



# Fourth Industrial Revolution

## STRATEGIC INTELLIGENCE BRIEFING

Generated for Patricia Caratozzolo on 17 March 2023

# Contents

3	Executive Summary
4	1 Latest insights
7	2 Overview
8	2.1 Agile Technology Governance
8	2.2 Agency and Trust
9	2.3 Technology Innovation
9	2.4 Ethics and Identity
10	2.5 Technology Access and Inclusion
10	2.6 Frontier Technologies
11	2.7 Disrupting Jobs, Demanding New Skills
12	3 Further reading
14	About Strategic Intelligence
16	Contributors
16	Acknowledgements
17	References

## Disclaimer

This document is published by the World Economic Forum as a contribution to an insight area. The findings, interpretations and conclusions expressed herein are the result of a collaborative process facilitated and endorsed by the World Economic Forum but whose results do not necessarily represent the views of the World Economic Forum, nor the entirety of its Members, Partners or other stakeholders. Portions of this document have been machine generated and/or machine translated.

© 2023 World Economic Forum. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, or by any information storage and retrieval system.

# Executive Summary



Strategic Intelligence on Fourth Industrial Revolution

The Fourth Industrial Revolution represents a fundamental change in the way we create, exchange, and distribute value. It is a technological shift merging our physical, digital, and biological worlds into one. The fast-developing technologies pushing it forward, such as artificial intelligence, genome editing, augmented reality, robotics, and 3-D printing, are promising smart solutions for intractable challenges. But this revolution also calls for governing these solutions in ways that empower, foster collaboration, and help build a more sustainable foundation for social and economic development.

The key issues shaping and influencing Fourth Industrial Revolution are as follows:

## Agile Technology Governance

Some reinvention may be necessary to better understand new technologies requiring regulation

## Agency and Trust

The ability to provide both security and agency over personal data could become a competitive differentiator

## Technology Innovation

'General purpose' technologies like artificial intelligence can have profound consequences for society

## Ethics and Identity

How should we deal with machines that have human-like qualities?

## Technology Access and Inclusion

COVID-19 exposed digital inequality globally and exacerbated the digital divide

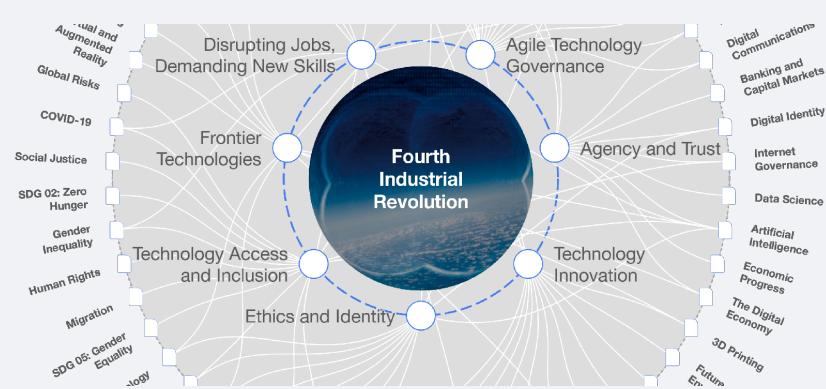
## Frontier Technologies

Whether related to quantum biology or AI, cutting-edge development must contribute to solving humanity's greatest challenges

## Disrupting Jobs, Demanding New Skills

People losing jobs due to technology-related disruption must receive help to gain new skills

Below is an excerpt from the transformation map for Fourth Industrial Revolution, with key issues shown at the centre and related topics around the perimeter. You can find the full map later in this briefing.



For the very latest information about Fourth Industrial Revolution, visit our [transformation map](#) on the [Strategic Intelligence website](#) or [apps](#).

# 1

# Latest insights

The latest publications from our network of over four hundred content partners.

Below are your latest updates on the topic of Fourth Industrial Revolution spanning 11 different sources.



Raconteur

**Data centres and IT infrastructure strategy are key to digital transformation**

14 March 2023

Data centres, the powerhouses that sit at the heart of the world's boundless computing needs, are often overlooked. Yet they are the unsung heroes of our digital world. As 5G networks, the metaverse, cloud computing, the Internet of Things and remote working are embedded in society, there's an increasing disconnect with the actual physical infrastructure needed to serve these applications.

As businesses transform and become more data-led, their IT infrastructure needs will grow and the nature of their data centre requirements will change as a result.



LSE Business Review

**Automation creates the space for entirely new jobs: the UK must adopt, adapt and improve**

27 February 2023

Fears about robots taking people's jobs are overplayed, say Rui Costa and Yuanhang Yu. Their research shows the real fear to overcome should be Britain's lack of productivity-enhancing robots, software, artificial intelligence and other technologies.

#LSEUKEconomy|

Worries that jobs will be lost to automation are not new but have been heightened since a seminal study in 2013 warned that nearly half (47%) of jobs in the United States were at "high risk" of automation. Nearly a decade on, we look at both the current and longer-term picture of the relationship between technology, jobs and pay.



YiCai Global

**Shenzhen's Drone Makers Produced USD10.9 Billion of UAVs in 2022**

17 February 2023

(Yicai Global) Feb. 17 – Shenzhen in southern Guangdong province is now home to more than 1,300 drone makers, whose output reached CNY75 billion (USD10.9 billion) last year.

Their output represented almost 70 percent of the country's total for unmanned aerial vehicles, said Yang Jincai, executive chairman of the Drone World Congress and head of Shenzhen's UAV industry association, during a press briefing yesterday.

Shenzhen now has a complete drone industry chain and has also established excellent low-altitude airspace conditions, Yang noted, adding that Shenzhen-based DJI is a global leader in the consumer drone market, while SF Holding, another Shenzhen firm, is a key provider of drones for logistics and delivery.

Since the first-ever proposal for developing the low-altitude economy in a document issued in 2021 by the State Council, China's cabinet, drones and the low-altitude economy have become important drivers of growth, said Yang.

Drones are now widely used in many sectors such as emergency rescue, logistics and transportation, electricity-related inspections, geology and meteorology as well as urban planning and management.



Project Syndicate

**Everyone Loses in a Fractured World**

30 January 2023

The dominance of national-security hawks continues to distort economic policy and impede

the delivery of global public goods. Unless this changes, we may well find ourselves living in a world that is irrevocably split, roiled by climate change, and hurtling toward all-out conflict.

#### The Conversation



### ChatGPT: why it will probably remain just a tool that does inefficient work more efficiently

14 March 2023

ChatGPT is a remarkable technological development, capable of writing compelling prose that comes across as natural, coherent and knowledgeable.

It has its limits, and can be made to say silly things. I managed to get it to say that 450 was larger than 500, and others have made it claim that 1lb of feathers weighs the same as 2lbs of bricks.

ChatGPT also cheats. While sometimes sounding impressive, it will make up citations to give the illusion of academic rigour.



#### Boston Consulting Group

### Amplify Your Warehouse Automation ROI

09 March 2023

How CPG Companies Can Conquer the E-Commerce Supply Chain

The dizzying growth in e-commerce has wreaked havoc on CPG supply chains. Here's how companies can tackle channel proliferation and meet customers' rising expectations.

Leading consumer-focused businesses are automating their warehouse networks, generating step changes in service and cost performance. Some companies have already unlocked 20% to 50% improvement in service levels while generating a 25% to 50% reduction in fulfillment costs—all while boosting their resilience amid today's acute labor shortages.



#### World Economic Forum

### What exactly does it take for a volunteer organization to succeed?

08 March 2023

The Global Shapers Community – a volunteer-run initiative led by young people and run by the World Economic Forum – has been asking its members about what they see as the root of their success.

The common factors identified between Global Shapers Hub members or curators indicate why some volunteer initiatives thrive more than others.

Purpose, a sense of performing meaningful work, focusing on hiring the right people, seizing the

moment and asking for help were all common veins running through successful projects.

Why does one volunteer organization succeed and flourish while others fail to launch?

One excellent source for answers is the Global Shapers Community , which added 50 new hubs to its 500+ hub volunteer-led youth initiative in January 2023 alone.

#### VoxEU

### Workers' responses to the threat of automation

08 March 2023

Automation can have important social and political consequences, as well as large impacts on the labour market. This column provides experimental evidence on the causal link between perceived automation risk and workers' employment responses, preferences, and attitudes. The authors find that fear of automation leads workers to demand higher taxation and more redistribution. Workers plan to join a union to protect their employment rather than adopt new skills or switch occupation. The findings highlight the pressure that automation may put on public budgets, and provide new insights into how technological advancements may alter the political landscape.

#### Cities Today

### Why airport technology vendors need to “up their game”

07 February 2023

The state of technology products available to airports is quite poor, according to one of Canada's leading airport bosses.

#### The Conversation



### Amazon still seems hell bent on turning workers into robots – here's a better way forward

07 March 2023

The strikes by hundreds of Amazon workers at the company's Coventry warehouse in the English Midlands have brought into relief some of the problems of work in today's high-tech society.

While primarily focused on pay, the workers are pushing back against long hours and an automated surveillance system that times how long they take to do each task, as well as going to the toilet. It all contributes to a high pressure and intensive work environment – plus more accidents.

We have much to learn from this painful situation about the future of work and technology. On the one hand, Amazon's whole employment model goes against the general assumption that technology destroys jobs.



World Economic Forum

## What is tech diplomacy and why does it matter?

23 February 2023

The first tech diplomat to Silicon Valley was appointed by Denmark in 2017 – and now there are around 20 formal or acting tech envoys out of the more than 70 consulates in the area. The World Economic Forum has partnered with the Technology Diplomacy Network to launch a new initiative to build trust and collaboration. Sebastian Buckup, the Forum's head of the C4IR Network and Partnerships, and Mario Canazza, C4IR Government Affairs Lead, explain why we need tech diplomats to shape safe future technologies that benefit everyone.



Scientific American

## Soft Robots Take Steps toward Independence

23 February 2023

Constructed from delicate, flexible and lifelike materials, soft robots have the potential to improve on their clunky, metal-bodied predecessors. Such machines could more nimbly explore other planets, gently collect organisms from the ocean depths and even lend surgeons a hand. Stubborn design challenges have long held them back from making it out of the lab and into our lives. Now a new generation of soft robots is navigating, growing and self-repairing its way to meeting researchers' lofty expectations.

Squishy materials let robots deform to adapt to changing environments, such as constricting tunnels.



Boston Consulting Group

## Accelerate Cloud Migration with Security Automation

14 February 2023

Senior Advisor

Adoption of cloud services promises greater flexibility, increased scalability, and significant cost savings. Gartner estimates that by 2025 over 95% of new digital workloads will be deployed on cloud-native platforms. Often, however, companies don't fully realize the cloud's promise, with only 52% of organizations self-identifying as cloud-mature, according to 451 Alliance. Cybersecurity issues are often responsible for the slow pace of cloud migrations, with almost 50% of companies citing cybersecurity as their top concern.



Wharton School of the University of Pennsylvania - Knowledge@Wharton

## How Jazz Can Unlock Your Team's Next Breakthrough

27 January 2023

"Generative conversations," in which multiple perspectives are integrated to kindle new solutions, are a powerful way to address the complex challenges facing organizations. Experts from Wharton and SEB explain the neuroscience behind why they work. ... [Read More](#)

2

# Overview

# The strategic landscape around Fourth Industrial Revolution.

The Fourth Industrial Revolution represents a fundamental change in the way we create, exchange, and distribute value. It is a technological shift merging our physical, digital, and biological worlds into one. The fast-developing technologies pushing it forward, such as artificial intelligence, genome editing, augmented reality, robotics, and 3-D printing, are promising smart solutions for intractable challenges. But this revolution also calls for governing these solutions in ways that empower, foster collaboration, and help build a more sustainable foundation for social and economic development.

## FIGURE 1

## Transformation map for Fourth Industrial Revolution



The following key issues represent the most strategic trends shaping the topic of Fourth Industrial Revolution. These key issues are also influenced by the other topics depicted on the outer ring of the transformation map.

## 2.1 Agile Technology Governance

*Some reinvention may be necessary to better understand new technologies requiring regulation*

Governments may have to reinvent the ways they operate in order to keep pace with technology. Powerful digital tools like artificial intelligence are swiftly disintermediating entire markets - taking influence away from traditional regulators and unskilled workers, and increasingly handing it to corporations and skilled labour. Meanwhile public sector officials everywhere are being challenged to move beyond simply understanding major technological advances to being able to mitigate, shape, and harness them in order to better govern - by becoming more accessible, transparent, and trustworthy. Governments making this transition will have to change their approaches to creating and enforcing regulation, not least in order to safely stimulate rather than stymie innovation. These governments may have to create brand-new ways to cope with the spread of new technologies, either by nurturing internal expertise or by working together with the private sector. Those that are sufficiently agile will be able to find ways to better understand the task at hand - and to steer technological development in ways that improve the state of the world for everyone.

Faster, 5G mobile networks promise to make digital communication even more ubiquitous, and increasing levels of processing power and storage capacity are boosting the amount of knowledge readily available to just about any computer user. When coupled with the increased availability and quality of data, conveyed through increasingly rich and varied visualizations and other analytic techniques, these trends have the potential to fundamentally reshape online discourse, news reporting, and public services - in ways that can respond more directly to the needs of the public. But there are also serious related risks that need to be managed. According to Cisco's 2018 Annual Cybersecurity Report, cyber attackers targeting governments have developed increasingly sophisticated and threatening malware, and can cover their tracks with encryption while exploiting novel vulnerabilities in cloud computing and the Internet of Things. New and evolving rules of the road such as the European Union's General Data Protection Regulation, which came into effect in 2018, will be critical for managing the consequences of such threats - but will also introduce their own new complexities to governing.

Related topics: [Behavioural Sciences](#), [Future of Media, Entertainment and Sport](#), [Cybersecurity](#), [Innovation](#), [SDG 01: No Poverty](#), [Internet of Things](#), [5G](#), [Agile Governance](#), [Corporate Governance](#), [Global Governance](#), [Blockchain](#), [SDG 16: Peace, Justice and Strong Institutions](#), [SDG 10: Reduced Inequalities](#), [Digital Communications](#)

## 2.2 Agency and Trust

*The ability to provide both security and agency over personal data could become a competitive differentiator*

The Fourth Industrial Revolution has been built on a foundation of data as a source of both innovation and governance. While giving people more agency over their data can improve their relationships with the institutions they must rely on daily, the use of biometrics and multi-factor authentication can help establish trust - something that has become increasingly scarce as cybercrime and the commercial exploitation of personal data increase. The same technology that can improve verification can deplete trust, however; artificial intelligence, for example, can be vulnerable to manipulation and the biases of its human programmers. People are generally demanding more agency over their data, and some technology companies and governments are exploring decentralized identity systems that could empower users; Microsoft, Accenture, and Mastercard have announced plans to invest in decentralized models, for example, and Malta's government developed a way for educational institutions to issue blockchain-based academic credentials that are owned by students, portable, and instantly verifiable. It is estimated that governments will have issued about five billion digital IDs globally by 2024, and the majority that have issued them so far are in low- and middle-income countries in Africa and Asia.

Traditionally, governments and banks have played the role of "trust anchor" for financial transactions, though emerging digital-identity models involve new actors (for example, the pharmacy startup Capsule has relied on doctors as a source of trust when filling e-prescriptions for delivery). Related governance efforts include the Pan-Canadian Trust Framework, and the European Union's implementation of an ethical AI strategy. However, the monopolization of online search and social media - and pervasive related personal data gathering - complicate efforts to win digital trust. According to poll results published by Accenture in 2022, internet users are increasingly placing conditions on sharing personal information; 57% will share it if they know it won't be sold or re-shared, and 56% will do so if guaranteed data protection safeguards are in place. While internet users expect personalized experiences, they also expect security and agency over personal

data - something that could become a competitive differentiator among companies and organizations. In an always-on, data-rich environment, stakeholders in every industry need to redouble efforts to ensure security, maximize trust, promote practices that place the user at the centre of systems, create collaborative governance mechanisms, and take interactions between human and non-human identities into consideration.

Related topics: [Cybersecurity](#), [Blockchain](#), [Internet Governance](#), [Economic Progress](#), [Banking and Capital Markets](#), [The Digital Economy](#), [Digital Identity](#), [Digital Communications](#), [Internet of Things](#), [Data Science](#), [Artificial Intelligence](#)

## 2.3 Technology Innovation

*'General purpose' technologies like artificial intelligence can have profound consequences for society*

Some innovation, like the development of new pharmaceuticals, has an obvious and direct link to novel scientific research. Other types may result from using existing technology in new ways, or even from developments in unrelated fields. Many companies behind the sharing economy, for example, are essentially offshoots of existing internet and mobile technologies. While certain technologies like drones or 3D printing may create new markets and disrupt existing networks, technical innovation in the form of so-called "general purpose" technologies has the potential to disrupt entire groups of industries; examples have included the steam engine, the automobile, the personal computer, the internet and, potentially, artificial intelligence - all of which have had profound consequences for society. Since research and development is key, policy-makers have been keen to focus on ways in which it can be improved. Common areas of focus include national systems for research funding, systems for awarding and protecting patents (which are sometimes state-subsidized), improvement in translating university research into value for the private sector, and tax incentives for innovative firms (such as R&D tax credits, or special tax regimes for revenue derived from intellectual property).

The physical and biological worlds are merging, partly due to the creation of new materials designed to emulate the biological world; the discovery of new classes of recyclable, thermosetting polymers (plastics) called polyhexahydrotriazines is a major step towards a more sustainable economy, for example. New materials are now routinely being used in medical implants, for tissue engineering, and for the creation of artificial organs - and 3D printing is increasingly being used to create customized structures. The biological and digital worlds overlap most controversially in the world of genetic engineering. Widely accessible and affordable gene sequencing and editing systems, such as CRISPR/Cas9, make it possible to reliably and precisely remove or replace sequences in the genomes of both plants and animals. The biological and digital worlds are also overlapping in the form of sensors used to monitor health and behaviour - and to understand and influence brain activity. Advances that might have once been confined to digital systems, like the application of cryptography to blockchain technology to create programmable, secure, and distributed records, are also now having an impact in the real world, in terms of managing land records, for example, or tracking deforestation.

Related topics: [The Net Zero Transition](#), [Entrepreneurship](#), [Sustainable Development](#), [3D Printing](#), [Drones](#), [Blockchain](#), [Future of the Environment](#), [Circular Economy](#), [Innovation](#), [Taxes](#), [Plastics and the Environment](#), [Future of Work](#), [Science](#)

## 2.4 Ethics and Identity

*How should we deal with machines that have human-like qualities?*

Innovation triggered by (and hastening) the Fourth Industrial Revolution, whether related to synthetic biology, quantum computing, or artificial intelligence, is redefining what it means to be human by pushing the limits of lifespan, health, and cognition in ways once confined to science fiction. As each new discovery is made, a related moral and ethical discussion is critical if people are going to be able to appropriately respond to phenomena like prolonged life, gene editing, and memory extraction. The biological domain in particular poses a range of ethical challenges when it comes to regulation and social norms; new technologies create questions about what it means to be human, what information about personal health should be shared, and what rights and responsibilities we have in regard to altering the genetic code of future generations. Many other questions are likely to arise related to human augmentation, and to how societies can best deal with machines that have human-like qualities and the ability to autonomously make life-or-death decisions.

Related privacy, data security, and identity issues are becoming increasingly important for policy-makers,

regulators, and corporate leaders.

It has become increasingly evident that artificial intelligence systems can perpetuate the biases of the humans creating them - and discriminate in ways that threaten human rights and undermine democratic values. For example, facial recognition technology depends on algorithms to make facial matches, and these algorithms are more robust for white men than for women and people of colour because databases tend to contain more data on white men; this can trigger biases in algorithms, according to published reports. There are also growing concerns that as the Fourth Industrial Revolution deepens our individual and collective relationships with technology, it may also negatively affect social skills - like the ability to empathize. As face-to-face conversation is crowded out by online interaction, there are fears that people will begin to struggle to listen, make eye contact, or accurately read body language. There is a need to ensure that this industrial revolution fosters humanity, and is an empowering force that enables technology to be a tool both made by and for people. People and organizations therefore need to take collective responsibility for fostering innovation that genuinely serves the public interest.

Related topics: [Health and Healthcare](#), [Behavioural Sciences](#), [Justice and Law](#), [Arts and Culture](#), [Biotechnology](#), [Artificial Intelligence](#), [Digital Identity](#), [Future of Media](#), [Entertainment and Sport](#), [Precision Medicine](#), [Diversity and Inclusion](#), [Values](#), [Systemic Racism](#)

## 2.5 Technology Access and Inclusion

*COVID-19 exposed digital inequality globally and exacerbated the digital divide*

Providing people with greater internet access can potentially improve their quality of life, by enabling them to more easily tap into government and educational resources. The COVID-19 pandemic has dramatically accelerated the digitization of economies and societies - access to digital technologies enabled many people to continue to working, learning, and seeing friends and family despite mobility restrictions imposed during the health crisis. But the crisis also magnified existing gaps and inequalities for the estimated 2.9 billion people who are still not able to use the internet, according to the International Telecommunications Union. Although most of the world's population now lives in areas that are covered by a broadband network, only about two-thirds are actually online - meaning that cost, and not technical coverage, is the key barrier preventing greater connectivity. Investing in the creation of more inclusive digital communities is essential for reducing this digital divide, by not only bolstering public access and affordability but also by increasing the average person's digital skills and awareness of important related issues.

Greater digital inclusion can also improve public services. For example, Maputo, Mozambique, which has had a solid waste management problem and where many residents live in informal settlements, has deployed a participatory monitoring platform and encouraged citizens to use it to report waste issues, and to keep track of waste management services - in a bid to help improve service delivery. By gaining access to increasing amounts of digital content, people can become better able to understand and navigate the systems increasingly relied upon to deliver health care, education, employment services, and civic participation opportunities. Vulnerable communities like the expanding global population of refugees and internally displaced people (at the end of 2021, the UN human rights agency estimated the total number of people worldwide forced to flee their homes was 89.3 million) can particularly benefit from greater digital inclusion. Digital accessibility also presents an opportunity to better empower communities with more specific needs, like indigenous people, rural communities, people with disabilities (via assistive technologies like voice-recognition software), women and girls, and young people who have been historically disenfranchised.

Related topics: [SDG 05: Gender Equality](#), [Internet Governance](#), [Gender Inequality](#), [COVID-19](#), [Artificial Intelligence](#), [Diversity and Inclusion](#), [Systemic Racism](#), [SDG 02: Zero Hunger](#), [Human Rights](#), [Agile Governance](#), [SDG 10: Reduced Inequalities](#), [Values](#), [Social Justice](#), [Migration](#), [Global Risks](#)

## 2.6 Frontier Technologies

*Whether related to quantum biology or AI, cutting-edge development must contribute to solving humanity's greatest challenges*

Technologies that help push research and development further into as-yet-unexplored realms of biology, energy, computing, and intelligence may be essential for the future health of the global economy. Whether it is through efforts to understand how quantum physics plays a role in natural energy and human consciousness (quantum biology), by developing artificial intelligence that does not require excessive training

data liable to inject human bias, or even through the study of how disease and disorders might be treated through an understanding of the chemistry of venom (venomics), economies everywhere could benefit greatly from the exploration of technology at its furthest frontiers. These endeavours could not only help to rebuild in ways that emphasize sustainability and improve both human and environmental health, but also establish greater resilience in anticipation of future crises - by bolstering government services, enabling more efficient infrastructure including public transportation and sustainable energy systems, expanding educational opportunities, and fostering more ways for businesses to develop services for their customers that create genuine, enduring value.

Frontier technologies will require careful and considered regulation and oversight, if they are to contribute to the greater good. A respect for human dignity, a concerted effort to create inclusive benefits attainable for anyone regardless of gender, race, or ethnicity, and legitimate attempts to establish trust must drive any technology development or regulatory effort. Some of the frontier technologies now on the horizon present grave threats. Digital phenotyping, or the use of computer systems to profile someone's physical or mental health, for example, raises significant privacy issues and could be subject to misuse. In addition, the use of big data and artificial intelligence to predict criminal activity raises multiple red flags related to cultural and racial bias, and the anticipated spread of lethal autonomous weapons calls for proactive efforts to bind them with some level of protective safeguards. Proactive steps must be taken to ensure that the adoption of any technology - be it 3D printing or satellites - does not enable the abuse of power, instil and aggravate systemic racism, expand wealth disparities, and rob the vulnerable of their livelihoods.

Related topics: [Blockchain](#), [Quantum Computing](#), [Virtual and Augmented Reality](#), [Precision Medicine](#), [Biotechnology](#), [Advanced Materials](#), [Manufacturing](#), [Science](#), [Future of Computing](#), [The Digital Economy](#), [3D Printing](#), [Artificial Intelligence](#)

## 2.7 Disrupting Jobs, Demanding New Skills

*People losing jobs due to technology-related disruption must receive help to gain new skills*

The Fourth Industrial Revolution has had a significant impact on livelihoods, and is generating serious demand for new skills. In the United Kingdom, for example, artificial intelligence and related technologies are poised to eliminate 7 million jobs by 2038, though they are also expected to create about 7.2 million new jobs in that same country over the same period - in the healthcare sector, in scientific labs, and in education systems, according to a report published by PwC. Related business model disruptions will have a profound impact on the employment landscape in many sectors, leading to similarly significant trends in terms of both new job creation and job elimination, potentially heightened productivity, and wider gaps between existing skills and those that are most sought-after among employers. Given the anticipated depth of this technological disruption, there is a pressing need to come up with more effective ways to help people develop new skills and stem job losses. During previous industrial revolutions, it has frequently taken decades to build the training systems and labour market institutions necessary to foster new skillsets.

Given the relentless pace of the current industrial revolution, however, such a relatively extended interval to allow for adequate skills development may no longer be possible. In order to address this challenge, businesses must promptly recognize and invest in their people as a valuable asset, rather than continue to perceive them as a potential liability. This is no less true as they try to find a firmer footing amid the lingering impacts of the COVID-19 pandemic, which may prompt them to increasingly turn to Fourth Industrial Revolution technologies. Ultimately, it will require them to develop and deploy more proactive talent-management strategies, and to cultivate deeper and more consistent collaboration with both governments and education providers. In terms of dealing with workers in fields that are disproportionately faced with potential job reductions, these businesses must attempt to provide both reskilling support and opportunities for viable occupation transitions. Any related efforts need to be firmly grounded in an understanding of the particular attributes of the country where they operate - and anticipate not only current skills requirements, but also future developments.

Related topics: [Artificial Intelligence](#), [Vaccination](#), [Social Protection](#), [Future of Work](#), [Global Health](#), [Gender Inequality](#), [Corporate Governance](#), [COVID-19](#)

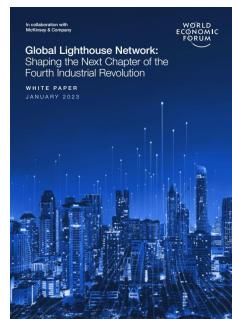
# 3

# Further reading

Explore the latest World Economic Forum reports related to Fourth Industrial Revolution.

13 January 2023

[Global Lighthouse Network: Shaping the Next Chapter of the Fourth Industrial Revolution](#)



12 January 2023

[Markets of Tomorrow Report 2023: Turning Technologies into New Sources of Global Growth](#)



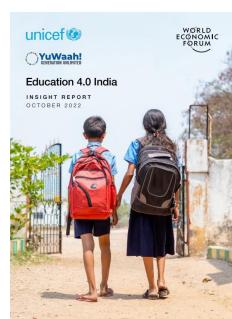
12 December 2022

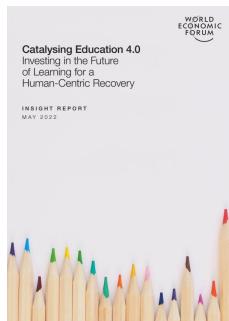
[Unlocking Value from Artificial Intelligence in Manufacturing](#)



07 October 2022

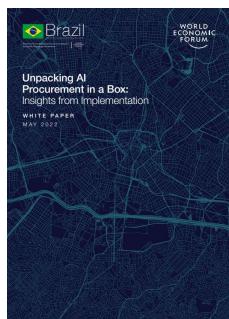
[Education 4.0 India](#)





16 May 2022

Catalysing Education 4.0: Investing in the Future of Learning for a Human-Centric Recovery



09 May 2022

Unpacking AI Procurement in a Box: Insights from Implementation



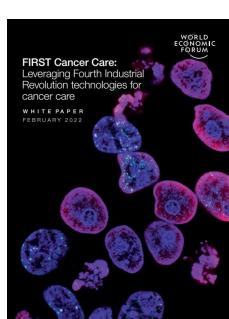
07 April 2022

Global Network of Advanced Manufacturing Hubs: Annual Report 2021



31 March 2022

Chatbots RESET Framework: Rwanda Artificial Intelligence (AI) Triage Pilot



03 February 2022

FIRST Cancer Care: Leveraging Fourth Industrial Revolution technologies for cancer care



20 January 2022

Regional Action Group for Africa Attracting Investment and Accelerating Fourth Industrial Revolution Adoption in Africa



# About Strategic Intelligence

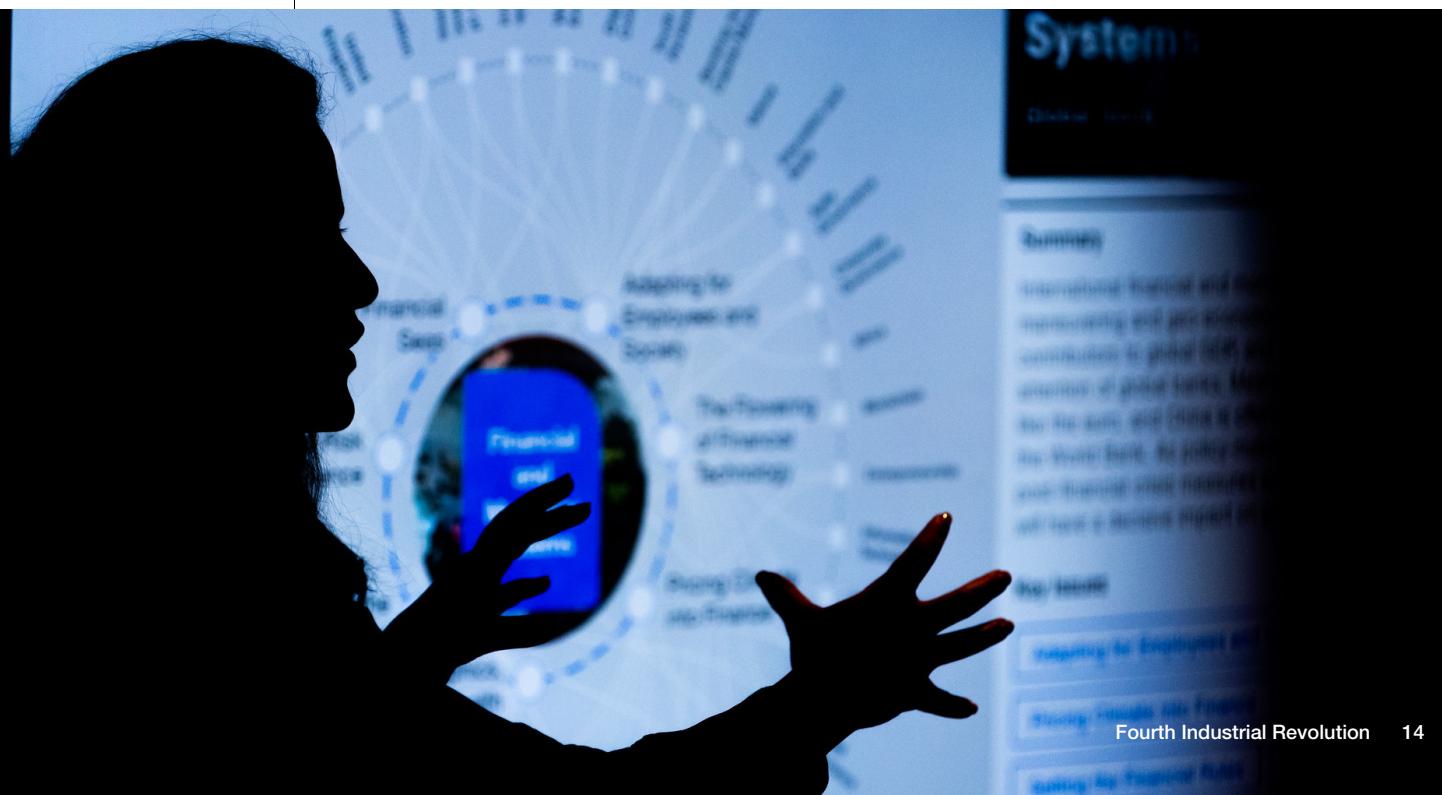
## Our approach

In today's world, it can be difficult to keep up with the latest trends or to make sense of the countless transformations taking place. How can you decipher the potential impact of rapidly unfolding changes when you're flooded with information - some of it misleading or unreliable? How do you continuously adapt your vision and strategy within a fast-evolving global context? We need new tools to help us make better strategic decisions in an increasingly complex and uncertain environment.

This live briefing on Fourth Industrial Revolution, harnesses the World Economic Forum's [Strategic Intelligence](#) platform to bring you the very latest knowledge, data and context from our 300+ high quality knowledge sources. Its aim is to help you understand the global forces at play in relation to Fourth Industrial Revolution and make more informed decisions in the future.

Each day, our Strategic Intelligence platform aggregates, distills and synthesizes thousands of articles from around the world. We blend the best of human curation with the power of machine learning to surface high-quality content on over [two hundred global issues](#) to our one million users globally. Our hand-picked network of [content partners](#) from around the world means that we automatically exclude much of the noisy clickbait, fake news, and poor quality content that plague the Internet at large. We work with hundreds of think tanks, universities, research institutions and independent publishers in all major regions of the world to provide a truly global perspective and we are confident that our data are well positioned when it comes to the intrinsic biases inherent to open text analysis on uncurated content from the Internet. For further context on our approach, you may be interested to read [Strategic trend forecasting: anticipating the future with artificial intelligence](#) and [These Are The 3 Ways Knowledge Can Provide Strategic Advantage](#).

↓ A leading expert presenting a transformation map at our Davos Annual Meeting



# Transformation maps

Our [Transformation Maps](#) are dynamic knowledge visualisations. They help users to explore and make sense of the complex and interlinked forces that are transforming economies, industries and global issues. The maps present insights written by experts along with machine-curated content. Together, this allows users to visualise and understand more than 250 topics and the connections and inter-dependencies between them, helping in turn to support more informed decision-making by leaders.

The maps harness the Forum network's collective intelligence as well as the knowledge and insights generated through our activities, communities and events. And because the Transformation Maps are interlinked, they provide a single place for users to understand each topic from multiple perspectives. Each of the maps has a feed with the latest research and analysis drawn from leading research institutions and media outlets around the world.

At the centre of each map is the topic itself. This is surrounded by its "key issues", the forces which are driving transformation in relation to the topic. Surrounding the key issues are the related topics which are also affected by them. By surfacing these connections, the map facilitates exploration of the topic and the landscape within which it sits.

## Continue online

Our suite of Strategic Intelligence tools are available to help you keep up to date across over 300 topics.

### On the web

Visit [Strategic Intelligence](#) on your desktop or laptop. All modern browsers supported.



### In the app stores

You can find our [Strategic IQ app](#) on the Apple App Store, Google Play Store or Huawei App Gallery.



You can also follow Strategic Intelligence [on Twitter](#).

## Go further with our Pro offering

Our Pro membership allows you to create unlimited custom transformation maps and the ability to collaborate on them with your colleagues. We also give you access to Advanced Analytics, to help you understand the dynamics surrounding a particular topic in more detail. You also get the ability to export transformation maps images and Powerpoint presentations. To learn more, [visit our membership site](#).

# Contributors

## World Economic Forum

Abhinav Chugh,  
*Content and Partnerships Lead, Expert Network  
and Content Partners*

Valeria D'Amico,  
*Community Specialist, C4IR Network and  
Partnerships*

Bryonie Guthrie,  
*Public Sector Engagement Lead, Strategic  
Intelligence*

Greta Keenan,  
*Lead, Strategic Impact and Communications*

Jim Landale,  
*Head of Content and Partnerships, Strategic  
Intelligence*

John Letzing,  
*Digital Editor*

Dhwani Nagpal,  
*Content and Partnerships Specialist*

# Acknowledgements

## Content Providers featured in this briefing

Boston Consulting Group

Cities Today

LSE Business Review

Project Syndicate

Raconteur

Scientific American

The Conversation

VoxEU

Wharton School of the University of Pennsylvania -  
Knowledge@Wharton

World Economic Forum

YiCai Global

# References

1. Raconteur, "Data centres and IT infrastructure strategy are key to digital transformation": [www.raconteur.net](http://www.raconteur.net) 
2. LSE Business Review, "Automation creates the space for entirely new jobs: the UK must adopt, adapt and improve": [blogs.lse.ac.uk](http://blogs.lse.ac.uk) 
3. YiCai Global, "Shenzhen's Drone Makers Produced USD10.9 Billion of UAVs in 2022": [www.yicaiglobal.com](http://www.yicaiglobal.com) 
4. Project Syndicate, "Everyone Loses in a Fractured World": [www.project-syndicate.org](http://www.project-syndicate.org) 
5. The Conversation, "ChatGPT: why it will probably remain just a tool that does inefficient work more efficiently": [theconversation.com](http://theconversation.com) 
6. Boston Consulting Group, "Amplify Your Warehouse Automation ROI": [www.bcg.com](http://www.bcg.com) 
7. World Economic Forum, "What exactly does it take for a volunteer organization to succeed?": [www.weforum.org](http://www.weforum.org) 
8. VoxEU, "Workers' responses to the threat of automation": [cepr.org](http://cepr.org) 
9. Cities Today, "Why airport technology vendors need to "up their game)": [cities-today.com](http://cities-today.com) 
10. The Conversation, "Amazon still seems hell bent on turning workers into robots – here's a better way forward": [theconversation.com](http://theconversation.com) 
11. World Economic Forum, "What is tech diplomacy and why does it matter?": [www.weforum.org](http://www.weforum.org) 
12. Scientific American, "Soft Robots Take Steps toward Independence": [www.scientificamerican.com](http://www.scientificamerican.com) 
13. Boston Consulting Group, "Accelerate Cloud Migration with Security Automation": [www.bcg.com](http://www.bcg.com) 
14. Wharton School of the University of Pennsylvania - Knowledge@Wharton, "How Jazz Can Unlock Your Team's Next Breakthrough": [knowledge.wharton.upenn.edu](http://knowledge.wharton.upenn.edu) 



---

COMMITTED TO  
IMPROVING THE STATE  
OF THE WORLD

---

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

---

World Economic Forum  
91–93 route de la Capite  
CH-1223 Cologny/Geneva  
Switzerland  
Tel.: +41 (0) 22 869 1212  
Fax: +41 (0) 22 786 2744  
[contact@weforum.org](mailto:contact@weforum.org)  
[www.weforum.org](http://www.weforum.org)