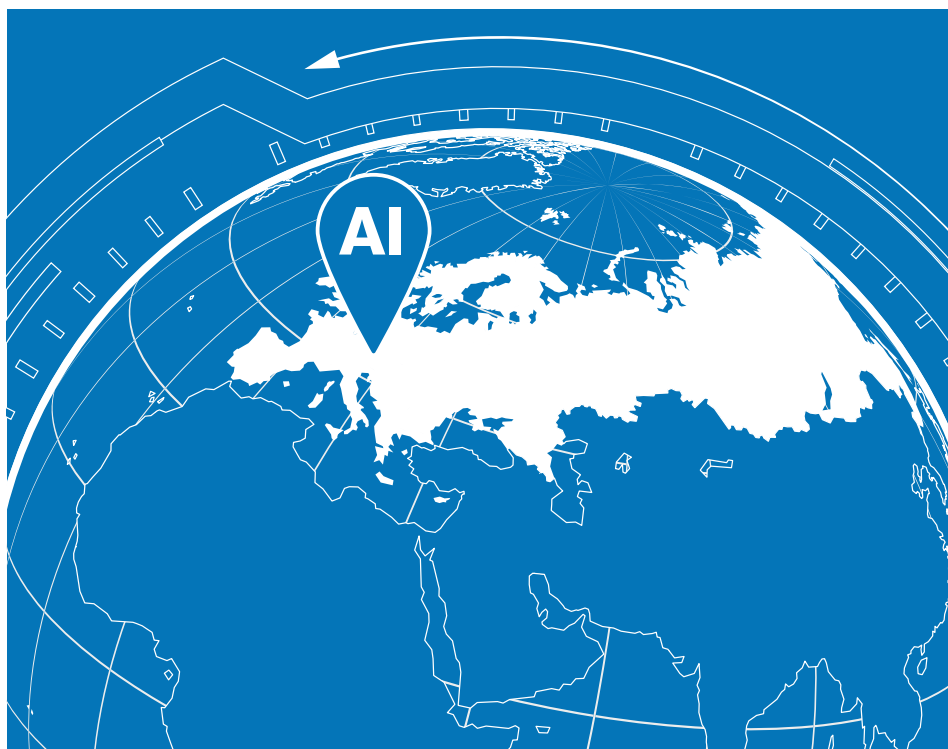


Trends in AI adoption,
leading use cases,
challenges, and the
future of data sharing
in Europe

The global AI agenda: Europe



Europe has the pedigree to be among the world-leading AI markets. Top-class universities, a 500-million strong consumer market, and combination of corporate giants and startups in sectors being transformed by machine intelligence, from logistics and health care to finance and entertainment.

The trend lines have been encouraging, but not stellar. The number of European AI startups more than tripled from 2011 to 2016¹, including local venture capital-backed names like Graphcore and Lilium that are pushing innovation frontiers in areas like chip technology and air mobility, respectively. The venture capital and funding landscape also features state-backed support mechanisms the likes of Bpifrance, Enterprise Ireland, and UK research councils, and region-wide investment through initiatives like the European Union's Horizon 2020 program.

The year 2017 marked a turning point, with AI startups raising €3.6 billion (US\$3.9 billion), three times higher than in 2016, and the startup community has developed an edge in sectors including fintech, health-tech, mad-tech (marketing, advertising, and technology), business intelligence, and automotive. This ecosystem is predominantly in business-to-business technology, at around 76% of the market, which can be an asset for the wider corporate world as it seeks to leverage both customized and off-the-shelf solutions.²

But Europe is also lagging the US and China in several AI metrics, including patent activity and the creation of the true tech juggernauts of the likes of MAGA (Microsoft, Apple, Google, and Amazon) in the US and China's BAT (Baidu, Alibaba, and Tencent). The continent's sluggish overall growth and lagging productivity are further economic challenges, to be aggravated by the lockdown caused by Covid-19—the IMF forecasts a 6.1% GDP contraction for advanced economies in 2020.³

How are executives grappling with the opportunities and challenges of AI in their own business? What is their AI roadmap and where are they reaping benefits? This executive summary examines regional responses from an MIT Technology Review Insights global survey, which polled 1,004 senior executives in Asia, the Middle East

Europe has the pedigree to be a world-leading AI market. Top-class universities, a 500-million strong consumer base, and widespread digital transformation. Yet the region lags the US and China in several AI metrics, including patent activity and the creation of the true tech juggernauts like a Google or Alibaba.

and Africa, Europe, Latin America, and North America, from sectors including consumer goods and retail, financial services, travel, telecommunications, and manufacturing.

About The global AI agenda

This report is part of “The global AI agenda,” a thought leadership program by MIT Technology Review Insights examining how organizations are using AI today and planning to do so in the future. Featuring a global survey of 1,004 AI experts conducted in January and February 2020, it explores AI adoption, leading use cases, benefits, and challenges, and seeks to understand how organizations might share data with each other to develop new business models, products, and services in the years ahead.

The respondents are evenly distributed globally, with 20% based in each of North America, Europe, Asia, Latin America, and the Middle East and Africa. Some 26% of respondents are C-level executives, 30% are directors, 16% heads of AI, and 10% heads of data or analytics. Over half (55%) of the organizations they represent are large, earning annual

revenue of \$1 billion or more; nearly one-third (32%) generate revenue of \$5 billion or more.

Of the 11 sectors represented, the largest contingents come from manufacturing (15%), IT and telecommunications (14%), consumer goods and retail (13%), financial services (11%), and pharma and health care (10%). The other sectors in the survey are professional services, energy and utilities, transport and logistics, travel and hospitality, media and marketing, and government.

In addition, MIT Technology Review Insights conducted in-depth interviews with leading AI experts globally, from organizations such as the World Economic Forum, Emirates Group, Vodafone, Walmart, Bank of Singapore, Lemonade Insurance Company, and Loom.ai, among others.



European companies have had early success with AI experiments. Some 92% of survey respondents made the returns they expected, or more.

Efficiency and customer experience

European companies have been busily rolling out AI over the past four years, the survey shows; by 2017, 58% of large businesses had initiated AI in their organizations, and by 2019 more than 90%. Their experiments have been well-executed so far, with 92% of those realizing an “expected” or “more-than-expected” return on their investment.

The top-cited benefits of AI are improvements to operational efficiency and customer experience, both selected by 51% of respondents. These benefits are valuable to key European sectors. Manufacturing is one of the continent’s leading segments and has provided much of the intellectual leadership behind the “Industry 4.0” rubric in which digitalization entwines with industrial production. While common narratives frame manufacturing as a dying industry in the West, the truth is more nuanced. The rise of robotics, AI, and customized and small-batch delivery, enabled by 3D-printing, has pushed aside economic arguments for moving manufacturing to lower-cost geographies to take advantage of cheaper labor.⁴ Tweaks and improvements in manufacturing processes achieved through AI could radically improve productivity and bring about a resurgence of European industry.

Figure 1: What have been the tangible benefits of your AI investments?
(% of respondents, Europe)



Source: MIT Technology Review Insights survey, 2020

Over half of European manufacturers, led by Germany, are now implementing AI, versus 28% in the US and 11% in China, according to one study.⁵ Gains include a 30% reduction in lost sales achieved by French food-maker Danone using machine learning to predict demand variability. Cosmetics-maker L'Oréal has deployed algorithms to predict customer demand by drawing on a range of data including social media, weather, and financial markets. European companies are among the front-runners in using AI to optimize supply chain efficiency; British online grocery retailer Ocado, for instance, has developed a smart robotics platform to build retail logistics and is using AI to manage logistics flows, limit fraud, and personalize online offerings.⁶

Customer experience, the other top AI benefit according to the survey, is also crucial to Europe's business-to-consumer industries. The continent is a global player in fintech and "challenger banking," led by the likes of Revolut and Monzo, that use AI in areas like fraud detection. European companies are also world-leading in entertainment technology—Sweden's streaming giant Spotify uses algorithms to build personalized playlists.

It's not just digital-born media brands using AI to enrich customer experience. Established telecoms incumbents are also exploring how AI can help their users and improve efficiencies.

"Customer service eats up a lot of costs," says Adi Chhabra, head of product innovation at Vodafone UK. "Integrating AI with interactive voice response almost instantly removes cost from these operations and leads to faster decisions to address customer issues." Chhabra believes AI can optimize everything from recommendations engines to predicting a customer's next action.

"You can predict what the problem is going to be through proactive rather than reactive customer care. Those are some of the larger use cases that I've seen being explored in the industry."

The survey shows that executives in European organizations foresee sizeable but not comprehensive AI rollout in the years to come, with a large share (45%) expecting between 21% and 30% of their processes to use AI in three years' time. While customer service will remain a

Health care: Europe's AI edge?

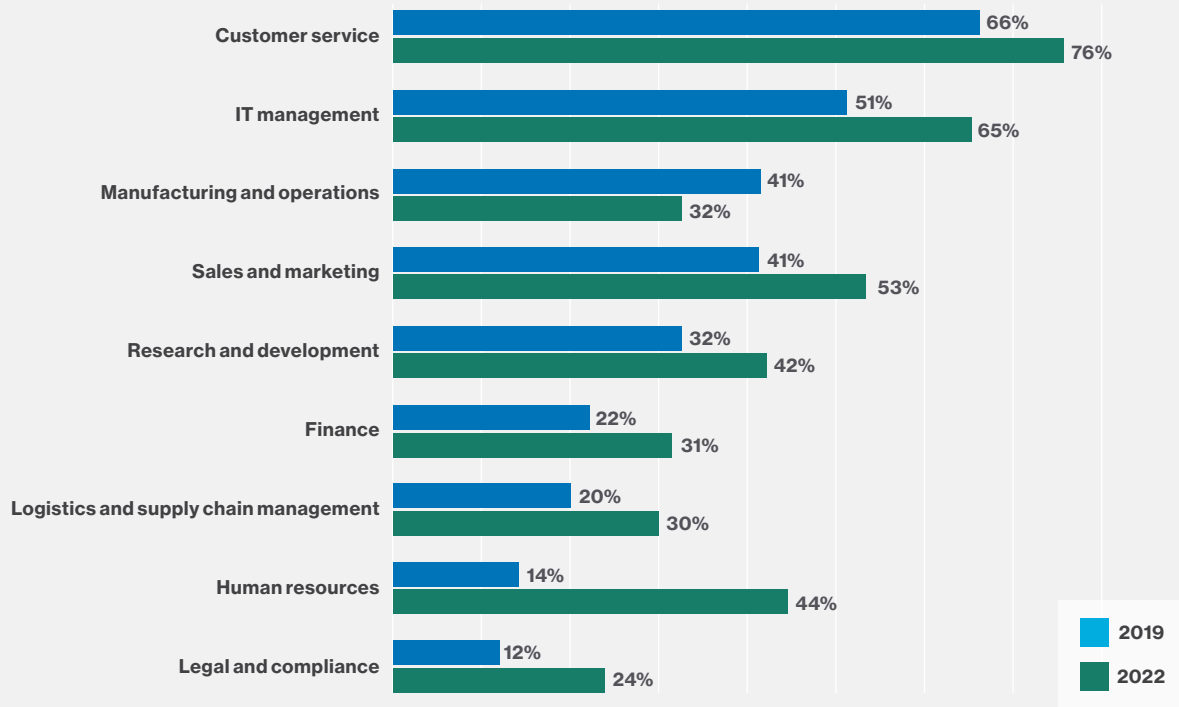
Of all the industries in which Europe is well-placed to lead AI, health care stands out. The continent boasts some world's largest pharmaceutical companies and a rising shoal of health-care AI startups working on everything from hospital workforce logistics to drug development. Governance reforms, such as European Union measures to ease the flow of patient data across borders to allow remote health care and tele-consultations, as well as funding through the Horizon program, can also nurture European health-care AI.

"For us," says Jeroen Tas, chief innovation and strategy officer at health-care technology provider Philips, "AI is a foundational technology that in the next couple of years will be found in the vast majority of our propositions." This will include both diagnostics and treatment, including for cancer. "Once diagnosed, AI algorithms now help us to

select the right therapy," says Tas. "That's complex because the options could include surgery, ablation, chemotherapy, immunotherapy, or radiation, or a combination of these. Selecting the right therapies and pathways is becoming an insights-driven, AI-enabled exercise."



Figure 2: In which three parts of your business are AI technologies being used most actively today and three years from now? (% of respondents, Europe)



Source: MIT Technology Review Insights survey, 2020

leading area of AI use for three-quarters of businesses, between 2019 and 2022 the fastest areas of AI growth will be in IT management, sales and marketing, and human resources.

The rising interest in HR and personnel is in line with our survey average, as companies turn to technology to support workforce management. AI-driven HR tools are now emerging for every activity from advanced candidate-job matching to smoother onboarding. AI is also being used to reduce bias in hiring as algorithmic models avoid common heuristics and shortcuts like elite universities, gender, postal codes, or cultural familiarity of someone's name. There are several European startups in the HR segment. Harver, based in the Netherlands, has developed an AI platform matching jobs and candidates that is being used by the likes of Netflix, Uber, and Booking.com.⁷ Personio, proudly "made in Germany" to comply with German data protection legislation, is an all-in-one HR platform for small- and medium-sized

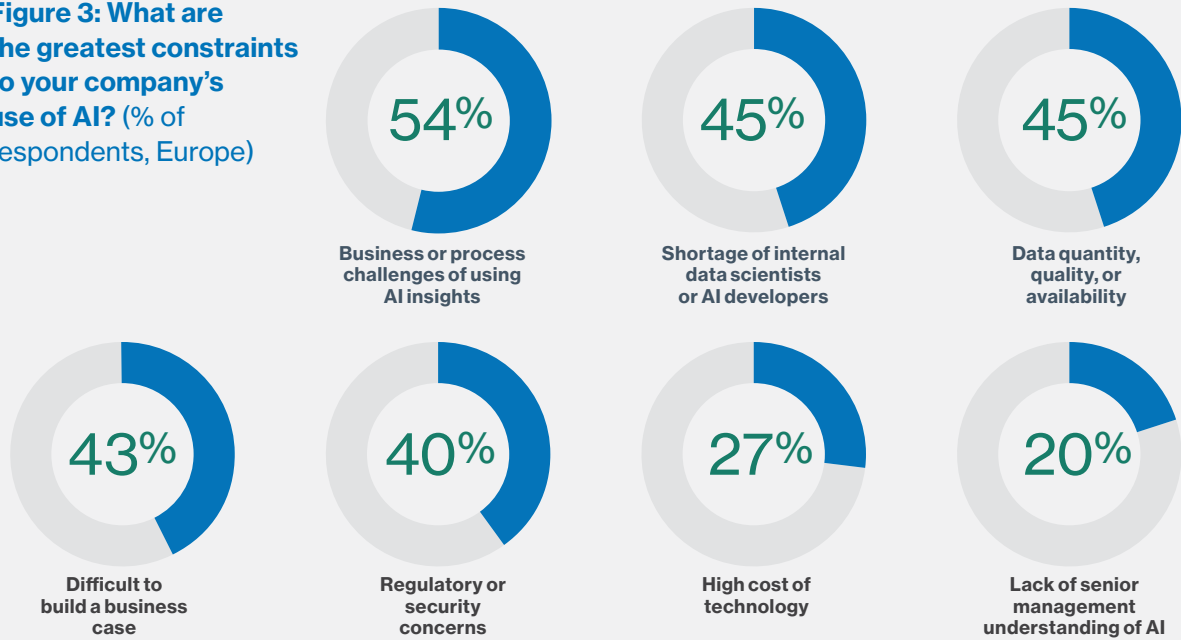
businesses and is designed to integrate third-party AI applications.

Change management is the top constraint

Overall, survey respondents in Europe—and in all regions—cite the challenge of changing business processes to use AI insights as the greatest constraint to AI adoption. Contrary to popular belief, Europe's strict data protection does not seem to create a bigger AI barrier for European respondents than those elsewhere. Indeed, fewer European executives cited data quality, quantity, and availability as a top three constraint to AI than their counterparts in North America and Asia-Pacific.

A shortage of data scientists or AI developers is a challenge for almost half of European respondents, which might seem surprising given Europe's academic powerhouses, including Oxford and Cambridge universities in the UK—which played a hand in the development of

Figure 3: What are the greatest constraints to your company's use of AI? (% of respondents, Europe)



Source: MIT Technology Review Insights survey, 2020

DeepMind (bought by Google), VocallQ (bought by Apple), and Swiftkey (bought by Microsoft)—and the German Research Center for Artificial Intelligence, one of the world's largest AI research institutes.

The challenge is in tapping into a talent pool that is in high demand. Companies building advanced AI models internally are often constrained by a talent deficit, as these require very sophisticated skills. European companies generally struggle to find the digital skills talent they need, according to a 2018 EY survey, with AI and cyber-security identified as key shortfalls.⁸ A LinkedIn report also highlights the small size of Europe's AI talent pool. There are twice as many AI-skilled workers employed in the US, despite its labor force being just half of Europe's.⁹ The study also showed that three countries are home to half of the EU's AI talent: UK (24%), Germany (14%) and France (12%), although, as a share of the workforce, Ireland, Finland, Cyprus, Luxembourg, Sweden, and the Netherlands punch above their weight in attracting or developing AI talent. AI talent is also clustered by sector: Germany leads the way in manufacturing AI, the UK on financial AI, and Finland on telecommunications AI. Europe faces a challenge in holding on to AI talent too; more developers

seem to be moving from Europe to the US (accounting for 32% of developers leaving Europe) than US developers moving to Europe (16% of incomers, most of whom relocate to the UK).¹⁰

Regulation is a double-edged sword

Regulatory or security concerns were selected as a big constraint by 40% of respondents. Europe's strong interventional posture in AI and digital technology is a double-edged sword. Positively, the EU is a major funding source for research and development. Under Horizon 2020, the EU increased annual investments by 70% to reach €1.5 billion (US\$1.6 billion) between 2018-20.¹¹ It has also launched dedicated funding instruments in areas like robotics. Political leaders have shown commitment to supporting the sector, including President Emmanuel Macron, who led a National Strategy for AI to position France as a worldwide hub, via the creation of a national network of specialized institutes to attract researchers, and the creation of an ethics committee to support and monitor AI. Macron also undertook to spend €1.5 billion (US\$1.6 billion) of public money on AI by 2022.¹² The UK government has pledged tens of millions of pounds in investments through its research councils and industrial strategy.¹³

There is a tension between GDPR and blockchain. GDPR requires data erasure at an individual's request, while non-erasure—full traceability—is inherent in the latter.

The downside, at least for some sector participants, is that Europe is also a strident digital regulator. Its General Data Protection Regulation (GDPR) is the most advanced consumer protection framework anywhere, and the European Commission is also promulgating AI-specific strategies and guidelines directions, including to promote “trustworthy AI.”¹⁴ Regulation is not *ipso facto* a constraint on innovation—when well-designed, it can provide clarity and uniformity and at a European level, reduce legislative fragmentation. But all regulators face a challenge in keeping up with the pace of innovation.

Companies are also trying to keep up with new cyber risks that go beyond regulatory requirements. Adi Chhabra of Vodafone says that complete customer anonymity, for instance, has been elusive: “As much as you want to anonymize, users of shared data can find ways to track the customers the data refers to.” He believes that blockchain and newer developments such as Ocean Protocol, a nonprofit platform that will promote secure data marketplaces, will eventually ensure that AI models can be run on fully anonymized data.

There is also a tension between GDPR and blockchain, he says. GDPR requires the ability of data erasure at an individual's request, while non-erasure—full traceability—is inherent in the latter. “They are trying to solve the same problem, but they cannot work together because blockchain by definition is immutable, which means you cannot erase anything, whereas GDPR says that you should be able to erase everything. The future is going to be exciting in terms of how these two things come together.”

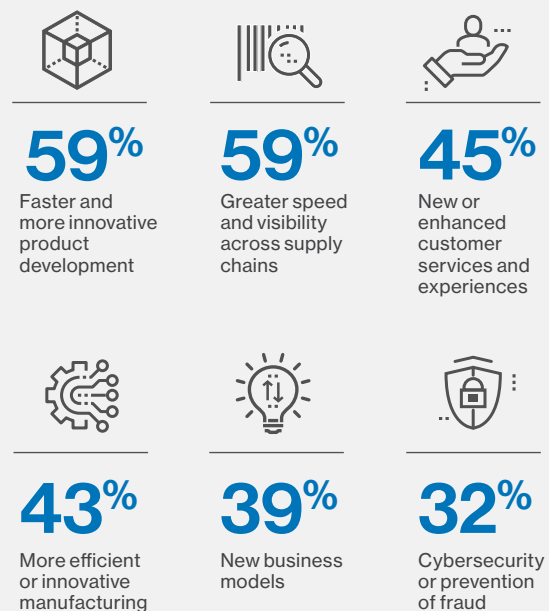
Toward open data

European voices are among those exploring creative ways to manage the trade-offs between open data and privacy and protection, like establishing data trusts. One of the

most prominent is the Open Data Institute (ODI), a UK-based nonprofit organization, that works across the public and private sectors to build an open and trustworthy data ecosystem. A large majority of European respondents in our survey (59%) think more data sharing could lead to faster and more innovative product development and 39% think it could lead to the creation of entirely new business models.

Overall, European respondents are more cautious about data sharing than their counterparts in other regions. Some 58% of Europeans said they were “very willing” or “somewhat willing” to share data with third parties, compared to 80% in Latin America, 75% in North America, and 64% in Asia-Pacific. The most-cited factor likely to lead them to engage more actively in data sharing is greater regulatory clarity. How the European Union and national governments handle the openness/privacy challenge will be a key factor shaping the continent's AI story in the years ahead.

Figure 4: What do you envision are the top three benefits of sharing data between companies in your own or adjacent industries? (% of respondents, Europe)



Source: MIT Technology Review Insights survey, 2020

Key takeaways

1

Human capital management will be a major growth area for AI in Europe. Customer care, IT management, and sales and marketing will be the leading areas of AI use over the coming three years, say survey respondents in Europe. By 2022, more than three-quarters will use AI to support customer service. The fastest area of AI growth is in HR processes. The number of companies using AI for human capital management will triple by 2022, reaching almost half of surveyed businesses.

2

Change management, a lack of skills, and data issues are the top AI constraints. The greatest constraint to wider AI use is the challenge of adapting business processes to use AI insights, according to the survey, followed by a shortage of data scientists, and insufficient data. Not only is Europe's data science talent pool potentially around half that of the US, but retention is a challenge. Companies are losing skills overseas, and much of the talent coming into Europe heads to the UK.

3

Data sharing could lead to faster and more innovative product development, say respondents. Executives in Europe can foresee more innovative product development and greater visibility across supply chains as the leading benefits of data sharing, although they are still cautious and would look for regulatory clarity before engaging more actively. How the European Union and national governments create a balance between innovation and data protection will be key in shaping the continent's AI story.

This report, “The global AI agenda: Europe,” is an executive briefing paper by MIT Technology Review Insights produced in partnership with Genesys. It is part of a series of regional papers published as part of The global AI agenda research program. Claire Beatty was the editor of this report, Nicola Crepaldi was the producer.

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- 1 “Notes from the AI Frontier: Tackling Europe’s gap in Digital and AI,” McKinsey, February 2019 (pdf, p.8)
- 2 “The European Artificial intelligence Landscape,” European Commission, 18 April 2018 (pdf, p.28)
- 3 “The World Economic Outlook, April 2020: The Great Lockdown,” International Monetary Fund, April 2020
- 4 “Remaking Europe: The new manufacturing as an engine for growth,” Bruegel, 7 Sep 2017 (pdf, p.103)
- 5 “Europe is leading AI in manufacturing operations adoption,” Capgemini, 12 December 2019
- 6 “Notes from the AI Frontier: Tackling Europe’s gap in Digital and AI,” McKinsey, February 2019 (pdf, p.9)
- 7 “Reshaping the HR industry – Interview with Harver CEO Barend Raaff,” EU-Startups, 18 December 2018
- 8 “Digital skills shortage in Europe poses risks for the continent’s future growth,” EY, 18 December 2018
- 9 “Understanding AI in Europe: Where the workforce is today, and where it needs to go,” LinkedIn Economic Graph, 18 November 2019
- 10 “Notes from the AI Frontier: Tackling Europe’s gap in Digital and AI,” McKinsey, February 2019 (pdf, p.7)
- 11 “Shaping Europe’s digital future: Artificial Intelligence,” European Commission [undated]
- 12 “Joining the Dots: A map of Europe’s AI ecosystem,” Roland Berger, 18 October 2018 (pdf, p.16)
- 13 “Realising the economic and societal potential of responsible AI in Europe,” Accenture, Spring 2018 (pdf, p.14)
- 14 “Shaping Europe’s digital future: Ethics guidelines for trustworthy AI,” European Commission, 8 April 2019 (pdf, p.14)

Illustrations

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