest iteration has taken form amid a global digital revolution. The Internet launched the modern version of gig work. Consumer services have been operational almost since the Web’s birth. Yet their rise to fast lift in late 2000s has been driven by smartphones, which have given rise to super-scale platforms that link gig work to customers across more than 200 cities, exceptional growth for a company founded only in 2010.

It is not only consumer services. Amazon’s Mechanical Turk platform matches workers to tasks such as online content moderation, survey participation and data validation across the world. High-end professions are also tapping into the model. Platforms like companies such as Keystone Law, Locals Law and GunnerCooke have all been described as the gig economy. For lawyers, operating in a market significantly more flexible than the traditional legal market compensates lawyers more usually follow. These disparate forms of employment have four common threads.

Typically they provide a place to display skills, allow access to online maps, instructions, or forums, and deliver work that is easy to project and plan. Yet gig work is not without its drawbacks as even skilled workers find it difficult to charge high fees for small tasks.

The International Labour Organisation surveyed workers across five platforms performing tasks including transcription, data collection and experiment participation. Typically the workers are well educated—37% held a bachelor’s degree and 20% a postgraduate degree. Yet “most microtasks are simple and repetitive and do not coincide with the high level of education of crowdworkers.” The pay is commensurately low at an average of $4.43 per hour worked, or $3.31 per hour when unpaid work, such as searching for tasks, is included.

In the US and Germany, the ILO found average earnings on gig platforms to be below legal minimum hourly wages.

Super-scale, super success?

That scale has become a key feature of the gig revolution sweeping the world economy. Estimates of the number of gig workers globally are difficult to assess, but indicate an extremely substantial share of the workforce is involved.

A study by McKinsey estimates that between 20% and 30% of workers in Europe and the US are involved in the gig economy to some extent. This amounts to up to 162m people.

Such scale could indicate win-win-win situation, with the gig economy matching the needs of workers, consumers and employers. Taxi drivers waste less time seeking a fare while customers gain cheaper rides and a more convenient service. Web designers can list their services on Fiverr and access a global market instantly. At the other side of the transaction this enables entrepreneurs to set up shop online without learning design skills or hiring a full-time designer for a one-off job.

It can provide an income for those typically excluded or marginalised from traditional employment, for instance if they have caring responsibilities, or face discrimination, or have criminal convictions. Those new to an industry and with too little experience to gain a full-time job can gain an income by working gigs instead. Older workers seeking part-time work to ease their way into retirement or top up their pension can find gig work more flexible and forgiving than a more permanent employment contract.

That McKinsey study found 64m happy to use gigs as a way to top up their income from other sources, with 49m choosing to earn most of their livings this way. However there is also a sense of desperation among a large number of workers. Another 23m use gig work as their main source of income out of necessity or a lack of choice, while 26m use it to top up incomes for the same reason.

This could still indicate the gig economy serves a useful purpose for those who have no other option. New entrants view the gig market as those without work find a degree of employment more easily than ever before.

Yet global competition and a lack of long-term contract with an employer comes with very poor wages, as seen evidenced by researchers earning less than $6 an hour to struggle high fees for services.

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A precariously life

Varied and unpredictable earnings are only one aspect of the sometimes difficult lot of the gig worker. To take the example of a takeaway delivery driver, in the past they were employed by a restaurant to take food to customers, paid per shift. If an unexpectedly low number of customers ordered, the restaurant suffered even as the worker was paid the usual wage.

Now a gig worker is paid per delivery, they bear the costs of slumping demand in lower earnings. At the same time the flexibility of the gig system may prove dubious: if the platforms exert a high degree of control over the work patterns of those providing services.

An investigation by the Work and Pensions Select Committee in the UK Parliament’s House of Commons found Uber drivers were required to “stay on the road for extended periods of time to make a living”, and did “not have the freedom to determine their own working patterns.” Complaints by workers of exploitative conditions, inflexible hours and disappointing earnings are widespread.

Descriptions of gig work as a digital sweatshop with slave wages which kills your self worth are not hard to find.

The rights which come with traditional employment are frequently lacking, including holiday pay and job security for those who cannot be easily dismissed. Sometimes this takes the form of extra flexibility in contracts, allowing employers to pay staff only when they are needed, with workers rather than employers suffering from periods of low demand. For instance, almost 1m workers are now employed on zero-hours contracts in the UK. These do not specify the work involved, so employees' earnings vary week by week or even day by day as their services are required.

Most workers are happy with the arrangement, and do not desire extra hours in work, according to the Office for National Statistics. But a significant minority are unhappy: more than one in four workers on an additional job, more than one in four workers on a new contract, or a different job with more hours. It has led to calls for major reform of the market. For instance, the Trades Union Congress, which represents 5.5m UK workers, wants zero-hours contracts to be banned.

Nor are these issues distinct to the gig economy. The wider labour market has seen a shift in risks away from employers and on to employees. Sometimes this takes the form of extra flexibility in contracts, allowing employers to pay staff only when they are needed, with workers rather than employers suffering from periods of low demand. For instance, almost 1m workers are now employed on zero-hours contracts in the UK. These do not specify the work involved, so employees' earnings vary week by week or even day by day as their services are required.

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Much of the rise of the digital gig economy has taken place since the financial crisis of 2008-09, in an upturn in the business cycle. Now with the onset of the coronavirus pandemic, the vulnerabilities of gig workers and their lack of legal rights has been brutally exposed. Gig workers face the combination of a health crisis and an economic slump.

They also lack the rights of workers off from a full-time job, such as sick pay, and may struggle to access government support schemes unrolled specifically to combat the coronavirus recession. As a result, many gig workers continue to work even if infected, which threatens to spread the virus further, undermining efforts to contain it.

In one sense their diversity of income sources may be a strength. Even if one employer goes bust or stops hiring the gig worker, others may continue to require their services. A worker familiar with gigging may be experienced with fluctuations in demand, shifting the type of services they offer to match the circumstances of the day.

But they also lack the rights of workers off from a full-time job, such as sick pay, and may struggle to access government support schemes unrolled specifically to combat the coronavirus recession, as those are typically targeted either at those in traditional employment, or those with a long history of self-employment. It brings serious health worries, for the individual and wider society.

A survey by the Royal Society for the Encouragement of Arts, Manufactures and Commerce (RSA) in the UK found that financial insecurity would compel more than half of gig workers to continue working even if infected, compared to just over one-third of other workers. That threatens to spread the virus further, undermining efforts to contain it.

“I do not see how the flexibility can work in favour of these people right now. They are exposed to an incredible amount of risk, because some of them are still doing deliveries and coming into contact with a lot of people while the rest are staying home,” said Jason Moyers Lee, general secretary of the Independent Workers Union of Great Britain, in March 2020 as the COVID-19 outbreak took hold. “They don’t have the basic employment rights and most of the schemes the Government is rolling out do not apply to them. I think they are in one of the worst positions you can be in in the country right now.”

Gigging in a pandemic

There is clearly demand for reform to the gig economy. Some of its workers face conditions deemed unacceptable in other parts of their countries’ labour markets. At the other end of the income scale, some platforms face allegations that they are close to becoming monopoly powers in their industries, in part because they rely on low-paid workers with no rights - effectively competing unfairly with incumbents via a less rigorous legal framework.

Yet the popularity of these near-monopolies with their customers, who benefit from the low prices on offer, can make it difficult to tackle the labour rights issues.

As a result, any regulation must seek to preserve the benefits of the gig economy - lower prices, more efficient use of resources, convenience for workers and customers - while aiming to protect some of the lowest paid workers in society.

Added to that, the wildly varying accounts and experiences of life in the gig economy, as a worker and as a customer, show the complexities involved for anyone trying to regulate, harmonise or improve an extremely heterogenous set of industries.

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Chapter 06

Bringing order to chaos

The UK has a three tier system with a category of ‘worker’ in between the self-employed and the employed. This brings some protections including holiday pay, rest breaks and the national minimum wage, but not others such as paid parental leave, statutory sick pay or protection against unfair dismissal. Yet the popularity of these near-monopolies with their customers, who benefit from the low prices on offer, can make it difficult to tackle the labour rights issues.

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Partial solutions are already emerging, typically based on the argument that gig workers are self-employed and as such are like employees, so should be treated as employment. In March 2020 France’s Court of Cassation ruled that Uber drivers are employees, bringing the rights which come with that status.
Towards a sustainable platform economy

At the same time, it must be borne in mind that reforms will create costs, potentially for customers through higher prices, platforms through lower profits, and potentially even workers if improved rights stymie the growth of the platforms on which they rely. Some of these seem bearable - a platform which bases its entire operating model on regulatory arbitrage cannot expect to have a long-term future without regulators closing gaps in the law. Despite the extraordinary progress made in the past decade, the digital gig economy is only just getting started.

Similarly, creating a level playing field will benefit those incumbents which suffer from being undercut by insurgents using holes in the legal framework. Instead of trashing innovation and competition, a more sensible and even-handed system of regulation should encourage platforms to focus on providing the service customers want, rather than the legal arbitrage which lets them offer lower prices, sometimes at workers’ expense. Despite the extraordinary progress made in the past decade, the digital gig economy is only just getting started. Smartphones have comprehensively colonised vast swathes of developed market economies, but have yet to reach most of the world’s population on any meaningful scale. Likewise reliable Internet access remains the preserve of the rich - at least 3bn people have no online presence at all. And with the emergence of high-speed and mobile internet access has overhauled industries over the past 10 years, so the continued rapid growth of the global online population could transform more sectors in the coming years. More workers, customers and employers will be able to access one another, and serve each other’s demands.

And just as attitudes towards gig workers have shifted as the market has grown, so might they shift again. It cannot be taken as read that the current moves to formalise gig work and enhance the rights of those taking six online platforms will continue forever. Opinions shift, views change.

When Daniel Defoe was writing almost 300 years ago, it seemed clear to him that the sudden change in work conditions and empowerment of the working classes should be met with a crackdown, rather than legal support. “Servants have it too easy and can move jobs at a whim. Masters are in slavery to their servants,” he claimed. If anything, he added, the law was too soft on the workers: “Laws have already been made on the servants’ side, for their more easy obtaining of wages, and for obliging masters to perform their contracts.”

His solution? “New laws therefore seem absolutely necessary to enforce the obedience of servants.” In the plan, workers would only find employment if they had good references from prior masters attesting to their good service and honesty, with would-be employers banned from hiring those without the necessary paperwork. The attitude may seem odd or taken to modern ears, but the solution is very modern - Defoe in effect proposed the strict rating system used by online platforms.

If the ratings fall too low, the worker is ejected from the system and from future employment through the app. After 300 years the arguments around gig work look remarkably familiar, despite the gloss applied by the digital age and the exhilaration of its growth and innovation.
Chapter 06

Towards a digital ‘Cold War’

How the battle for infrastructure and data will redefine our future

By Natasha de Teran and Federico Guerrini
Technology tensions are as old as time: technology both advances wars and can be advanced by war. And then, as some would argue is happening today, technology can be the cause of both.

Experts seem to be fairly evenly split on the question of whether we are in, are moving towards, or are quite a way away from a technological Cold War. Some maintain that the major powers have been locked in a technological Cold War for much of the end of the Cold War, others that the major powers’ technologies are now so interdependent that the term ‘Cold War’ cannot and should not be used to describe the status quo – however tense it may look at times.

The Economist trod a middle path in March 2019, when its cover story defined the China-US stand-off as “a new kind of Cold War”. Not just diplomatic, this was perhaps the most accurate assessment.
In the Cold War, an iron curtain prevented the flow of ideas, innovation and technology, in the USSR, developed completely different tools to the US and vice versa. For the last few decades, these have flown pretty freely between the US and China – so much so, in fact, that vast parts of the US technology stack are reliant on Chinese-made components. The supply chain disruptions caused by the very localised COVID in Chinese manufacturing. Apple’s ability to sell iPhones and iPad in Central depends on factories working in Pinghu. China meanwhile looks to the US consumer and US companies for jobs, semiconductors and 5G network components.

If the embrace was always a tense one it has become downright uncomfortable since 2015. In 2015 China resolved to make China 2025 strategy which amongst others aims to reduce Chinese manufacturing sector up the value chain and ensure the country becomes self-sufficient in key technologies such as US semiconductors and is a world leader in 5G and robotics. The US’s then-tack, the Caucus on Foreign Relations, described the strategy as a ‘real existential threat to US technological leadership.’ Then in late 2018, President Trump was elected on the back of a campaign which – amongst many other things – accused China of buying the US with its unfair trade policy, committed to raising tariffs against the country, and repatriating jobs from it. Things weren’t great, but it wasn’t for a couple years that things got really difficult.

Trump’s collapse with China’s economy, could rival the need for the early lines like codes, enabling computers to work smoothly, to communicate. It could make the Internet of Things a reality and revolutionise our world, as people interact with machines to seamlessly communicate. It could make the Internet of Things a reality and revolutionise our world, as people interact with machines to seamlessly communicate.

The relationship between private and public sectors is of critical symbols – Without them there’d be fewer jobs, less taxation and with that there’d be less government investment in innovation and education.

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The relationship between private and public sectors is of critical symbols – Without them there’d be fewer jobs, less taxation and with that there’d be less government investment in innovation and education.
Nation states that do not ‘own’ technologies are in a much weaker position not only to influence how these develop, but also how governance evolves.
Perhaps even more important, user data can be leveraged to detect behavioral patterns and make predictions on the future actions of those who have generated it, which has significant consequences for citizens, nation-states and corporate actors alike. As you know the term, the habits, the demographics of groups of users with similar characteristics, it is possible to influence their behavior. By targeting them, it is possible to change it. And to succeed, you need power.

Adventures are taking advantage of this, to make their marketing campaigns on Facebook, Google, Instagram and other platforms more effective. Politicians can use this tool to target key voters, by identifying those who can be more effectively “shamed.” For instance, voters who are uncertain whether to go to the polls can be targeted to make them vote. Additionally, deploying individually targeted political advertisements to encourage or discourage a certain behavior. Shadow actors can use these very same capabilities to disseminate false news and sow discord, spark outrage, further polarizing already fragmented societies. With appropriate judicial oversight, law enforcement can use it for beneficial purposes.

This leads to a paradox: citizens of the EU and of other countries produce a lot of data, but aren’t rewarded for it. If at all, people are always aware, even if they haven’t noticed, of the data that is shared about them, but nothing is expected in return. New technologies allow for the continuous gathering of data on individuals, every time they access any website, or use any social media platform, or when they buy something online. Collecting data on individuals is something that the EU Regulation (GDPR) which is meant to give citizens more control on how their data is being used. The GDPR sets specific rules on how to obtain data, how to store it, and how and when to delete it, among other things. It also opens the way for individual data protection to be leveraged to detect behavioral patterns and make predictions on the future actions of those who have generated it, which has significant consequences for citizens, nation-states and corporate actors alike. As you know the term, the habits, the demographics of groups of users with similar characteristics, it is possible to influence their behavior. By targeting them, it is possible to change it. As far as personal data is concerned, the landscape is dominated by a few US companies (the so-called GAFA, Google, Apple, Facebook and Amazon, to which other companies like Microsoft, Twitter, Netflix, Alibaba, Uber can be added and then Chinese counterparts, the MAFA, Baidu, Taobao, Tencent and others).

All of this highlights the importance of controlling and managing the platforms on which data is being produced and disseminated. The data pool is already immense – and it’s only going to continue to grow. The EU projects a 530% increase in global data volume in the period from 2018 to 2025 – from 33 zettabytes to 175 zettabytes. As far as personal data is concerned, the landscape is dominated by a few US companies (the so-called GAFA, Google, Apple, Facebook and Amazon, to which other companies like Microsoft, Twitter, Netflix, Alibaba, Uber can be added and then Chinese counterparts, the MAFA, Baidu, Taobao, Tencent and others). As far as personal data is concerned, the landscape is dominated by a few US companies (the so-called GAFA, Google, Apple, Facebook and Amazon, to which other companies like Microsoft, Twitter, Netflix, Alibaba, Uber can be added and then Chinese counterparts, the MAFA, Baidu, Taobao, Tencent and others).

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In 2008, an alliance of Internet and telecommunications companies, human rights and press freedom groups, investors, and academic institutions from around the world, launched the Global Network Initiative (GNI). The coalition, which counts Google, Facebook, Microsoft, Nokia, Ericsson among its members, was founded with the mission “to protect and advance freedom of expression and privacy rights in the information and communications sector.” The GNI board performs recurring assessments of its members’ operations to make sure they are aligned with its principles.

The process, however, is confidential and not open to the public. The organization’s focus also seems more on protecting users from abuses from government intelligence agencies and other nation states than on deterring them from the possible abuses of the Internet companies themselves. Principle 3 and Principle 5, in particular, are about “Alleviating Internet censorship, by providing clear and understandable privacy policies, to enabling controls over how personal data is collected and used” – if that should be taken by signatories to impose restrictions on our ability to work with personal data.

More than 80 organizations have joined the initiative, including Facebook, Google, Microsoft, Amazon and Twitter. While the Contract certainly provides a well-articulated decision-making framework and also points to the relevant human rights regulatory contexts on which the key principles are hinged, without strong accountability measures it risks resembling a Manifesto, similar to Mozilla’s “Pledge for a Healthy Internet” more than a real contract, which usually contemplates sanctions for infringers (incidentally, the lack of sanctions is mentioned by Mozilla as the reason for not signing the Contract).

A more technical solution to avoid the Internet just becoming a battlefield in which governments, and companies compete (and, at times, collaborate) with each other for the control of vital network infrastructures and for the collection and commercialisation of valuable data generated by machines and citizens, could be the adoption of a bottom-up, decentralised approach to the Web, the so-called DWeb.

Unlike the current situation, in which a certain content is usually hosted on a single server and is located by using a specific address (the Uniform Resource Locator, or URL), with the decentralised web the same content is spread across and can be accessed from multiple locations; DWeb links identify information based on its content, not location – making it more difficult to censor or delete. The intention of the proponents is that the DWeb would free users from the “walled gardens” of centralised platforms (Facebook, Amazon, etc.) and allow them to discuss and share information and multimedia without intermediaries. In doing so, it would also solve or mitigate the problems of data breaches, micro-targeting, surveillance and user profiling, as it would give back control to users on what data is shared and with whom.
The idea undoubtedly raises other issues, however. With no one in charge, who would be responsible for online harm, misinformation and the like? With no one in charge, who would be responsible for online harm, misinformation and the like? It's already difficult enough to identify judge and remove dangerous content right now; with the DWeb it might be downright impossible. How would legitimate data access be ensured? How would requirements such as the European “right to be forgotten”, which gives users the possibility of asking for content removal, lose their rationale?

For better or worse, anyway, the DWeb seems to have still a long way to go; although there are already several decentralised apps and platforms (like Mastodon or Diaspora), they have little traction and poor user experience. In any event, it would seem unlikely now that the genie is out of the bottle that companies or governments will allow the type of (intellectual and economic) control that comes with centralised data collection and processing. They will, if emerging trends are any indication, quite the opposite. The spreading of wearable devices, IoT in the home, biometric data in mobile payments and access services, will affect people’s lives in ways difficult to assess now.

The COVID-19 pandemic in 2020 also seems to have given an unexpected boost to the adoption of digital services and tools in fields and segments of populations that were still lagging behind. Education schools and students in lockdown were forced to take classes remotely; families that never used it before have taken to social media; in healthcare volunteers have been enlisted and are contacted by apps; data pools are being used; “contact tracing” apps, have been designed to monitor the spread of the contagion and are now being trialled across the world, in what might be regarded in the future as a watershed moment; the first examples of governments supplying smartphone-mediated digital services on a massive scale.

Before the pandemic, the predominant attitude in western democratic societies, was that of a “techlash”, a soft revolt against the invasion of private spaces by companies and nation states through digital technologies. In authoritarian regimes meanwhile, the use of these tools for surveillance and control of the population was becoming more and more widespread.

Since the onset of the pandemic, the mood has changed. On one hand the US-China relationship has worsened. Countries have worked individually rather than collectively to counter the pandemic. On the other, global interdependencies have been brought to the forefront like never before. The hope of some is that the episode of it indeed proves to be an episode, not world wide help unite an otherwise splintered world. The despair of others is that it will forever change the US-China relationship, and the world.

The mood has also changed when it comes to surveillance and civil liberties. Post-pandemic it’s possible, if not likely, that at least some of the technologies that several less democratic countries have been using to monitor and govern their citizens, will be adopted by the West – albeit hopefully in a more balanced and respectful way. Such a cross-cultural trend toward adopting and adapting surveillance technologies is a critical concern. It is important to keep in mind, however, that there is no one-size-fits-all solution to the control of key data and information, while simultaneously converging on the use of tools and techniques used.

If so, it’s of the utmost importance that safeguards are put in place to avoid abuses from all parties involved: citizens, companies, governments. The principles contained in the Contract for the Web – and in other charts and manifestos – could be a good starting point, as long as they do not stay only on paper, but are enforced across society through accountability measures and mechanisms.

At the same time, efforts to build decentralised versions of apps and services will doubtless continue and could, in some and with due norms, become the basis for a real alternative. One things however a constant is the form of a “Cold War” in the form of a peaceful coexistence between different approaches. Digital is going to become more and more entwined in societies across the globe. Going back is not an option, going forward norms are needed.
Chapter 07

Climbing to the top

Why the future generation of supercomputers will (need to) be built with open hardware and software

By Mateo Valero and Robin Wauters
Japan is home to one of the most famous mountains in the world; Mount Fuji, located on the island of Honshū. Commonly used as a cultural icon of Japan, it was not much of a surprise when the Kobe-based scientific research institute RIKEN Center for Computational Science in August 2019 announced that it would base its mountain and its rocky peak as inspiration for both the name and logo of its flagship supercomputing project, Fugaku.

At the time, not too many people outside of a small part of the global scientific community had heard of Fugaku, which had started development in 2014 as the successor to the so-called K computer. That changed somewhat less than a year later when it made headlines around the world for -at least temporarily- beating both the United States and China at something that is bound to define a large part of humanity’s future: ultra high-performance computing.

In essence, a supercomputer is ‘just a computer’ but with a dazzlingly high level of performance. It usually clusters multiple highly performant, optimised machines which are all configured to accomplish a specific type of task. This optimisation will typically include finely-tuned hardware and custom processors and accelerators, a specialised network, vast amounts of storage and so forth.

Conversely, the workloads that require a supercomputer usually have two things in common; they either require computation on a colossal amount of data, or they are very computationally-intensive -sometimes they are both-. Supercomputers are exceptionally fit for what is known as parallel computing, which refers to the process of breaking down large problems into smaller, independent parts that can be executed simultaneously by multiple processors communicating via shared memory, the results of which are combined upon completion as part of an overall algorithm.

Fugaku is such a supercomputer. In June 2020 it managed to capture the lead in an even more important speed ranking that is currently dominated by American and Chinese machines in both absolute numbers and aggregate computing power.

As Fugaku was crowned the world’s fastest supercomputer in the 55th edition of the TOP500, as the name yearly ranking is called, it displaced US-based systems Summit and Sierra, and bumped a duo of Chinese contenders down to the fourth and fifth spots on the list. European systems did not make it into the top five in this particular game of tag, although there are systems in Italy, France, Germany and Switzerland rounding out the current top 20.

This is important for a number of reasons.
Supercomputers let researchers create significantly more accurate simulations for things like modeling climate change, the development of new drugs, advancements in transportation and manufacturing technology and others.
The race is on, and it’s as global as it is crucial

Countries are locked in an expensive high-stakes contest to develop the specialist computers on the planet for big-data research and increasingly demonstrate the technological and economic muscle (though it remains to be seen) as it does so. In reality, there are myriad of other driving and accelerating the development of high-performance computing systems, and thus the stakes are ever higher.

And the consensus is that it will be difficult for the Japanese research center to hold on to its fastest supercomputer and reclaim the top spot away from Fugaku in the near future. The motivation behind the Mont-Blanc projects was Valero’s belief that Europe needed to have its own supercomputing technology to be technologically sovereign, and that supercomputers based on European components had to be designed (more on that later). This background mission was cut short, however, when Arm, which had acquired the Mont-Blanc projects, was acquired by Softbank in 2016 for $32 billion, the Japanese juggernaut’s largest-ever purchase.

From mobile chips to processors for the world’s swiftest computers

Valero says that the work for using mobile chips for supercomputers was born at the Barcelona Supercomputing Center almost a decade ago, when the center debuted the Mont-Blanc projects. Its aim was to design a new type of computer architecture - based on Arm processors, which stood out for its high level of energy efficiency - capable of setting future global supercomputer standards.

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If the choice of a processor designed initially for mobile phones was a surprising decision, at least for people without significant knowledge and experience in the subject, what was definitely not surprising about the creation of Fugaku was the software aspect of it. Its operating system, at least partially, banks on the Linux kernel—just like all 500 of the world’s fastest computers. That said, there are interesting connections to be made between the history and ongoing rise of open-source software engineering in general and the future of supercomputing in particular.

One of the prime examples of open-source software development is the Linux kernel itself. Initially developed by Finnish software engineer Linus Torvalds back in 1991, the open-source version of the Linux kernel was first released on the TOP500 supercomputer speed-ranking list in 1996 and has been continuously improved for use in personal computers.

Today, Linux is by far the leading operating system on servers, mainframe computers, and supercomputers, and also boasts an enormous install base on smartphones, courtesy to the dominance of Linux-based mobile OS Android.

The software, part of the HPC equation

The results are in, and they say open source has won, basically. Since its release now almost 30 years ago, Linux has indisputably and comprehensively altered the entire software industry beyond recognition. Now, a relatively young organisation wants to do the same for processors and other hardware, which is highly relevant to the future of supercomputing, as well as Europe’s chance to compete and perhaps even play a leading role in the further development of high-performance computing systems and infrastructures.
To supercompute, one of the things you need is a harmonious combination of highly specialised hardware, processor and software programs. As mentioned, the latter are very easy to find in a free and open form in large numbers on the Internet. Arduino and other open-source communities that support them, but the same does not go for the tangible elements in the real equation.

Take chips, for instance. Even though Fugaku has licence-manufacturer designers from Arm, most makers of high-performance computing devices still turn to licensed AMD for their chips. There are simply not a lot of alternatives out there. As a result, chip makers pay royalties. But in IoT, the chip market is still quite fragmented, with many different chipmakers competing.

When SoftBank acquired Arm in 2016, it did so in part to capitalise on an expected surge in Internet-of-Things (IoT) markets. IoT devices are expected to connect to the Internet. But in IoT, the chip market is still quite fragmented, with many different chipmakers competing.

The RISC-V Foundation, which was founded in 2015, says it counts more than 500 member companies today, including well-known names like Google, Huawei, Samsung, IBM, Red Hat, Qualcomm, Alibaba Cloud, Western Digital, Raspberry Pi and NVIDIA. "RISC-V enables members to design microprocessors and other types of chips (which is pronounced Risk-Five) is a nascent computer architecture that's available to anyone," explains Valero. "It’s open source, which means its licensees do not have to pay royalties to large, entrenched semiconductor industry incumbents," explained Valero.

One of the reasons it boasts widespread industry support from both processor and device makers is that it is modular, as in designed to be freely extensible and customizable to any market niche.

Another is that the RISC-V movement comes from the world of academia and is customisable to fit any market niche. As is often the case, the European Union suffers from multiple (often conflicting) priorities and its own set of challenges on a number of data sovereignty, intellectual property, security and geopolitical levels.

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Indeed, as highlighted previously, competing in the supercomputing field is of great strategic importance for sovereign nations and blocs for a variety of reasons, which has led to the European Union launching and supporting a number of initiatives to gain a competitive advantage. As previously mentioned, the EuroHPC Joint Undertaking is the largest, with its aim to accelerate the commercialisation of high-performance computing innovation and to bridge the gap between academic and industry research. There are several others worth highlighting.

One such initiative is the HPC Europa project, which is a pioneering distributed European initiative for High-Performance Computing Applications (DEISA), which was founded in 2002 as a partnership of eleven supercomputing centres from across Europe. DEISA provides researchers with access to world-class supercomputers and other high-performance computing systems, albeit with a limited budget (€9.2 million).

Another is EuroHPC, a century-long project to support academic research excellence and innovation in high-performance across Europe. It is headed by the European HPC Alliance, an EU-funded initiative that aims to enable impactful scientific and engineering (HPC) research of all disciplines in Europe, and is spearheaded by a team of experts.

As for the future, researchers are working on initiatives to internationalise the European supercomputing centres, such as the EuroHPC, and to further strengthen the European supercomputing ecosystem, enabling researchers to access world-class facilities.
An EU supercomputer chip in the making?

A fifth and arguably most notable project is the European Processor Initiative (EPI), which is building a new low-power central processing unit (or CPU) based on European technology. This CPU will admittedly rely on a closed-source processor core, but will bundle an accelerator based on the open-source RISC-V architecture (see details above in previous pages).

“Ultimately, the goal is to create a microprocessor for an exascale machine based on European tech, rather than proprietary alternatives”, as Valero explains.

This supercomputer will be capable of one exaflop of performance, one operation or a billion billion operations per second, which is around a billion times faster than your average desktop computer. Exascale capability is the next frontier, a computing power level roughly comparable to aggregating all the combined computing capabilities of the entire EU population’s smartphones.

In November 2019, the Barcelona Supercomputing Center, one of the leading supercomputing centers in Europe, announced the opening of the European laboratory for Open Computer Architecture (LOCA), its self-described mission is to design and develop energy-efficient and high-performance chips, based on open architectures such as RISC-V but also OpenPOWER and MIPS, for use within future exascale supercomputers.

In March 2020, the research center followed up on the LOCA announcement with the unveiling of the MareNostrum Experimental Exascale Platform (MEEP), an emulation platform that will explore hardware/software co-designs for exascale supercomputers and other hardware targets, based on European-developed IP.

On a related sideline, there is more innovation happening on the processor front in Europe. A British startup called Graphcore is making an equal semiconductor start-up with a recently launched chip designed specifically for running cutting-edge Artificial Intelligence algorithms.

When Graphcore, which is based in the English city of Bristol, unveiled the new computer chip, it said it managed to put a remarkable 56 billion transistors and almost 1,500 processing units into a single silicon wafer. The company also stated that in benchmark tests, its chip performed up to 16 times faster than those from Nvidia, which currently leads the market for chips designed specifically for intensive machine-learning applications.
Europe and the exascale road ahead

In its policy outline upon its formation, the President of the European Commission, Ursula von der Leyen, predicted that exascale supercomputers will be available around 2022, and that it has every intention to play in the top league: “Pooling and rationalising efforts at the European Union level is essential to reach exascale capabilities and place an exascale supercomputer among the world top three by 2022.”

One reason why this is considered such a vital part of the EU’s strategy: a third of the global demand for high performance computing capabilities comes from European industry players, SMEs and researchers, currently a mere 5% of those capabilities are actually provided by European supercomputing centres.

As a result, European innovators are increasingly using supercomputers located outside the European Union, which leads to important risks in terms of access, data protection, cybersecurity, and privacy.

But if the EU wants this to change, it will also need to find away to bankroll the steps that needs to be taken to get there.

As the European Investment Bank wrote in a ‘Financing the future of supercomputing’ paper published in June 2018: “In order to address this investment gap, securing the appropriate financing to cover the high costs of funding and maintaining the world-leading position of European High Performance Computing remains a challenge. While the EU and national governments are actively promoting the sector with various initiatives, public funding alone will not be sufficient to finance the broad uptake of HPC by industry and SMEs in the coming years. The EU needs to continue acting as a cornerstone investor, mobilising public funding alongside a clear public value proposition. This should ultimately be recognised and rewarded by the private sector through co-investments.”

Put frankly, the EU will need to put its euros where its mouth is.
If you look at the top 5 fastest supercomputers in the world today, it would appear the high-performance computing race involves only American, Chinese and Japanese contestants.

But with a number of supercomputers currently ranked in the list of top 20 speediest machines, Europe has healthy ambitions not to stay in the backseat for much longer.

Put simply: Europe wants to be a player, not a buyer, in the field of high-performance computing. This is considered a strategic resource to have, and not some vanity contest.

After all, high-performance computing systems are bound to play a major role in things like drug development, cancer research, Artificial intelligence, modeling climate change and weather forecasting, molecular chemistry, quantum mechanics, astrophysics and much more, and supercomputers can also be employed for a number of military and large industrial purposes.

The EU has committed to double down on its effort to create a cluster of pan-European innovation ecosystems linked to the field of high-performance computing, and build supercomputers that can ultimately achieve exascale performances.

“The Fugaku demonstrates that new HPC technology can break through and become the top machine, for a short time. This is exciting because we are trying to re-engineer the machine from the research done by the BSC. We believe this can be done again, but leveraging a completely open ecosystem, software and hardware, based on Linux, many other open-source software components and RISC-V as the basis for the hardware,” explained Barcelona Supercomputing Center director Mateo Valero.

Indeed, with a deeply rooted history in the creation and mainstream adoption of open-source software programs (e.g. the Linux kernel for operating systems and Arduino for IoT devices), there are many lessons to be learned in Europe to help it keep a seat at the high-performance computing table and maintain, or even increase its global competitiveness.

“Coupled with a large, active and world-class scientific and research community, Europe has an opportunity to benefit from current advancements in open hardware ecosystems and standards to co-create and operate supercomputers that do not rely heavily on non-European technology, which would represent a real risk to its future data and technological sovereignty,” Valero added.

As the United States and China continue to be locked into an ongoing trade war and economic conflict, it is not an option for Europe to stay on the sidelines when it comes to supercomputing. In fact, it has a clear incentive to take its destiny in its own hands, Valero concludes.

Conclusion

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Chapter 08

The role of humans in the digital society

By Virginia Dignum and Bennie Mols
From the 20th century inventions of the computer and the internet gradually a whole new set of digital technologies have evolved: algorithms, big data, Artificial Intelligence, robotics, biometrics, virtual and augmented reality, and smartphone networks like 5G, to name a number of important ones. Whereas humanity created these digital technologies, in turn these technologies shape society, and even what it means to be human. Digital technologies impact core human values like autonomy, control, safety, security, privacy, dignity, power and distribution. Technological development is like an evolutionary process in which humanity establishes rules in a symbiotic way creating both new opportunities and new risks. First we create technology, then it creates us.

The central question in this chapter is how to shape digitisation so that it enables the society that its citizens want. In order to answer this question we first need to think about the ways in which people are involved. An open, inclusive approach where everybody is welcome to participate is needed to design technology so that shared human values are built into the technology. We need to take into account that people have different cultural, social and economic backgrounds, different levels of involvement and different interests. This causes technology to have different effects on different groups. Consequently, different groups have different needs and views about the role of digital technologies in society. Engineers are those who ultimately implement technology to meet societal principles and human values, but it is policy-makers, regulators and society in general who can set and enforce the purpose.

Each individual and socio-cultural environment prioritises different moral and societal values. Therefore, which societal impacts should be decided in a democratic process with at its core the individual's right to self-determination. The implementation of digital technologies needs therefore to consider the socio-political environment it is inserted into. However, a digital technology like Artificial Intelligence (AI) might impact self-determination by taking decisions that people used to take themselves, which in turn will impact the democratic processes and ultimately society itself.

Dealing with these issues requires a human-centred approach to digital technologies. This means that the leading requirements for digital technology should be: empowering humans, protecting humans and facilitate engagement for social transformation. Incentives for ensuring these functions can be both regulatory or market-based.

A human-centred approach also leads to the question of human control in a society in which machines operate more and more autonomously. How much control should humans have over digital systems? In many applications the concept of ‘human plus machine’ is a more fruitful concept than the concept of ‘human versus machine’.
In order to explore the consequences that digitisation can have for humans, we now sketch three possible scenarios for our digital future.

Scenario 1: Let the market rule

Digital technologies have a few characteristics that make them different from previous, analog technologies: they scale easily and with little costs to bigger sizes, and they easily transcend borders. When the market for digital products and services is left in a laissez-faire way — with no government intervention at all — this rapidly leads to a ‘winner takes all’ end result.

When we let the market rule the digital economy, priority is given to maximising company profits and maximising share-holders value, without taking into account important public values like the environment, equality or privacy.

For example, company A, which is only slightly better than company B in providing a certain service, let’s say information search, quickly acquires more users. More users means more data on and insight in these users. Company C can subsequently improve its service and even create completely new services for example health care based on data that it originally collected for different purposes. Any newcomer will then have such a competitive disadvantage that it has very little chance to survive on the market. The result is a market ruled by a monopolist. This is an extreme version of what presently is the case with platforms like Facebook and Twitter and with search giant Google.

When we let the market rule the digital economy, priority is given to maximising company profits and maximising share-holders value, without taking into account important public values like the environment, equality or privacy. When companies can earn money with fake news and polarisation of views, then that is an unwelcome societal outcome of a laissez-faire-market-process. This is an extreme version of the American capitalistic philosophy in which the government intervenes as little as possible in the digital economy.

Scenario 2: Let the government rule

In between the previous two scenarios we have a scenario in which the government in a democratic way defines the missions of the digital development, for example the UN’s sustainable development goals, defines the boundary conditions: for example a CO₂ emission cap and then leaves it to the market to develop products and services. Often it is under-appreciated that governments historically have been very successful in creating big technological breakthroughs by using long-term and high-risk investments that are too costly and too risky for companies.

Huge amounts of public money have made possible the development of the foundations of the modern digital society: the computer, the internet and the smartphone. Only after these foundations were laid did tech-companies find the possibility to flourish. A healthy digital ecosystem therefore needs both government vision and government funding, public-private partnerships, start-up culture and a healthy market competition. Governments should stimulate companies to find solutions for the societal problems that its citizens find important.

The political view of the EU is to choose such a middle way between the American view in which business is leading and the Chinese view in which government is leading. The EU favours to balance the interests of individuals, society and business. In this political view human progress according to European core values is key, instead of the more narrow economic progress.

Scenario 3: Let the government inspire the market

At the other end of the spectrum we have a country like China, whose government wants to steer digital innovation in a top-down way. The government decides which technologies will be developed and how they are going to be used, in an extreme scenario the government acts as a Big Brother on its citizens. It collects all the data of its citizens, monitors what they do and what they buy. These data can be used to score citizens: citizens who behave not well enough according to the government get a low score and might lose housing, investing places or medical care. In this case, all kinds of technical complications have prevented China from building a fully functioning social credit system, so it’s stalled, but it’s a dystopian possibility.
As described in the introduction, human-centric digitisation should empower humans, protect humans and incentivise engagement for social transformation.

Empowerment

Empowering humans refers to the question of what humans need in order to cope well in the digital society. Digital technologies should be designed to augment, complement and facilitate human cognitive, social and cultural skills, and at the same time leave meaningful opportunity for human choice. Education, training, access to knowledge, inclusiveness and closing the digital divide are some of the tools that can empower humans.

Empowerment starts with access and education. Ensuring that everybody can use technology, taking into account fairness and opportunity requires political will and education.

On the issue of inclusion, diversity and access much has been said and written, in particular where it relates to bias. However, more than only looking at objective percentages of certain groups (men, women, minorities…), it is important to understand how inclusion is experienced, so the subjective feeling. Broadening engineering education curricula to include the humanities and social sciences that are essential to ensure the responsible design and development of digital technologies, will also contribute to a more diverse student population.

Protection

Protecting humans refers to the need to safeguard human well-being. This goes beyond issues of security and safety, privacy and data protection, but should first and foremost ensure that universal human rights are guaranteed and contribute to the achievement of 17 Sustainable Development Goals (SDG's) that the United Nations have formulated for the 2015-2030 period. These include fighting climate change, poverty and hunger, and striving for gender equality, good health care and good education.

Experience shows that digitisation often leads to unintended consequences and new risks that might endanger core public values. The widespread use of digital technologies is eroding the capability to level majority sentiment, traditionally a function of democratic institutions. On the one hand, the internet has rendered the diversity of citizens’ views more salient, and has proven a powerful medium for discontented citizens to put pressure on the democratic institutions and force changes in policies. People who entertain extremist opinions are now able to connect with like-minded people, and to voice their opinions without any regulation or control. On the other hand, AI and big data are creating possibilities to generate and distribute fake and misleading information, and personalise content to exacerbate the feelings of individuals and (radical) groups.

Engagement

Engagement for social transformation refers to the question of how people can be engaged to deploy digitisation for a sustainable future for people and planet. More specifically, the question arises how digitisation can contribute to the 17 Sustainable Development Goals.

The responsible development and use of digital technologies requires to ensure participation and inclusion.

The responsible development and use of digital technologies requires to ensure participation and inclusion in ways that both represent social acceptance and ethical acceptability of the systems being developed. Social acceptance can be viewed as a combination of individual feelings, perceived benefits and risks. It is also a social process in which people are influenced by various types of interactions. Available information and alternative views are important for social acceptance.

Unfortunately, what is beneficial for humans as consumers, free services, is not beneficial for humans as citizens, because of the loss of privacy, no control of data and giving too much power to only a few companies.
How to empower humans?

In the field of education and training, programs can be offered to help people of all ages develop digital skills, computational thinking and digital literacy. For people who want to dig deeper, coding lessons are a great way to empower them to write their own computer programs and better understand the workings of the software they use every day.

Finland and the Netherlands already offer free national online courses to educate citizens in the field of Artificial Intelligence. The Finnish AI course is for everybody, freely available in English. At schools courses can be introduced for groups of students building little robots. This has the advantage that it combines skills needed in the digital world (like programming and computational thinking) with skills needed in the physical world (engineering, designing, testing, cooperation) and it also has the advantage to discuss various aspects of the digital world. How to make a robot safe? Which values should be embedded in a robot? What are ethical good and what harm?

Even though the history of computing shows great achievements by women already in the early days (e.g. the pioneering thinking about coding by Ada Lovelace in the 19th Century, long before the first real computer was built, or the role of women in breaking Nazi codes during the Second World War) the number of women in computer science in Western countries has dropped sharply after a peak in the late 1970’s and early 1980’s. According to the British professor of computer science Dame Wendy Hall, this is the result of the way personal computers were marketed after the first real computer was built, or the role of women in computing. Women could only use it if they were married or they were going to become a wife; the computer science was a male-only domain at that time.

Inclusiveness should not only be about including more women, it should also be about including people from more diverse ethical and social-economic backgrounds, as well as people with disabilities.

Empowerment should also be used to close the digital divide within countries and between countries. At present about 95% of the world population has access to the internet.

Even though this is a great achievement, it also means the 5% has no access. This leads to a digital divide between people who can benefit from online services on the internet and those who can’t. And as those services are becoming more and more powerful (information search, communication, e-shopping, e-health, e-government, e-banking etcetera...) the digital divide in turn leads to a power divide. Closing the digital divide is therefore a priority in any scenario for the digital future. The digital divide should therefore be a priority in any scenario for the digital future. The digital divide within countries and between countries.

Empowerment should not only be directed towards individuals, but also towards public institutions like schools, universities, libraries, cultural institutions and hospitals. Especially in Europe such institutions have a rich history in delivering goods and services for the public benefit.

How to protect humans?

First of all, humans need to be protected by ensuring that digital technology is designed and used responsibly. This is an aim of governance. It is up to governments and citizens to determine how much liability should be regulated for example, as for liability in a self-driving car. Many people are afraid of the implications of autonomy. The General Data Protection Regulation (GDPR) has the aim of protecting personal data. It also demands that companies keep the data they collect for as short a time as possible. The biggest threat to the protection of personal information is fake news.

In addition, technologies can be developed to filter misinformation and fake news, or at least to give a warning that some information might be fake. Platforms like Facebook and Twitter should do much more to fight the intentional spread of false information. If self-regulation of such platforms doesn’t work, and unfortunately it doesn’t, then regulation on national and international levels is needed.

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How to engage humans?

The most significant form of engagement in a democracy is voting: both in local, regional and national elections, and also via referenda. But engagement of course includes much more than voting. Citizens can express their opinions in the media, in public debates, they can join civil movements and other public organisations. They can join trade unions and organise protests. These are all classical forms of engagement. But new digital communication platforms have changed the communication landscape fundamentally, by allowing communication to become fast, cheap, global, direct and by giving everybody with internet access a voice.

It’s still an unsolved problem of how the new digital tools can best be used to engage people.

On the one hand, digitalisation has definitely broadened the ‘public square’, the imagined space where people collectively debate what they want in a society. More people than ever before in history can give their opinion in public. But on the other hand, digitalisation has led to a fragmentation of the public square. We are not all hearing the same debate anymore, we can all create our own personalised media experience. It’s still an unsolved problem of how the new digital tools can best be used to engage people.

What is definitely important for engagement is that there is a broad consensus on what the aim of the engagement should be. In this respect it is a victory that many nations and businesses have agreed on the United Nations 17 SDG’s.

Obviously such complex societal problems can never be solved by digital technologies alone, but each of the SDG’s digital technologies can be identified that can contribute partly to solving them. Some examples are automatic analysis of satellite images to predict harvests, precision agriculture that uses data analysis and agriculture robots to save on water, energy and pesticides, and medical diagnosis via smartphones in areas in developing countries where people do own smartphones but lack a sufficient number of doctors.

Since 2017, the UN, together with the International Telecommunication Union (ITU) and XPRIZE, has been organizing the annual AI for Good conference in Geneva. Here representatives from science, industry, government and non-governmental organisations come together to discuss the question how AI can help achieve the 17 SDG’s. A recent scientific paper co-authored by one of us Virginia Dignum (VD) concluded: “AI can enable the accomplishment of 134 targets across all the goals, but it may also inhibit 59 targets. However, current research foci overlook important aspects. The fast development of AI needs to be supported by the necessary regulatory insight and oversight for AI-based technologies to enable sustainable development. Failure to do so could result in gaps in transparency, safety, and ethical standards.”

AI, however, is only one of the digital technologies. In the context of thinking about the digital future, it would be good to broaden the scope to other digital technologies and ask the general question of how digitisation can best contribute to achieving the SDG’s.

Last but not least, the SDG’s would need to become more widely known among ordinary citizens. Most people know about climate change, too few know about other important SDG’s. Here lies a task for governments, businesses, NGO’s and media to more effectively communicate the SDG’s and the way digital technologies can contribute to solving them. Very inspiring in this communication is how the right balance between raising awareness for the problems on the one hand, but on the other hand also showing positive examples of what already has been achieved with the help of technology, like prolonged life-span, reduction in early childhood deaths and a reduction of infectious diseases to name only a few. Positive examples from the past can prevent fatalism and inspire possible solutions for the future.
Running through all the three enablers (empowerment, protection and engagement) is the question of human control. We now discuss two models for human control: First, designing technology so that our values are built-in from the beginning. And second, the concept of ‘human plus machine’ instead of ‘human versus machine’.

A piece of digital technology should not just do the thing for which it was functionally designed, it should also do it right, meaning that its wider impact on society is in accordance with our values. Values can range from privacy and equality on the level of individuals to sustainability on the level of society. Technology ‘doing it right’ means that societal, ethical and legal requirements should be embedded in the design from the beginning.

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Embedding values in design

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All too often technology is designed only with functionality in mind, without thinking ahead of the ethical and societal consequences that the technology might cause.

Let’s look at three examples.

Google Glass, a smart glass released on the market in 2013, is an example of a technology that was rejected by society because of its intrusiveness on privacy. Wearers of the Glass could potentially record all they were seeing without people noticing and without any permission by the people being recorded. On top of this was the fear that automatic face recognition would enable the Glass-wearers to display information on people in public spaces to the Glass-wearers. Google Glass showed a mismatch between the values embedded in the technology and the values considered important by society.

In October 2018, Amazon decided to stop using a recruitment algorithm. The algorithm appeared to systematically disadvantage women compared to men. This is just one of many examples from recent years in which algorithms were found to discriminate in decisions about people. The Amazon-recruiting algorithm used historical data that were biased against women. By thinking about the values that are implicitly embedded in the historical data, the designers could have embedded our present values better in the design of the recruitment algorithm.

The design of Twitter and Facebook news feeds is optimized for a maximum number of likes by users. This has led to the amplification of extreme opinions and fake news. Both types of information trigger our emotions which leads to more likes and clicks. This is a clear example of how the design impacts the value of users and society.

A successful example of embedding values in design is a privacy-friendly camera system for crowd control. In crowd control you only need information about how many people are in which place, but you do not need to know who they are. The system works by ‘coarse-graining’. The camera system automatically blurs the faces of all people so that they cannot be identified. In the end the value privacy is embedded in the crowd control system from the beginning.
Red Burns, the creator of the Interactive Telecommunications Program at New York University — also called ‘Godmother of Silicon Alley’ (New York’s technology district) — once said: “Don’t see the world as a market, but rather a place that people live in — you are designing for people, not machines.”

Humans are always part of any digital system: humans do the design, humans define the technical requirements, humans incorporate moral and ethical values, humans build, maintain and update the digital system. Therefore, every digital system, however autonomous it might seem, is still essentially a human-machine system.

Furthermore, whenever a new technology is implemented in an organisation, it changes not just the work that individual people do, but also how people function as a team. Often there are unforeseen side-effects. An interesting example is the introduction of a tele-operated robot in the operating room of a hospital. Because the surgeon tele-operating the robot does not stand anymore next to the operation table and the assistants, the communication between the surgeon and her assistants changes from using gestures or body language to speaking, in order to bridge the much larger distance. The whole operation team has to learn to communicate effectively in a new way.

In addition, the assistants suddenly get more important tasks to do, like helping to place the robot arm better in the patient, a task for which the assistants traditionally have not been trained. These are all changes that the assistants probably have not been trained for. Often there are unforeseen side-effects. An interesting example is the introduction of a tele-operated robot in the operating room of a hospital. Because the surgeon tele-operating the robot does not stand anymore next to the operation table and the assistants, the communication between the surgeon and her assistants changes from using gestures or body language to speaking, in order to bridge the much larger distance. The whole operation team has to learn to communicate effectively in a new way.

By realizing in which tasks machines are better than people and in which tasks people are better than machines, we can think about how we can combine the best of both worlds.

Empowering humans can be done via education and training, inclusiveness and closing the digital divide. Protecting humans can be done via governance, human rights for the digital age, fighting misinformation and culturing the public, non-commercial role of digital technologies. Engagement for social transformation can be facilitated by fair democratic processes, fact-based balanced and non-polarising public debates, and by taking the UN’s Sustainable Development Goals as a common aim.

Finally, in order to develop human centred digital technologies, core human values need to be embedded in the design and it should be realised that in many applications the combination of human and machine is more powerful than either the human or the machine in isolation. At the heart of the digital society should be the idea that humans should flourish more with than without digitisation. Digitalisation should never be an aim in itself but always a tool for expanding human capabilities and improving people’s lives.
Chapter 08

08 THE ROLE OF HUMANS IN THE DIGITAL SOCIETY

Virginia Dignum

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Bennie Mols

Contribution Science journalist for NRC Handelsblad and others such as Delft University of Technology, European Science-Media Hub (EEM) and the Association for Computing Machinery (ACM). Bennie Mols is a science journalist, author and speaker with more than twenty years of experience. He specialises in Artificial Intelligence, robots and the human brain and has written more than 500 popular-scientific articles for various media. He has written four books (translated into English), Robotics for future presidents and Turing's Tango (in Dutch only - about Artificial Intelligence).

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Public value, platform capitalism and digital feudalism

Alternatives to the extractive new-feudalistic behaviour of big tech platforms

By Mariana Mazzucato, Rainer Kattel and Parminder Bahra
It’s mid-March, 2020. Italy is at the forefront of the epicentre of the COVID-19 pandemic; infections rise exponentially, intensive care units are at risk of being at full capacity and hospitals in danger of being overwhelmed. The Italian government imposes some of the toughest restrictions on movement anywhere with drastic limits on travel; schools and universities remain closed and outdoor gatherings are forbidden.

“There were north of 700-800 deaths per day”, says Luca Boschin, “but most of the people we knew didn’t really care. You would go around the streets and notice people gathering together. It was crazy. We thought, maybe there is an opportunity to inform people in a different way, that what they were doing was going to make the crisis worse.”

“So we came up with the idea of accessing publicly available Instagram pictures and videos, apply them to our visual AI technology and see if we could understand if and where these gatherings were happening. We could produce a report that would help influence people to change once it was released to the public.”

Boschin is co-founder of LogoGrab (soon to be rebranded Visua), an AI-visual recognition firm that works with major global marques to assist with brand protection, authentication and identification of counterfeit products online.

The other half of the “we” Boschin refers to is Andrea Stoppa, founder of Ghost Data, a collective of tech experts who come together to produce reports and research that are in the public interest. “The group’s work is unpaid. They, like myself, have day-jobs as tech consultants or similar, but at night they come together to produce reports that have an impact on society,” says Boschin.

The COVID-19 research was illuminating. Of the half a million images scraped from social media platform Instagram, they found 1,316 violations to the restrictions. Half of these were taking part in group activities, 26% were spending time at the beach and 17% were out in parks and parkland.

When Facebook, the owners of Instagram, found out about the report they told Stoppa and Boschin to cease scraping their data. “The tech giants don’t want anyone to use their data. Facebook’s concern was that we were processing their data to resell it but we tried to explain to them that this is just something that we did last year, you know, we are seeing our friends and family dying and we’re trying to give a hand.”

PUBLIC VALUE, PLATFORM CAPITALISM AND DIGITAL FEUDALISM
Ghost Data and LogoGrab were going to produce more reports and behavioural insights but decided not to after Facebook’s intervention.
We have just described a case of platform capitalism: over the last two decades, firms which leverage data aggregation and create multi-sided markets—digital platforms—have come to take a predominant place in the corporate landscape. The most commonly referenced of these firms, the US-based tech giants—Alphabet, Amazon, Apple, Facebook, Netflix, Microsoft, and Uber among others—are platforms for products, consulting, search, e-commerce, operating systems, and digital advertising, respectively.

Capitalism has always excelled at creating new desires and cravings. The big platforms, however, have both accelerated and inverted this process. Rather than just creating new goods and services in anticipation of what people might want, they already know what we will want, and are selling our future selves. The algorithms, processes, and data used to generate gender and racial biases, and can be manipulated for profit or political gain.

Thus, the battle for personal data comes as no surprise. It is becoming clear what people stand to gain and lose as we all become wellbeing platforms. The increasingly well-connected world, and the data that digital platforms, algorithms, and big data could be used to generate public services, working conditions, and the wellbeing of all people. However, these technologies are currently being used to undermine public services, promote zero-hour contracts, violate individual privacy and personal data, and undermine all the interests of profits.

This chapter shows that the monopolisation of data and rent extraction is not the only game in town. Rather than just private profit, public value can be generated through data collection, analytics and innovative new business models and digital platforms. From digital services for dealing with the COVID-19 pandemic and saving our oceans to making climate affected communities more resilient and small-scale fishers in the Global South report ocean data in exchange for mobile phone top-ups.

Fundamentally, creating public value means governing the public interest in a manner appropriate to 21st century viewpoints. Governments can and should be shaping digital markets to ensure that collectively owned value serves collective ends. This means making sure that the way that intellectual property rights and data neutrality are structured is aligned with societal values.

Owing to concerns in the early days of the Internet about official misuse of data, much of the current data architecture was built by private companies. But governments are now using enormous potential to improve the efficiency of the public sector and to democratize the platform economy.

We show that there are clear alternatives to the extractive, new-feudalistic behaviour of big tech platforms. These alternatives tap on public cooperation and value being at the heart of public-private collaboration.
Platform capitalism is extremely good at value extraction. Just as landowners in the seventeenth century extracted rents from land-price inflation, and just as robber barons profited from the scarcity of oil, today’s platform firms are extracting value through the monopolisation of search and e-commerce services. Yet, as the case of Ghost Data and LogoGrab shows, platforms can take very different forms and shapes, and they can, if properly governed, generate value for all actors in a given ecosystem. We need to have a better understanding of how value is distributed among users, various supplier firms, and the platform itself. This is why platform governance has become one of the most important issues for the future of capitalism. We should aim towards a transformative approach to the nature of the digital economy—away from the data-extractive practices and towards a privacy enabling, agency building economy.

Platform governance for public value should focus directly on the prevailing business model of platform capitalism, and especially on the source of economic rents. Breaking up large companies will not solve the problems of value extraction or abuses of individual rights. There is no reason to assume that many smaller Googles or Facebooks would operate differently or develop new, less exploitative algorithms.

Creating an environment that rewards genuine value creation and reduces value extraction is the fundamental economic challenge of our time. Of course, some will argue that regulating the platform economy will impede market-driven value creation. But they should go back and read their Adam Smith, whose ideal of a “free market” was one free from rents, not the state.

We must ensure that the explosion in data serves society’s interest and not just that of a few large companies. We must identify data, digital platforms and other emerging solutions that can underpin public value to increase the welfare of communities and broader society, such as that identified by Ghost Data and LogoGrab in the examples shown before. Where data is privately owned, we must ensure that actions operating for public good have access. Conversely, private entities should have access to public data but leveraged on favourable terms for the state. Finally, we should explore whether the private sector can play a role in enhancing the economic welfare of society through its ownership and use of data.

The scale of the challenges should not be underestimated but it is clear, as we will show, that public value can be generated through alternative governance models to establish communities as they take on society’s biggest challenges. Key to this is to rethink the fundamentals of capitalism—business produces value, governments redistribute it. We argue that innovation is a cumulative process embedded in institutions and contractual relationships. This assumes that the value created through innovation is collectively generated by a range of stakeholders, including the private sector, the state and civil society in other words, the market and the economy itself are an outcome of the interactions between these sectors.

Data and digital infrastructure create new ways to tackle global challenges; yet we need to rethink the relationship between the market and public sector to take advantage of this potential.
The COVID-19 pandemic

The coronavirus pandemic heralded a new era of collaboration between the government and public and private sectors. Researchers at universities and companies around the world raced to develop a vaccine and develop new digital tools to help counter the pandemic. Dozens of new vaccines were put forward for preclinical development while a handful entered clinical trials within a matter of months. While there has been significant investment, success can only be achieved if there are clear and transparent rules of engagement based on public-interest goals and metrics. A critical step is to adopt a mission-orientated approach—a clear purpose—that focuses both public and private investments on achieving a clearly defined common goal, for example developing an effective COVID-19 vaccine that can be produced at a global scale and made universally free.

Could a similar mission-orientated approach in respect of data have allowed Ghost Data and LogoGrab [See Ghost Data case study] to produce public value from the Instagram data? In this case, a collection of private individuals provided pro bono work to use a private sector platform’s data to deliver research findings to support public health authorities facing a national crisis. Ultimately, the private sector entity didn’t want this public value to be generated.

Diana Coyle of Oxford University warns that “policymakers need to recognize the urgency of the challenge to focus on new and developing data-driven policies, and regulations. Otherwise, the gains of the data age will be seized by a small number of big companies, and much of the potential benefit to society will be squandered.”

To get real about value we need to understand how platform algorithms allocate value among consumers, suppliers, and the platform itself. Failure to embrace public purpose within data will result in private sector rent-seeking activities and the public value that could save lives or energize the economy will remain trapped in the servers of a handful of tech companies.

Rather than simply assuming that economic rents are all the same, economic policymakers should be trying to understand how platform algorithms allocate value among consumers, suppliers, and the platform itself. While some allocations are driven by competition, others are driven by value extraction rather than value creation.
The oceans, climate emergency and public value

The most ambitious public organisations—those that invented the welfare state, put a man on the moon, created the Internet, and are today funding renewable energy and climate targets—operationalised the platform model in ways that emphasise the need for collaboration between both private and public sectors. They also provided the vision and purpose that extended beyond the day-to-day politics of the moment.

One such goal, which one could argue is universally accepted, is the protection of our oceans. Battered by climate change, pollution and illegal, unreported and unregulated fishing, the lungs of our planet are under serious threat.

To mitigate these threats, scientists, governments and the private sector need access to the “data tsunami” that is being captured through new technology such as satellites, autonomous underwater vehicles and other platforms, based on information and data streams from social media, smartphones and low-cost sensors. Used in conjunction with data from other sources, they can create a real-time understanding of what is happening to our oceans and their habitats.

There is, however, a problem—ownership. According to a study, conducted for Ocean Conservancy, 5% of the data on what is happening to our oceans and their habitats is not accessible to anyone who cares to access it even if that data are accessible, current data management techniques within science research make it impossible for the information to be shared.

One of the most ambitious data collection efforts in developing countries is Fishcoin Technology’s Fishcoin application which incentivises fishers in developing countries to provide data on their catches in exchange for mobile top-ups.

Fishcoin provides an alternative business model where data and the platform provide value and incentives to not only provide data in the fight against overfishing but also encourage fishers to act in a sustainable way and therefore make progress toward mission-oriented goals such as the UN’s Sustainable Development Goals.

In order for such platforms to scale, the public sector needs to take purposeful action in collaborating and supporting these actors.
“The data was turned into a public good and placed in the public domain, while at the same time preserving privacy, ethics and security by design via the use of strong cryptography,” explains Bria.

The municipal e-government platform, called DECODE, is one of the innovations that underpins Barcelona’s approach to data commons, as the Commissioner of Digital Technology and Innovation for the City of Barcelona and project coordinator of the pilot programme, Digital Democracy and Data Commons (DECODE), Fracesca Bria explains. It is part of the EU-funded DECODE (Decentralized Citizen Owned Data Ecosystem) project also led by Bria which creates legal, technological and socioeconomic tools to allow citizens to take control over their data, their common good.

"Underpinning DECODE are the ‘data commons’, a broad range of initiatives and organisations, who collectively decide on the rules that govern access to it. Those involved in the pilot were given access to various apps which allowed them to manage the permissions around their data; who gets access to it, how it is shared and for which purposes. They also received physical and digital copies of sensor data and insights and that ‘story data’ from community members should be just as important in the process of understanding what to prioritise in a succession of these events. Combine the community’s observations and you have very powerful, engaging and tangible stories that explain the impact of climate change where they live and they work.

The platform provides real-time data that every story has incredible data and insights and that you can pull these data from community members previously not engaged in decision process who are now engaged and see in their community, how they are changing and adapting to known climate changes".

"Our data show the planning model is broken in a number of ways", says Drapkin, who adds that they “constantly see differences” between SewaChange data and the public and private data that is used by city planners and the construction firms employed by them.

“People post pictures and leave comments on the platform about changes they have noticed in their neighbourhoods, such as unusual levels of cloud cover, humidity, dew point, air pressure and wind speed. Users post pictures and leave comments on the platform about changes they have noticed in their neighbourhoods, such as unusual levels of cloud cover, humidity, dew point, air pressure and wind speed. They have noticed a number of problems that are not covered by the sensors - things like noise, temperature, humidity and pollution which they could use to influence local policies. It is important for visualisation of the data collected and presented in real-time, how local decision-makers and citizens are slowly starting to take this data into account when making decisions".

The mechanism through which communities are expected to assure their consent is also not working, says Drapkin: “I guarantee you, somebody with three kids and two jobs isn't coming to your four-hour workshop on Saturday. Civic engagement itself is a luxury that most people who are impacted by climate change can’t afford.

Sharing the SewaChange apps can make a space for communities to engage and participate and claims how “foul play is engaged in engagement over traditional approaches while adding that the public becomes a partner over time when there is a consistent dialogue with them about climate change”.

For all the talk of public value, SewaChange is, in fact, a private sector organisation: “This is just not sustainable in the public-private space. We work directly with cities and also private companies, such as engineering firms, who have been hired by them,” says Drapkin. “It’s the mix of qualitative data -intensity, heat, flood heights under storm surge -and qualitative data (picture in a unique ending to our clients).”

But what about the community’s data? What is the damage? Not that there is no manipulation. "In the past, people used to live in the data that we collect. We don’t want it being passed on to actors we can’t control between the public and the private sector. This is public space, not a designated area of the public, is it an attention economy, is it earning in the economy space.

"ISeeChange is not designed to be extractive of your time, it is not an extractive market of time and energy. Information sharing is the driver for change within these communities, says Drapkin, in stark contrast to the dominant social media platforms. "Of course, I guaranteed for the data that we collect. The public is impacted by climate change can’t afford."
Innovation does not only have a rate of progression; it also has a direction. The threat posed by data hoarders, rent-seekers and other technologies lies not in the pace of their development but in how they are being designed and deployed. The challenge for us is to set a new course.

Digital capitalism offers us starkly different options: global and largely extractive platform economies or local community-driven yet highly interlinked global digital value creation for tackling grand challenges.

Digital technology will not make the choice for or against these options: the choice will have to be made through reforming existing governance structures of platform capitalism.

And for this reform agenda, we need a public sector capable of developing a digital platform innovation ecosystem that produces value for all and penalises rent extraction through regulation, anti-trust and tax policies.
Chapter 09

PUBLIC VALUE, PLATFORM CAPITALISM AND DIGITAL FEUDALISM

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Bibliography


10 Urban autopia (self driving vehicles)

Mobility and sustainability in the cities of the future

By Raúl Rojas and Rene Millman
It’s the year 2050. Jane has a meeting in Barcelona in a few hours. She asks her smart mobile device to order an autonomous taxi to take her to the airport for a flight from Berlin. The car drops her off at the terminal. While in the car, she has already checked-in: so it is a walk-through security and onto her flight on a zero-emissions electric plane. Once in Barcelona, she uses her smartphone and calls for an autonomous rideshare shuttle to her final destination.

Autonomous cars are expected to ease commutes, make driving safer and increase the quality of urban life. They promised to transform the future, but one step that is easy to forecast is the imminent rise of the fully autonomous vehicle. PwC estimates 40% of the mileage driven could be done in autonomous vehicles in 2030. Their impact represents a challenge for the city as we know it, since cars will have to understand the urban environment and cities will have to evolve in order to accommodate such smart vehicles.

Mobility is key to making our cities liveable; it enables people and goods to get around. However, in large cities we are witnessing its increasing degradation. The number of city dwellers in the world will reach 6.3 billion by 2050, from 3.6 billion in 2010, according to the United Nations. It is estimated that 85 per cent of the population will be urban by 2050. With such massive increase in population, there is very likely to be an increase in congestion and commuting times. In turn this would increase the cost of transportation and emissions.

It is clear that modern metropolises face a great challenge in improving mobility for their citizens. The problems facing politicians, transportation experts and urban planners centre around increasing safety, easing congestion, and improving accessibility. Of course, there are also growing environmental concerns. To respond to these issues, we have to move away from the old urban paradigm to the new concept of smart cities, focused precisely on mobility and connectivity concerns.

There are several stages to make sure cities continue to be liveable. The cities themselves will have to devise innovative solutions around transport. Financial support needs to be available at a national and local level to help cities adopt new technologies. Autonomous vehicles can play a fundamental part in tackling the challenges around developing smarter and safer cities.

**Chapter 07**

**URBAN AUTOPIA (SELF-DRIVING VEHICLES)**
There are several stages to make sure cities continue to be liveable. The cities themselves will have to devise innovative solutions around transport.
As more urban areas embrace the idea of becoming smarter, autonomous vehicles play an essential part in that advance. The main reason for smart cities is to correct the errors in the traditional urban landscape. Congestion is the main issue plaguing cities. The emergence of autonomous vehicles has the potential to bring important benefits to society by reducing the need for private car ownership. This means a decrease in congestion as people share autonomous vehicles and use them alongside existing public transport.

Autonomous cars will work in tandem with smart city infrastructure—such as sensors, data sharing and analytics—to increase road safety. Along with safer vehicle behaviour and reaction times, autonomous vehicles could markedly decrease the number of people killed on roads.

Future cities also need to take into account the needs of all its citizens. Autonomous vehicles could provide improved accessibility for disabled people and the elderly that are cheaper than existing options.

While this sounds great, there are possible difficulties that may appear from the introduction of autonomous vehicles if the appropriate regulation is not in place. If an autonomous vehicle becomes non-operational when confronted by unforeseen weather conditions or unidentified obstructions, it could become a roadblock for all other road users. The disabled and elderly may well benefit from autonomous cars if they are not fit to drive themselves but could find themselves cut off from using such services if they need assistance getting in and out of vehicles. There is also a risk that autonomous vehicles are deployed well before private car use has decreased, which could, in turn, create more traffic. This may be made worse if autonomous vehicles drive around without passengers, waiting to be used.

Regardless of potential advantages and disadvantages, what is the situation today and how do we plot a course to an autonomous future?
The present

Today, you just can’t walk into a car showroom and buy a fully autonomous car as there are none currently available in the market. There are cars with driver assistance systems, such as cruise control, lane keeping and collision avoidance, but these still require drivers to keep their hands on the wheel at all times in case they need to take control in an emergency.

For a fully autonomous car to go on sale to the general public, it will need to be designed, developed, tested, produced, approved, and marketed. This will have to happen in conjunction with the creation of new legislation and infrastructure to support such vehicles.

Until then, there are trials around the world aiming to find out how ready society is for self-driving cars and how they will use them. In Las Vegas, Dell, an experimental fleet of 50 autonomous vehicles provide an on-demand car service similar to Uber. SoftBank is testing a self-driving company, Apas, to provide private service. However, safety still sits in the back for safety reasons.

A UK government-backed consortium has launched trials in London with volunteers riding as passengers in the vehicles, which are currently operating in test routes in Croydon and Bromley. London, British company Kars is leading the project by supplying the software that controls the vehicles, which has been developed and trained on UK roads. The trial is running through a consortium called StreetWise, which includes car insurance company Direct Line Group and TfL, an independent organisation focused on transport innovation. A crucial part of this testing is to find where autonomous vehicle systems fail and what can be done to ensure safety.

French car manufacturer PSA Group is conducting tests in the Spanish city of Vigo into the impact that autonomous vehicles on city streets will see profound changes in how our future cities function and how they are set up.

How autonomous cars will change cities

As autonomous vehicles begin to change the way people move in cities, the urban environment will have to drastically change in terms of infrastructure to accommodate them. Autonomous vehicles will improve the efficiency of road use, increase the sharing of cars, reduce congestion and combat climate change.

Currently, most vehicles are involved for about 96% of the time. The requirement for a large parking space surface has resulted from the huge rate in car ownership. The cars are parked on the roads or large car parks, both taking up space in urban areas.

However, autonomous vehicles do not need to remain at a destination. They could be dropped off before an origin and picked up by other passengers. When not needed, these vehicles could park on the periphery of the city, in the parking lots of large malls, and needed again. This is borne out by two studies.

Recent studies have shown that if all trips in a city were carried out by a fleet of self-driving cars shared by users, autonomous vehicles would not need parking spaces, as they can be dropped off at any point. That is, a 2% cost of conventional cars could become unnecessary under certain conditions. This means that large amounts of public space could be freed up to other uses.

According to data from Singapore, the MIT (Massachusetts Institute of Technology) and the Swiss Institute of Technology (ETHZ), and the Institute of Transportation Studies at the University of California, Berkely, autonomous vehicles may not need traffic lights. Researchers at the Massachusetts Institute of Technology and the Massachusetts Institute of Technology have developed a system which allows autonomous vehicles to enter traffic lights. This is based on a situation where vehicles equipped with sensors pass through intersections by communicating and remaining at a safe distance from each other, rather than coming to a halt at traffic lights. The system should be flexible enough to accommodate pedestrians and bicycles crossings with vehicular traffic.

While autonomous vehicles can take over the roads, cars would be repurposed for other uses, they would need wireless networks and communications infrastructure to ensure they are in order and available for one user. If everything is automated, we shall see what will be needed to make the future reality.

A massive decrease in the number of cars on the road could also lead to less money spent on road construction and maintenance as thoroughfares will last longer and fewer lanes will be needed for vehicles.

In addition to freeing up valuable real estate, autonomous vehicles could not need as much real estate to build roads. Fleets owned and operated by ride-sharing service providers could fill the gap between people who walk or cycle and public transportation.

This will drive down the need for car ownership. According to PwC’s report titled – The future of urban mobility by 2020, the stock of cars could fall from 690 to 200 million in Europe and 570 to 200 million in the United States. By the same timeframe, more than one in three kilometres driven will be under one of the many forms of vehicle sharing. There will be less need for car parks.

A massive decrease in the number of cars on the road could also lead to less money spent on road construction and maintenance as thoroughfares will last longer and fewer lanes will be needed for vehicles.

As autonomous vehicle systems fail and what can be done to ensure safety.

In a future smart city covered completely by autonomous vehicles, the roads may not need traffic lights. Researchers at the Massachusetts Institute of Technology and the Swiss Institute of Technology have developed a system which allows autonomous vehicles to enter traffic lights. This is based on a situation where vehicles equipped with sensors pass through intersections by communicating and remaining at a safe distance from each other, rather than coming to a halt at traffic lights. The system should be flexible enough to accommodate pedestrians and bicycle crossings with vehicular traffic.

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What infrastructure is needed?

A city serviced by fully autonomous vehicles will require the right infrastructure. While most talk has understandably been centered on the safety of such vehicles, there are other very important questions to ask: When will infrastructure be ready for self-driving cars? And what technology will be used and where will it be the most effective?

According to the KPMG’s Automotive Vehicle Readiness Index, the country with infrastructure most prepared for autonomous vehicles is the Netherlands, it is working with neighbouring nations to launch groups of autonomous trucks to transport flowers on major “Tulip Corridors” routes from Amsterdam to Antwerp and Rotterdam to the Ruhr valley. A town called Enschede, which has created a test bed for driverless vehicles complete with traffic lights, bus stops, skyscrapers and a rain machine that recreates its stormy tropical weather.

Before any infrastructure can be put in place, city planners will have to ensure that laws are in place so that it is legal for autonomous vehicles to operate and to safeguard the safety of passengers, pedestrians and operators alike.

Autonomous vehicles will not only require consistent regulations across multiple jurisdictions and standard road construction and renewal, but also vehicle signage, crash barriers, pavements and islands.
Chapter 10

10 URBAN AUTOPIA (SELF-DRIVING VEHICLES)

Sensors

City planners will need to include sensors on lanes, kerbs and pavements to enable autonomous vehicles to anticipate hazardous or unforeseen conditions well ahead.

Smart road signs

At present, autonomous vehicles use sophisticated image recognition to read road signs. Machine-readable signs could use wireless beacons that broadcast to traffic such directions as “keep right”. Such broadcasts would be detectable by vehicles but imperceptible to humans so as not to distract them.

Lane marking improvements

Car manufacturers have had to create complex sensors and maps to overcome the issues surrounding poor road markings. Autonomous vehicles will require reliable road markings to ensure the safety of passengers and other road users. In Canada, the operator of the 407 Express Toll Route (407 ETR) and 3M Canada, started testing in 2019 the use of high-visibility pavement marking tapes optimised for advanced driver assistance systems (ADAS) in the Greater Toronto Area. This high-visibility tape lane marking technology being put onto the road by 407 ETR is to help ensure both humans and machines can accurately judge their position on the road.

Reinforced roads

Autonomous vehicles could have a notable impact on the road surface because they will do what they are programmed to do. Such cars will be trained to stay in the middle of the lane, meaning that the weight of every vehicle will always be in the same two tracks. Humans don’t tend to do this and use all of the lane. To prevent these roads from developing hollow tracks, the software in the vehicles will have to be programmed to position the cars in the lanes taking this into account during daily rides.

Power and networking

The infrastructure that is essential to keep autonomous cars on the move will require power and networking to operate all of the sensors in needs and to communicate with cars. City planners will have to ensure that whether they build a new transit system or a motorway, there should be power and networking in place so that sensors can monitor traffic conditions.

Support facilities

Places of autonomous cars providing shared mobility will need facilities to service and charge vehicles. Smart city planners will need to create them, also for buses and trains. Parking lots that are no longer needed could be repurposed in order to provide these facilities. Support facilities should be located where the least disrupt the urban environment.

Idling and pickup areas

As mentioned earlier, autonomous vehicles could spell the end of the need for massive amounts of parking, but still these cars will need somewhere to go when not in use. Some car parks could be repurposed to provide a place for idling cars. Not only do they: these cars do not need space to open docks so the same used to park 10 traditional cars could be 67, according to a study carried out by researchers at the University of Toronto. The same used to park 15 traditional cars could fit 40 autonomous cars.

Traffic management systems and connected autonomous cars

Traffic management systems are already part of life in major cities. With the mainstream adoption of connected and autonomous vehicles, such systems can become smarter as these vehicles will be able to send and receive data from sensors dotted around a city. Connected vehicles using vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications, alongside IoT sensors and platforms, cloud infrastructures and data analytics will be used to predict road congestion, detect road incidents, and enable traffic to re-route appropriately. Autonomous vehicles will use data from smart traffic management systems to carry out changes in speed and direction without human intervention.
With city roads full of autonomous vehicles, new laws will have to be enacted. For example, in the event of an accident involving an autonomous car, who is at fault? Regulating responsibility is necessary.

In 2015, Volvo Cars president and chief executive Håkan Samuelsson said that the manufacturer would accept full liability whenever one of its cars is in an autonomous mode.

Prior to laws governing self-driving cars, there has been a lot of legislation to put in place to ensure that trials of autonomous cars can take place.

In the UK, the government has created the Centre for Connected and Autonomous Vehicles (CCAV) to work on legislation to enable testing on motorways and cities, including London and Coventry.

In Germany, the Autonomous Vehicle Bill was passed in June 2017, amending the existing Road Traffic Act, allowing a trial of highly and fully automated vehicles, while also fining drivers on-brand rights.

France established in 2016 a legislative framework that permits autonomous car testing on public roads. The French government’s aim is to deploy highly automated vehicles on public roads between 2020 and 2022.

Spanish legislation of autonomous-driving tests currently comes from an instruction approved in November 2015 by the Dirección General de Tráfico (General Direction of Traffic). The rule includes all self-driving cars up to level 3, the entirely full autonomy on all roads and any condition. The DGT has collaborated with Israeli vision technology firm Mobileye to turn Barcelona into a full-scale test laboratory by deploying a 5,000-vehicle fleet in the city equipped with Mobileye’s 8 Connect technology.

In the US, things are a little different. According to a report by Wired, in many states, companies testing autonomous vehicles don’t have to specify how many vehicles and where they are testing and how the cars are performing. At a federal level, the government does not appear to be monitoring this situation.

The Japanese government passed legislation in 2019 approving rules for生产经营自动车辆的立法，允许进行智能道路的立法。这将为未来使用自动驾驶车辆铺平道路。根据日本的修订道路交通法，具有自动驾驶能力的车辆必须配备交通数据记录器用于交通事故分析。

In August 2018, China launched national standards for testing smart autonomous cars on roads. The standards cover vehicle tests in 34 traffic situations, such as decelerating after sensing speed limit signs and stopping when pedestrians are recognized.

With laws and infrastructure in place, smart cities can start to accommodate autonomous vehicles.
There will inevitably be a period where driverless cars will share the roads with traditional cars with human drivers. That means cities will have to adapt to supporting both modes of transport for the foreseeable future.

Self-driving vehicles currently comprehend the road marking system they have been designed for, but in the future, they will have to be able to understand different national markings.

Road layouts have been designed for people driving; these would need adapting to ensure that there is a safe environment for all vehicle types.

Smart cities and autonomous vehicles will be crucial components of a future where mobility is considered a service rather than a privately-owned asset. The future will see ‘city operating systems’ that share data between local government, citizens, and mobility service providers to detect issues and model transport solutions.

A future where cities are smarter, more sustainable, safer and more habitable will require local and national governments to work with private companies and services providers to confront the technological, environmental, economic, and political components of creating smart cities. If done correctly, the results will be incredible and may just save the planet from ecological collapse.

How will we transition to smart cities fit for autonomous cars?
Chapter 10

The development of self-driving technology has been rapid, with significant progress made in recent years. This chapter provides an overview of the current state of autonomous vehicles, their impact on society, and the future of mobility.

### The Rise of Autonomous Vehicles

Self-driving technology has come a long way since its inception. The first autonomous vehicle was a remote-controlled car built by Thomas Davenport in 1885. Since then, the technology has evolved significantly, with major advancements in sensors, processing power, and algorithms.

### Challenges and Opportunities

While autonomous vehicles offer many benefits, such as reduced traffic congestion and improved safety, they also present significant challenges. These include regulatory hurdles, public acceptance, and ensuring the safety of the technology.

### Future of Mobility

As autonomous vehicles continue to evolve, they will likely play a significant role in shaping the future of mobility. This chapter explores the potential impact of autonomous vehicles on transportation, the economy, and society as a whole.

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Rene Millman and Raúl Rojas are interviewed by Rene Millman. Rojas is a professor of Machine Learning and Robotics at Freie Universität Berlin. He has been building mobile robots for 20 years and autonomous cars since 2007, when he took part with his students in the DARPA Urban Challenge. His vehicles have been driving in Berlin streets since 2011, when they obtained the certification for full autonomous driving (with a safety driver). The cars have driven Berlin streets since 2011, when they obtained the certification for full autonomous driving (with a safety driver).

### Key Quotes

- **Rene Millman**: "Self-driving cars affect and shape our lives. They have the potential to transform transportation, the economy, and society as a whole.

- **Raúl Rojas**: "We have been building mobile robots for 20 years and autonomous cars since 2007. The development of autonomous driving is critical for the future of transportation.

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Rene Millman is a writer and broadcaster who covers artificial intelligence, mobility, green tech, mobile technology, and infrastructure. Contributing journalists to The Guardian, Financial Times and other media such as Internet of Business, Computer Weekly, GC Media UK, IT Pro, he has made numerous television appearances to give his views and expertise on technology trends and companies that affect and shape our lives.