In this brilliant and extensive work, *The Organisation of Tomorrow*, Mark van Rijmenam dives deeply into the rapidly changing nature of organisations and the radically evolving notions of work in the 21st century.

Dr. Kirk Barne, Principal Data Scientist, Booz Allen Hamilton

"In *The Organisation of Tomorrow*, Mark van Rijmenam maps the landscape of today’s most disruptive technologies and presents a clear-eyed and actionable roadmap for putting data at the very heart of every strategic decision your company makes. If you’re looking for a compelling, practical guide to your own organisation’s future, there’s no better step to take than reading this book today."

Greg Verdino, Digital Transformation Advisor & Global Keynote Speaker

"An intriguing and thoughtful introduction to the current technologies and their applications which are already having a profound impact on companies, staff, and consumers alike. The future is set to change in dramatic ways, and *The Organisation of Tomorrow* will put you a step ahead."

Josh Ziegler – CEO, Zumata

"Mark van Rijmenam has written a superb executive guide to data, blockchain, and AI. The book presents hundreds of concrete examples to explain the actions that business leaders must take to remain relevant in today’s dynamic environment. This book is meticulously crafted and researched; it rewards the reader with insight, practical advice, and greater understanding."

Michael Krigsman – Industry Analyst and host of CXOTalk

The Organisation of Tomorrow presents a new model of doing business and explains how big data analytics, blockchain, and artificial intelligence force us to rethink existing business models and develop organisations that will be ready for human–machine interactions. It also asks us to consider the impacts of these emerging information technologies on people and society.

Big data analytics empowers consumers and employees. This can result in an open strategy and a better understanding of the changing environment. Blockchain enables peer-to-peer collaboration and trustless interactions governed by cryptography and smart contracts. Meanwhile, artificial intelligence allows for new and different levels of intensity and involvement among human and artificial actors. With that, new modes of organising are emerging: where technology facilitates collaboration between stakeholders; and where human-to-human interactions are increasingly replaced with human-to-machine and even machine-to-machine interactions. This book offers dozens of examples of industry leaders such as Walmart, Telstra, Alibaba, Microsoft, and T-Mobile, before presenting the D² + A² model – a new model to help organisations datafy their business, distribute their data, analyse it for insights, and automate processes and customer touchpoints to be ready for the data-driven and exponentially-changing society that is upon us.

This book offers governments, professional services, manufacturing, finance, retail, and other industries a clear approach for how to develop products and services that are ready for the twenty-first century. It is a must-read for every organisation that wants to remain competitive in our fast-changing world.

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**THE ORGANISATION OF TOMORROW**

How AI, blockchain and analytics turn your business into a data organisation

DR MARK VAN RIJMENAM

*The Organisation of Tomorrow*
This is a free preview. Purchase the full copy at Amazon:
https://amzn.to/31mL436
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Michael Krigsman – Industry Analyst and host of CXOTalk

“In this book, Mark takes us onto an in-depth and exciting journey on how organisations, our economy and society are transforming today. He navigates through the maze of new technologies and rewrites the change formulae for future success based on 4 key ingredients. That future captures our every digital touch points, predicts and gives it meaning to then distribute it as one single and decentralised source of the truth. In such a reality, the centrally organised managerial capitalist structures are making place for ecosystems that are creating value in a decentralised, self-governed way and where choices are guided by human progress instead of the fear for machine dominance. A must read for anyone with an ambition to stay relevant and profitable!”

Stephan Janssens – Organizational Transformation & Blockchain Strategist

“In The Organisation of Tomorrow, Mark van Rijmenam maps the landscape of today's most disruptive technologies and presents a clear-eyed and actionable roadmap for putting data at the very heart of every strategic decision your company makes. If you're looking for a compelling, practical guide to your own organisation's future, there's no better step to take than reading this book today.”

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Josh Ziegler – CEO, Zumata

“It is often said that the organisation of tomorrow will be a data-driven organisation. However, business people in today's world often fail to understand the ins and outs of the digital revolution. The fact that the Internet has been so pervasive means that such business people really have to get to grips with digital concepts such as blockchain, AI and the implications of how data can enhance the power of your business. As well as respect the rights of your customers. Mark is an expert in this area and has given us a very useful account of this topic in a little less than 200 pages. His analysis is thorough
and doesn't just rest on the positive sides. It also highlights some of the dangers of not using data-driven technologies properly. Furthermore, it encourages us to rethink the future of the Internet, not just for businesses, but for Society in general. This book is a must-read for all forward-looking business people who care about growing responsibly.”

Yann Gourvennec – Founder of Visionary Marketing and Program Director of the Advanced Master's in Digital Business Strategy at Grenoble Management School

“Our competitive landscape has changed, for good. This we all (hopefully) know. What is less well known is what the implications of this change entails for how we orchestrate our capabilities and assets to drive impact and value. The 20% of capabilities & assets that made us successful to date will not be the same as the new 20% critical to capture new economic value. Mark’s book provides thoughtful and pragmatic insights into the roles and implications of today’s emerging (but tomorrow’s table-stakes) technologies and how we respond to our changed competitive environment. Making sense of these changes requires navigation as to what to do when – which he provides.”

Ralph Welborn – CEO of CapImpact

“New technologies and startups are disrupting traditional business models and challenging legacy organizations to think differently. Mark offers his perspectives for organizations on how-to think about leveraging emerging tech such as analytics, blockchain and AI with an eye towards transforming their business into more data-driven organizations. This book is very relevant for business leaders who are interested in preparing their organization for a more digital future.”

Mike Quindazzi – Managing Director, PWC

“The world is changing at an ever-faster rate as the internet and digital become the drivers of commerce today. With new technology comes new opportunities and Van Rijmenam dives in and explains Blockchain, Artificial Intelligence and Big Data; not in a technical way, but in a way that senior business leaders should easily able to digest.”

Timothy (Tim) Hughes – CEO and Co-Founder of Digital Leadership Associates

“A compelling read for every data-driven organization who needs to excel and innovate in the rapidly evolving digital world.”

Ronald van Loon – Top 10 Global AI, Machine Learning, Big Data Influencer

“The book provides a new perspective on how AI, blockchain and analytics can transform a traditional business into a data-driven enterprise. Starting with datafication, the $D^2 + A^2$ model will equip digital economy leaders to
engineer a data-driven transformation, powered by some of the most profound technologies of our time. Ultimately to become one of the innovative organisations that will thrive in the new era in business. Avoiding this book would be akin to avoiding the incredible opportunities and challenges that lie ahead for authentic digital economy leaders.”  

Rob Llewellyn – Chief Executive and Founder of CXO Transform

“In his brilliant and extensive work, The Organisation of Tomorrow, Mark van Rijmenam dives deeply into the rapidly changing nature of organisations and the radically evolving notions of work in the 21st century. The organisation of tomorrow is no more likely to look and behave like the organisation of yesterday than the world of tomorrow is likely to have much resemblance to the world of yesterday. Mark expertly addresses the drivers and inevitable consequences of the current ubiquitous digital disruption that has become an unstoppable force of nature, human nature, in organisations everywhere. Yes, humans are the creators and beneficiaries of these disruptive forces, due to our curious, creative natures, through our incessant innovation and insertion of new emerging technologies into our life and business processes on time-scales that are becoming extremely much shorter than the lifespan of a typical person’s career or a typical organisation's existence. Mark takes a deep and wide view of the transformations and disruptions that are taking place. Mark examines these changes from the complementary perspectives of the worker and of the workplace. In particular, Mark illustrates how the notion of work is evolving rapidly at the frontier of the human-machine interface, where the AI that matters will be automated, augmented, assisted, accelerated, and adaptable intelligence. Mark further describes in wonderfully rich detail the emerging digital organization within the context of the three main drivers (data, blockchain, and AI) that define a new $D^2 + A^2$ model for the organisation of tomorrow that he introduces to us in this book. Ultimately, we learn from Mark that the future organisation's success in the global arena will be measured in the three dimensions of trust (enabled by blockchain), efficiency (enabled by AI), and effectiveness (enabled by deep insights that are delivered through data from ubiquitous sensors). The internet of things may just as well be called the internet of insights. The size of an organisation will no longer be a metric of success. As the number of new emerging technologies continues to grow every year, we can be thankful that the most significant ones are converging into a unified business model and that Mark van Rijmenam has illuminated that model for us through an insightful broad vision of the organisation of tomorrow.”

Dr. Kirk Borne, Principal Data Scientist, Booz Allen Hamilton
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The Organisation of Tomorrow

How AI, Blockchain, and Analytics Turn Your Business into a Data Organisation

Dr Mark van Rijmenam
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This book is the result of my PhD, which I undertook at the University of Technology Sydney (UTS) from 2016 to 2019. Undertaking a PhD is a journey and turning my academic thesis into a, hopefully, easily digestible book turned out to be a journey in itself. Doing a PhD and subsequently turning it into this business book would not have been possible without the help of multiple people, whom I would like to thank for their hard work, contributions, discussions, and reviews. Without them, this book would not have become the book it became.

Therefore, first of all, I would like to thank Jochen Schweitzer, my principal supervisor at UTS, for challenging and stretching me intellectually. Thank you for your direct and critical feedback on the work I created, but also supporting me in the intellectual journey that I gave myself. Thanks to your valuable and tireless input, I have been able to write a thesis in the way I did, which subsequently I have been able to transform into this book. Without your input, that would not have been possible. I would also like to thank my other supervisors, Mary-Anne Williams and Danielle Logue, for your input and feedback on the work and papers I wrote. Your feedback helped me improve my work and see things differently when needed.

Once the book was written, I was able to improve the initial version of the manuscript thanks to the great feedback provided by Christian R. Meier, Glen Hendriks, Maksym Koghut, Pieter Bos, Stephan Janssens, and my co-author of my second book, Philippa Ryan. Without your feedback, I would not have been able to improve the book. Thank you so much!
We live in exponential times. We are experiencing a paradigm shift, where businesses and technology change and grow at an exponential rate, causing profound social and economic change. The fast-changing, uncertain and ambiguous environments that organisations operate in today require them to rethink their internal business processes and customer touchpoints. The last time such rapid change happened was the advent of the internet. The internet caused organisations to completely rethink their business and enabled the success of organisations that embraced the new paradigm, including Amazon, Google, Facebook and WeChat, to become monopolists within record time. Now, we are experiencing another change due to emerging information technologies (EIT) such as big data analytics, blockchain, and artificial intelligence (AI) and trends like the Internet of Things (IoT). These technologies make it easier for startups to compete with existing organisations. As a result, and because of the lack of legacy systems, these startups are more flexible and agile than Fortune 1000 companies. Within a short timeframe, startups can become a significant threat if not paid due regard. Therefore, only paying attention to the day-to-day operation is simply no longer enough. Organisations have to become innovative and adaptive to change if they wish to remain relevant and competitive. New technologies can help achieve this shift. When big data analytics, blockchain and AI are combined, it will change collaboration among individuals, organisations and things. When implemented correctly, these technologies can significantly improve consumer engagement, increase transparency, reduce costs and improve production efficiency or service delivery. Thanks to these technologies, we move from “computer-assisted work” to “human-assisted work”, particularly as human-to-human interactions are increasingly replaced by human-to-machine interactions and then machine-to-machine interactions. When these technologies converge, it enables organisations to design smarter businesses and incorporating these technologies within your organisation has become easier than ever before.

However, in the words of Commander Chris Hadfield, a retired Canadian astronaut, engineer, and former Royal Canadian Air Force fighter pilot, during a keynote in 2018, “smart only matters when you do something with
it”. You can have all the technology in the world, but it comes down to what you are going to do with these new tools. How will you put (existing or new) technology to work and how will you take an idea and change yourself and the organisation? In today’s world, it is no longer only about collecting as much data as possible, simply because collecting data has become too easy. It is more about doing smart things with that data, while ensuring privacy and security. To achieve that, you need intelligence, human and artificial, to work together seamlessly. Organisations can now leverage data and embed learning in every process. This can empower people with all forms of intelligence and “put smart to work”. We now experience the greatest opportunity of all time, forcing organisations to make big bets for the future and to dare to think the impossible. Organisations should go on to the offensive and disrupt their industry if they want to survive in this fast-changing and fiercely competitive world. Emerging information technologies are rapidly changing how we work and live. Organisations have to adapt to these new technologies if they wish to remain relevant in the future.

This book aims to help organisations understand these fast-changing times by providing clear insights into what these technologies are, how they can work together, and how it will change your business. Only if you understand these new disruptive technologies will you be able to incorporate them into your organisation. Therefore, this book will also pay attention to the downside of these emerging information technologies and what organisations should do to prevent consumers from becoming victims of an increasingly data-driven world.

1.1 The importance of data

In constantly changing environments, organisations remain competitive not only by focusing on excellence in the day-to-day business operation but also by being innovative and adaptive to change. Thanks to emerging information technologies, it has become easier to compete as a newcomer in traditionally closed markets. This means that the ability to cope with, react to, and anticipate industry disruption becomes important for organisations if they want to remain competitive. Detecting, anticipating and responding to disruptive changes while displaying industry leadership and managing shifting behaviours of stakeholders is called “organisational ambidexterity”. It is considered especially important when facing a fast-changing and uncertain environment. Organisations that wish to achieve this ambidexterity should rely on data as a key resource for their business and develop data-driven business models. This requires organisations to use a variety of internal and external data sources. To apply a variety of activities to that data, including processing, analysing, and visualising, and use the insights of those activities to develop new products and services that target the right customers at the right moment and at the right price. For many, this requires a different
mindset, as many organisations still base their decisions on experience and intuition instead of data analytics.\textsuperscript{9–11} Startups that threaten your existing business are already used to this new, data-driven approach. They leverage new technologies and experiment with new approaches. This allows them to benefit from opportunities available in our constantly changing global market. Such startups, which sometimes experience exponential growth, are usually characterised by a so-called “platform approach” to organisational design. A platform organisation is a meta organisation, where members benefit from economies of scale while remaining independent.\textsuperscript{12} Well-known examples include Uber, the world’s largest taxi company that does not own any taxis; Airbnb, the world’s largest accommodation provider that does not own any hotels; or Facebook, the world’s largest media company that does not create any content.\textsuperscript{13} Another emerging approach to organisation design is that of the Decentralised Autonomous Organisation (DAO). This radical new form of organisation uses blockchain technology and smart contracts to establish governance without management or employees, run entirely by computer code\textsuperscript{14} (where \textit{If This Then That} statements are deployed on a blockchain, but more on this in Chapter 4). These approaches fundamentally challenge incumbent industry practices. Almost all new technologies produce large amounts of data, which can be analysed using algorithms to help derive actions and improve decision-making. As a result, these companies are at first data companies that happen to offer a certain service, such as connecting people (WhatsApp), moving people from A to B (Uber), or allowing consumers to experience local accommodation (Airbnb).

Viewing your organisation as a data organisation will completely change all your processes and customer touchpoints. This is a difficult change, but it is required if you want to be able to compete with startups that have been doing this since inception. When you see your organisation as a data organisation, a “gestalt shift” will occur; all of a sudden, you will see your organisation from a different perspective. For example, a car company should no longer see itself as a car manufacturer, but as a software company that is in the business of helping people move from A to B. It should look at how the company can do so in the most reliable, comfortable and safest way. Once the mindset has changed, the organisation can ask whether it wants to produce cars, flying taxis, or develop “Uber-like” apps. The same goes, for example, for a bank. A bank is no longer a financial institution, but a data organisation that enables people to store value and make secure transactions. Whether this is done using a cryptocurrency, as a mobile-only bank or to store digital identity data are then questions that can be asked. Nowadays, any organisation, regardless of industry, should see itself as a data organisation. When doing so, it can remove any barriers that prevent the business from delivering the product or service in the most efficient, effective and customer-friendly way. In the digital world, anything is possible, although it might take some time to figure it out.
1.2 The downside of data

There is also a downside to the abundant presence of data in today’s society. Today’s tech giants such as Google, Amazon, Facebook, Microsoft, Tencent and Alibaba have long recognised that data is a valuable asset. They have been aggregating vast amounts of data in return for “free” services from the outset. Unfortunately, the problem with “free” services is that you and your data are the actual product. This has resulted in a centralisation of the web and a handful of organisations dominating and controlling it.15, 16 This has caused problems with truth and trust – such as fake news, clickbait, trolling, spam, lack of privacy and absence of accountability. This book, therefore, will not only help you to change your organisation into a data organisation, but also help you to do it the right way.

This centralisation, where the internet ended up in the hands of a few very powerful companies, is not how the world wide web was originally envisaged. As Sir Tim Berners-Lee said during the Decentralised Web Summit in 2016:17

> The web was designed to be decentralised so that everybody could participate by having their own domain and having their own web server and this hasn’t worked out. Instead, we’ve got the situation where individual personal data has been locked up in these silos.

These centralised internet corporations are incredibly powerful. They have access to vast amounts of data of their users, which they use and abuse to follow (potential) customers around the web. They often ignore existing privacy practices.15, 18 Tech giants use their enormous data silos to make money through advertising (85 per cent of online advertising spend goes to Google and Facebook, according to Morgan Stanley analyst Brian Nowak19). They use the data to their liking, often without properly involving or informing the consumer.20 In addition, while some organisations take data security seriously, many do not. As a result, many consumers have become the victim of one of the hundreds of data breaches happening every year. Their details ending up in the wrong hands, resulting in significant costs for organisations, individuals and society at large.21

One of the biggest scandals and privacy breaches happened in 2018, when it became clear how many consumers’ Facebook data was stolen and abused by Cambridge Analytica. Cambridge Analytica was a data mining and data analysis company that played a pivotal role in the US presidential election of 2016, the Brexit vote, and a number of other recent political races. Behind the company were key figures backing President Trump, including Steve Bannon, Trump’s former strategic advisor, and Robert Mercer, founder of the (ironically labelled) Government Accountability Institute, which uses the dark web and bots to denigrate political opponents. In 2014, the company used personal information obtained without the authorisation of these users to develop...
a highly effective system to target individual US voters. Under the pretence of academic research, they harvested 87 million profiles without the notice or consent of those whose data was being harvested. Cambridge Analytica then used that data to influence the US election. It was a privacy breach at an unprecedented scale. It showed that Facebook’s attempts to protect its users were not working. Already, Facebook faced a huge problem with fake news on its platform. This massive data leak made it clear that it is time for us to rethink how we deal with data. The centralisation of the web has caused consumers to be increasingly dependent on these monopolies and, as a result, we, the internet user, have no control over our data. Instead, companies such as Facebook, Twitter and Google harvest our data and use it for advertising purposes to make billions of dollars. Unfortunately, escaping the power of these companies is rather challenging. Even if you do not have a Facebook profile, the company is capable of tracking you via so-called “shadow profiles”.22 These shadow profiles are possible because Facebook’s “Like” button is present on almost every website. This enables the organisation to follow internet users by collecting disparate data such as your location, computer ID, IP address, browsing behaviour and other valuable data sources. Through these live captures, they can discover patterns in that data when they connect them. Mark Zuckerberg claimed to be ignorant about these shadow profiles during the 2018 congressional hearings on the Cambridge Analytica scandal. A surprising and unconvincing remark as it was first brought to light by researchers at Packet Storm Security in 2013.23

As if these shadow profiles are not enough, in 2018 it became clear that Google had closed a secret deal with Mastercard that gave it access to the spending patterns of millions of consumers. Google paid millions of US dollars to Mastercard to be able to link clicks on its advertisements to actual online and offline purchases to understand the effectiveness of the ads. Using Mastercard’s data, Google can link your ad click to your (offline) transaction, even if the ad click did not convert to an immediate sale. With your Google email address and Mastercard’s data, Google can obtain a digital copy of your receipt to know exactly what you are buying, when, and for how much. This information is then shared with a select group of Google advertisers who can use that data to improve their ads and, most likely, increase their spending. Strangely enough, although Mastercard’s customers ought to be informed about this – as it directly affects their privacy – many of the two billion Mastercard holders have not been informed about this deal.24

These two examples make it clear that there is a significant downside to data. Especially if it is controlled solely by centralised companies that are not held accountable for their data collecting, sharing, and processing practices. Over the years, the objective of a distributed network of nodes, where everyone would be able to participate for the betterment of humanity, has been lost. This is how the web was originally designed by Sir Tim Berners-Lee and colleagues. Today, we have many centralised companies offering centralised
services that remove fundamental freedoms such as consumer data ownership rights, privacy, and security. Too often, consumers become the victims of the malpractices of large organisations, that do not take care of their customers’ data, leaving their customers vulnerable. In addition, some governments use this centralised web to censor freedom of speech. On a regular basis, countries block important websites such as Wikipedia, Twitter, or Telegram, simply because they host an article or post they do not like. As it may seem, the internet as we know it has a problem. If we want to build the organisation of tomorrow, we need fix the internet as well.

The existing internet has degraded trust among individuals and organisations. The centralised web and the possibility to remain anonymous – but unaccountable – has resulted in a suite of negative behaviours. However, a fully accountable digital society as is currently being created in China, using the social credit scoring system Sesame Credit, is also not the solution. (Sesame Credit is discussed in detail in Chapter 4.) Sesame Credit’s proposed solution to problems associated with online anonymity results in the absence of privacy (from the Western perspective of “privacy”), while enabling complete government surveillance and control, due to an even increased centralisation of the web. As a result, we have a trust problem, or as the Lee Rainie, Director of Internet and Technology at Pew Research Center, puts it: 25

Trust is a social, economic and political binding agent. A vast research literature on trust and social capital documents the connections between trust and well-being, collective problem solving, economic development and social cohesion. Trust is the lifeblood of friendship and caregiving. When trust is absent, all kinds of societal woes unfold, including violence, chaos and paralysing risk-aversion. There is considerable concern that the way people use the internet is degrading trust. The fate of trust and truth is up for grabs.

The problem lies in how the web and the internet were developed. When the internet was created, the original designers did a lot of things really well. They created standards such as TCP/IP, DNS, HTTP, etc. However, unfortunately, they also forgot two important standards: an identity protocol to use your offline identity online and to have full control over your own data; and a reputation protocol that allows users to be reputable and accountable online, even when they are anonymous. They forgot this, simply because when the web started, only trusted actors had access to the network and these protocols were simply not necessary. Therefore, to build the organisation of tomorrow, we need to restore this (online) trust. We need to restore the original design of the web and replace the web’s current anonymity with a reputation system to allow (pseudo)anonymous entities to be reputable and accountable across the internet. In addition, we need a web that limits the influence and power of
centralised organisations to use and abuse consumers’ data, thereby ignoring their privacy. Instead, we should give consumers full control over their data. In other words, we need a self-sovereign identity (to be explored in detail in Chapter 5).

Apart from centralised control and ownership of data or the lack of an identity and reputation protocol, biased data also causes tremendous problems, as I will discuss in Chapter 6. Due to all these problems, it may seem that emerging information technologies have a lot of negative implications for society. However, there is also hope. Increasingly, organisation, especially startups, and regulators see the importance of data governance, ethics and privacy. Regulations such as the EU General Data Protection Regulation (GDPR) aim to protect consumers and startups such as Berners-Lee’s Inrupt aim to give control back to consumers. In 2018, Sir Tim Berners-Lee revealed his new vision, one where the internet becomes decentralised again as he had envisioned it originally. His technology is called Solid POD (personal online data store), which is developed by his company Inrupt. Solid PODs will allow every internet user to store their own data, be it video, articles, wearable tracking data or comments, and share that with anyone or any website that has connected to the Solid ecosystem. Using the Solid POD, the user will remain in full control over their own data and who has access to it and who not. A great new initiative that will hopefully bring us closer to a decentralised society where data is owned by those who created it, privacy is protected, security is a given, and distributed ledger technology will enable trustless transactions among individuals, organisations and things.

In recent years, also media attention to problems of data has grown. Consequently, consumers have become more aware of the consequences of data that is in the hands of technology companies. Increasingly, they demand change or take action themselves. With the discourse growing within the tech community, and among academics, a new type of organisation is required, and fortunately also emerging. This type of organisation applies technologies such as analytics, blockchain, and AI to contribute to creating a better society, which incorporates the initial values of the web: an organisation that respect users’ privacy and security; and that will fairly reward users for their work and that gives back control to users over their content and data. In this book, I will discuss how to build this organisation, the organisation of tomorrow. I will do so from a consumer’s perspective instead of a shareholder’s perspective, as is often the case. After all, if you take care of your customers, your customers will take care of your shareholders.

1.3 The changing face of collaboration

Emerging information technologies change organisations. Exactly how these technologies change an organisation depends not only on the technology, but also on the social actions of the people responding to that technology. As humans
interact with technology in different contexts, it changes their behaviour and accordingly the behaviour of organisations. Consequently, organisational change requires breaking down old habits and values, while at the same time altering high impact systems such as decision-making capabilities and governance practices. Technology startups have long understood this and have developed an absorptive capacity and overall innovation capability. They value the opportunity to collect and analyse data and create organisations that are more agile and flexible. Startups are familiar with building digital organisations with data at the heart of their business. With a data-driven business comes new stakeholders, or actors, leading to new ways of collaboration among those actors. Such changes go along with the need to adopt a different mindset to solve the current issues involved with consumer data. For many, this necessitates radical change.

To understand how collaboration changes among actors in data-driven organisations, I will take a closer look in the next chapter at how organisations and technologies interact. How does the interaction change when a new, artificial actor joins the scene? Organisations are social entities, and they respond differently to the need for change due to contextual variables such as environment, size, and the technology adopted. Some organisations will show reorientation behaviour, while others will showcase abortive movements, and some will be reluctant to change. For example, online film distribution, digital photography, and online book retailing have seen businesses like Blockbuster, Kodak, and Borders become well-known examples of how once successful companies lacked the innovation mindset or the willingness needed to respond to emerging technological change. Successful organisations continuously adapt to and exploit new, more advanced technologies to survive. Newcomers, such as Facebook, Amazon, Apple, Netflix and Google (responsible for the so-called FAANG stocks) or Alibaba, Baidu and Tencent, have shown such reorientation behaviour to leverage (technological) opportunities that are ignored or overlooked by others. Hence, to avoid what in the mid-2010s came to be known as a “Kodak moment”, it is vital to develop the capacity to detect, anticipate, and respond in a timely manner to market changes and competitive pressures.

Resulting from this data-driven approach is a shift in the balance between power and empowerment. This, consequently, creates a shift in collaboration among the involved organisational stakeholders. It does this by (1) including previously excluded actors, such as customers or competitors; and (2) by moving from pure human-to-human interactions to human-to-machine interactions; and, increasingly, even machine-to-machine interactions. This requires an innovative mindset within organisations as a whole. They need to rethink internal processes, customer touchpoints, and structures, and move from traditional product models to collaborative service models and ecosystems. If done successfully, the new ways of cooperation among those stakeholders involved (human and artificial) will ensure continued productivity growth.

To successfully incorporate emerging information technologies, organisations need to be thinking like software companies; to see
themselves as a data organisation. These organisations must turn existing analogue processes into digital processes that can be analysed and to build a digital platform to grow the organisation. Developing a digital platform not only offers new revenue streams and continuous growth opportunities, but it also allows companies to create new partnerships with previously excluded partners. Such collaborative communities, where organisations share knowledge, engage in collaborative relationships with industry partners and even competitors, and drive innovation have data at their heart. Data and emerging information technologies will allow those organisations to affiliate not only with industry partners but with any previously excluded stakeholder, whether human or machine. The result is new ways to organise activity with the most extreme form of organisation design being that of a DAO. Such an organisation uses blockchain technology and smart contracts combined with AI to establish governance without management or employees, run completely by computer code.

Although the types of actors involved in an organisation have never been limited to human actors, new technologies result in networks that combine social participation and machine-based computation. In such organisations, humans and machines interact with each other to produce constantly evolving, synergistic effects. Social interactions become more important, interactions less demanding, and machine–human interactions more prominent. Consequently, big data analytics, blockchain, and AI result in new modes of collaboration among the actors involved, each offering a different take on collaboration. Big data analytics provides insights and information to customers and employees. When more people have access to information and knowledge, empowerment becomes possible. Thus, when organisations provide more people with access to information and knowledge using analytics, power is distributed more equally. This will enable empowerment throughout an organisation and result in decentralised decision-making. Conversely, blockchain enables peer-to-peer collaboration by creating distributed value through a network of peer-to-peer actors distributed across the globe, collaborating effortlessly and in real time to create value together for all actors in the network. It is governed by cryptography, consensus mechanisms, and smart contracts, enabling a trustless exchange of transactions. AI is about automating actions, enabling new forms of interaction among humans and machines, resulting in interactions with different levels of intensity and involvement. As such, organisations are engaged with various interactions among humans and machines, resulting in unexpected technical, social, and ethical implications requiring complicated strategies.

1.4 Conclusion

Technology startups in particular seem to value the possibility of collecting and analysing data to create new organisations. These new market entrants
often take a different approach to organisation design and, as a result, their business models are more agile and successful than existing organisations. They are better able to leverage new technologies and experiment with new approaches than existing companies. They benefit from opportunities arising from a constantly changing global market. Understanding how these startups do so could help incumbents to remain competitive when challenged by new digital platform organisations and disruptive technologies. Therefore, in the coming chapters, I will discuss how the emerging information technologies of big data analytics, blockchain, and AI can change your organisation. Data is central in all of this as all new technologies now create data. To gain insights from that data, analytics are required. Analytics are used to interpret data regardless of the volume, velocity, or variety. Blockchain is examined because of its potential to fundamentally change how we deal with data and because the cryptography used in distributed ledger technology significantly affects organisation design, decision-making capabilities and existing power structures. Finally, AI is addressed because the mathematical formulae that make up algorithms rely on data to automate and accelerate decision-making and improve business, resulting in an algorithmic business where AI forms an essential part of doing business and where algorithms run multiple aspects of organisations to make sense of data without the intervention of humans. In Chapter 7, I will explain what organisations should do to prepare for the data-driven future, using the $D^2 + A^2$ model. I will offer a clear roadmap for organisations to remain relevant and competitive in the fast-changing world they operate in. But before we get to that, let’s first examine how technology will change the organisation of tomorrow and how organisations should respond.

**Note**

This book follows industry practices in the writing of Bitcoin vs bitcoin and Blockchain vs blockchain. When written as Bitcoin, it relates to the technology and when written as bitcoin, it relates to the cryptocurrency. The same goes for Blockchain, which refers to the technology/trend as a whole and blockchain, which means one or more blockchain(s); a distributed ledger database.
**Algorithm**  A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.

**Analytics**  The discovery of patterns in data that provide insights and turn data into information.

**Artificial agency**  Coordinated artificially intelligent intentionality formed in partial response to perceptions of human agency and material agency.

**Artificial agent**  Artificially intelligent actors that have the ability to act upon their own, apart from human intervention.

**Artificial Intelligence (AI)**  The process of constructing an intelligent artefact. Using computers to amplify our human intelligence with artificial intelligence has the potential of helping civilisation flourish like never before – as long as we manage to keep the technology beneficial and prevent AI from inflicting any damage.

**Big data**  A term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis. These data sets are so voluminous and complex that traditional data-processing application software are inadequate to deal with them.

**Bitcoin**  An innovative payment network and a new kind of money. It is a type of cryptocurrency. It is the first decentralised digital currency, as the system works without a central bank or single administrator.

**Black Swans**  Events that deviate from the expected, that have an extreme impact and although they are difficult to predict, they have retrospective predictability.

**Blockchain**  A digital ledger in which transactions made in bitcoin or another cryptocurrency are recorded chronologically. The cryptography underlying blockchain ensures a “trustless” system, thereby removing the need for intermediaries to manage risk, making data on a blockchain immutable, traceable, and verifiable.

**Consensus mechanism**  A feature in decentralised networks to determine the preferences of the individual users (or nodes) and to manage decision-making of the whole network. The key to any blockchain; with a consensus algorithm, there is no longer the need for a trusted third party;
and, as a result, decisions can be created, implemented, and evaluated, without the need for a central authority.

**Cryptocurrency** A digital asset designed to work as a medium of exchange that uses cryptography to secure its transactions, to control the creation of additional units, and to verify the transfer of assets.

**Cryptocurrency mining** A race that rewards computer nodes for being first to solve cryptographic puzzles on public blockchain networks. By solving the puzzle, the miner verifies the block and creates a hash pointer to the next block. Once verified, each block in the chain becomes immutable.

**Cryptography** Protects data from theft or alteration, and can also be used for user authentication. Earlier cryptography was effectively synonymous with encryption but nowadays cryptography is mainly based on mathematical theory and computer science practice.

**Datafication** Turning analogue processes and customer touchpoints into digital processes and digital customer touchpoints.

**Decentralised Autonomous Organisations** An organisation that is run through rules encoded as computer programs called smart contracts. A DAO’s financial transaction record and program rules are maintained on a blockchain. It is an organisation without management or employees, run completely by autonomous code.

**Decentralised networks** A computing environment in which multiple parties (or nodes) make their own independent decisions. In such a system, there is no single centralised authority that makes decisions on behalf of all the parties.

**Descriptive analytics** Analytics that enable organisations to sense, filter, shape, learn, and calibrate opportunities by providing insights into what has happened in their internal and external environment, from one second ago to decades ago.

**Digital signatures** A digital code (generated and authenticated by public key encryption) which is attached to an electronically transmitted document to verify its contents and the sender’s identity. Digital signatures are based on public key cryptography, also known as asymmetric cryptography.

**Digitalisation** The conversion of information into digital format.

**Distributed Application (DAPP)** Blockchain-enabled products and services are commonly referred to as Decentralised Applications, or DApps. A DApp has at least two distinctive features: (1) any changes to the protocol of the DApp have to be approved by consensus; and (2) the application has to use a cryptographic token, or cryptocurrency, which is generated according to a set algorithm. Bitcoin is probably the best known DApp.

**Distributed Ledger Technology (DLT)** A digital system for recording the transaction of assets in which the transactions and their details are recorded in multiple places at the same time. A blockchain is a distributed ledger.
Distributed networks Distributed networking is a distributed computing network system, said to be distributed when the computer programming and the data to be worked on are spread out across more than one computer. Usually, this is implemented over a computer network. Participants in a distributed network are able to verify and authenticate other users’ transactions and exchanges. For this reason, the community values its own worth and reputation.

Double spending problem Arises when a given set of crypto tokens is spent in more than one transaction. By solving the double spending problem, digital or cryptocurrency has now become viable.

Dynamic capabilities Those capabilities that enable an organisation to develop new products and services depending on changing market circumstances.

Emerging information technologies New advanced information technologies that use advanced computer programs to store, retrieve, manipulate, or transmit data.

Hash algorithm Each block of data on a blockchain receives a hash id, as a database key, calculated by a Secure Hash Algorithm. This block hash is fixed. In other words, the hash id allocated to the block never changes. Hash algorithms are used in a variety of components of blockchain technology, one of them being the hash id, which is a unique string of 64 numbers and letters that is linked to data in each block.

Hash function A hash function is any function that can be used to map data of arbitrary size to data of fixed size. The values returned by a hash function are called hash values, hash codes, digests, or simply hashes.

Immutability Unchanging over time; and impossible to change.

Initial Coin Offering (ICO) Crowd funding by issuing crypto tokens in exchange for fiat money. Also known as a Token Generation Event (TGE).

Internet of Things A network of physical devices that are connected through the internet and where sensors enable advanced data collection to generate insights.

Machine learning A method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns, and make decisions with minimal human intervention.

Material agency The capacity of non-human actors to act without human intervention.

Nano technology Science, engineering, and technology conducted at the molecular or nanoscale (which is about 1 to 100 nanometres).

Nodes Computers confirming transactions occurring on the network and maintaining a decentralised consensus across the system.

Open strategy Allowing previously excluded internal and external stakeholders, such as customers, suppliers, connected devices, employees, or
even competitors, to join in the strategy-making process to create increased value for the organisation.

**Peer-to-peer transactions** Also referred to as person-to-person transactions (P2P transactions or P2P payments), electronic money transfers made from one person to another through an app.

**Performativity** Performativity shows how relations and boundaries between technologies and humans are enacted in practice and, therefore, are not fixed or pre-given. Something is performative when it contributes to the constitution of the reality it describes.

**Practical Byzantine Fault Tolerance (PBFT)** A process that relies on the sheer number of nodes in order to confirm trust. Assuming that a malicious attach on the network will occur, the PBFT provides a level of assurance and trust that would not otherwise be achievable.

**Predictive analytics** Analytics that uses machine learning and algorithms to find patterns and capture relationships in multiple unstructured and structured data sources to create foresight.

**Prescriptive analytics** The final stage of understanding your business. It is about what to do (now) and why to do it, given a complex set of requirements, objectives and constraints.

**Private Key Infrastructure (PKI)** A set of roles, policies, and procedures needed to create, manage, distribute, use, store, and revoke digital certificates and manage public-key encryption.

**Proof of Stake (PoS)** A way to validate transactions and to achieve a distributed consensus. It is an algorithm and its purpose to incentivise nodes to confirm transactions. PoS uses someone’s stake in a cryptocurrency to ensure good behaviour.

**Proof of Work (PoW)** A requirement to define an expensive computer calculation, also called mining, that needs to be performed in order to create a new group of trustless transactions (the so-called block) on a distributed ledger or blockchain.

**Quantum computing** Incredibly powerful machines that take a new approach to processing information. Built on the principles of quantum mechanics, they exploit complex laws of nature that are always there, but usually remain hidden from view.

**Self-sovereign identity** The concept that people and businesses can store their own identity data on their own devices and provide it efficiently upon request. The key benefits of self-sovereign identity are the user only provides the information that is needed by the provider and the provider only receives and stores essential information (and with the identity-owner’s express permission).

**Smart contracts** Programmable applications that can be automated to initiate upon satisfaction of certain conditions. Those conditions can include complex conditional logic. The smart contract verifies that parties to a transaction can meet their promises and then the technology manages the
exchange so that each promise is satisfied simultaneously, almost certainly eliminating risk for all parties to the transaction.

**Social agency** How humans define and use technology and how people apply (new) technologies to achieve their goals.

**Sociomateriality** The theoretical concept that helps researchers understand how technologies and organisations interact.

**Timestamp** A sequence of characters or encoded information identifying when a certain event occurred, usually giving date and time of day, sometimes accurate to a small fraction of a second.

**Trust protocol** A mechanism whereby trust is managed by technology in a decentralised network. Trust is established through verification or proof of work and is supported by immutability of that work and the consensus of all participants.
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In this brilliant and extensive work, *The Organisation of Tomorrow*, Mark van Rijmenam dives deeply into the rapidly changing nature of organisations and the radically evolving notions of work in the 21st century.

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Michael Krigsman – Industry Analyst and host of CXOTalk

The Organisation of Tomorrow presents a new model of doing business and explains how big data analytics, blockchain, and artificial intelligence force us to rethink existing business models and develop organisations that will be ready for human–machine interactions. It also asks us to consider the impacts of these emerging information technologies on people and society.

Big data analytics empowers consumers and employees. This can result in an open strategy and a better understanding of the changing environment. Blockchain enables peer-to-peer collaboration and trustless interactions governed by cryptography and smart contracts. Meanwhile, artificial intelligence allows for new and different levels of intensity and involvement among human and artificial actors. With that, new modes of organising are emerging: where technology facilitates collaboration between stakeholders; and where human-to-human interactions are increasingly replaced with human-to-machine and even machine-to-machine interactions. This book offers dozens of examples of industry leaders such as Walmart, Telstra, Alibaba, Microsoft, and T-Mobile, before presenting the D2 + A2 model – a new model to help organisations datafy their business, distribute their data, analyse it for insights, and automate processes and customer touchpoints to be ready for the data-driven and exponentially-changing society that is upon us.

This book offers governments, professional services, manufacturing, finance, retail, and other industries a clear approach for how to develop products and services that are ready for the twenty-first century. It is a must-read for every organisation that wants to remain competitive in our fast-changing world.

Dr Mark van Rijmenam is Founder of Datafloq and Imagjn. He is a highly sought-after international speaker, a big data, blockchain, and AI strategist and author of three management books.

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