

The Mobile Industry and AI

How mobile connectivity and artificial intelligence can work together to make the world a better place: a guide for policymakers and regulators





The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

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The GSMA AI for Impact initiative

The AI for Impact (AI4I) initiative, led by the GSMA, is guided by a global task force of 23 major mobile operators serving more than two billion connections in more than 100 countries and an advisory panel of 12 UN agencies and partners. The AI4I initiative is defining how to sustainably scale mobile big data analytics and AI, grounded in the implementation of privacy and ethics by design. The GSMA further facilitates collaboration and knowledge sharing to ensure a flourishing policy and regulatory environment to help accelerate economically viable real-world implementations and innovative use cases.

For more information, please visit:
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#AI4I

Executive summary

The rollout of 5G and the Internet of Things (IoT) is enabling organisations and individuals to collect more real-world data in real-time. Artificial intelligence (AI) systems can use this data to become increasingly sophisticated and capable.

In the telecoms industry, AI is enabling mobile operators to improve both connectivity and their customers' experience. By using AI to optimise and automate networks, mobile operators can provide better services and enable more people to become connected.

For example, Telenor is using advanced data analytics to reduce power consumption and CO₂ emissions in its radio networks, while AT&T anticipates and avoids network service outages by using predictive models that employ AI and statistical algorithms. AI systems can also support more personalised and meaningful interactions with customers.

At the same time, some mobile operators provide AI capabilities to third parties on a commercial basis. They may deliver AI as a platform capability or they may employ AI to process network data for analytics for third-party organisations, such as governments, traffic planning authorities, energy providers and other commercial organisations.

Operators are using anonymised mobile data and AI to deliver valuable products and services that can help governments and public agencies to address pressing global challenges, such as climate change and pollution, the need for better healthcare and transport, and sustainable development. These tools can also be used to better prepare and respond effectively to extreme weather, natural disasters and infectious diseases.

For example, KDDI is integrating information from sensors, IoT devices and mobile networks into an AI-based system to help optimise governments' response to natural disasters. Meanwhile, Telia's Travel Emission Insights enable city and environmental planners to measure and benchmark carbon emissions and prioritise actions with the biggest impact.

As AI needs to be fair, open, transparent and explainable, the mobile industry is committed to the ethical use of AI in its operations and customer interactions to protect customers and employees, remove any entrenched inequality and ensure that AI operates reliably and fairly for all stakeholders. The mobile industry has aligned behind a set of AI ethics principles¹. For example, Telefónica's 'responsible use of AI by design' methodology encompasses AI principles, awareness and training for employees, a questionnaire, technical tools and a governance model that defines roles and responsibilities. It has also established an AI ethics committee consisting of multidisciplinary experts.

The mobile industry believes policymakers and regulators should facilitate and fund further R&D and investment in AI and mobile data-related solutions in both the public and private sectors. As mobile operators work with AI researchers, academia and start-ups to drive innovation, policymakers can encourage and facilitate this interaction by making their country an attractive space for AI talent. Clear principles and safeguards for the usage of AI and data analytics will provide certainty and facilitate responsible usage of AI and data analytics. Ideally, these principles and safeguards will be applied internationally and consistently to enable AI solutions to benefit from economies of scale.



The positive impact of AI

Artificial intelligence (AI) can be defined as the ability of a machine or computer to emulate human capabilities through learning and automation. Drawing on advanced automated feedback loops, AI systems continually optimise the algorithms they use to achieve a specific goal via a process known as machine learning.

Over the past decade, many AI systems have progressed to a point where they can be used to accurately transcribe or translate text, write code, recognise a vast range of images, anticipate when a machine will break down and optimise complex industrial systems and processes.

At the same time, the vast expansion in connectivity with the rollout of 5G and the IoT is enabling organisations and individuals to collect more real-world data in real-time. This data can be used to further improve AI systems so that they become increasingly sophisticated and capable. In effect, these technologies can create a powerful virtuous circle that can generate immense socio-economic benefits.

The European Parliament has noted² that “AI can increase the efficiency with which things are done and vastly improve the decision-making process by analysing large amounts of data. It can also spawn the creation of new products and services, markets and industries, thereby boosting consumer demand and generating new revenue streams.”

Consultancy PWC has estimated³ that AI could add 14% to global GDP – the equivalent of up to US\$15.7 trillion by 2030. It says the economic impact of AI will be driven by productivity gains from businesses automating processes, as well as augmenting their existing labour force with AI technologies and increased consumer demand resulting from the availability of more personalised and higher-quality products and services.

² July 2019 briefing paper: [europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI\(2019\)637967_EN.pdf](http://europarl.europa.eu/RegData/etudes/BRIE/2019/637967/EPRS_BRI(2019)637967_EN.pdf)

³ pwc.co.uk/economic-services/assets/macro-economic-impact-of-ai-technical-report-feb-18.pdf

AI: Delivering better connectivity

In the telecoms industry, AI is having a profound impact. It is enabling mobile operators to improve both connectivity and their customers' experience. By using AI to optimise and automate networks, mobile operators can provide better services and enable more people to become connected. For example, AI can be used for real-time network monitoring, predictive maintenance and to bolster network security, thereby providing customers with better connectivity.

AI systems can also strengthen and enable personalised and meaningful interactions with customers. For example, they can be used to improve automated communications, virtual assistance, customised pricing and technical support. In the security sphere, AI systems can help to detect and prevent fraud, fend off cyber-attacks and counter unlawful robo-calling.



In principle

- **Optimising network planning and operations:** AI systems can plan network capacity and then make dynamic adjustments in line with changes in demand.
- **Supporting predictive maintenance:** AI can pinpoint patterns that indicate a network component is nearing the end of its natural life, enabling it to be replaced before it fails.
- **Reducing energy usage and emissions:** AI systems can optimise different elements of the network so that they use just the right amount of energy required to deliver the desired level of performance.
- **Enhancing network security:** AI can detect traffic patterns that indicate malicious attacks on the network.
- **Reducing fraud:** AI can identify actors and devices that are seeking to disguise their identity for financial gain.
- **Improving customer service:** AI can be used to understand customers' questions and their context, then provide them with appropriate answers.





In practice

AT&T anticipates and avoids network service outages by using predictive models that employ AI and statistical algorithms. These models detect and exploit patterns by scanning millions of different network records, devices and customer circuits, and analysing more than 1.2 trillion daily network alarms and alerts.

Deutsche Telekom is using advanced technologies, such as rule-based filters, pattern-based fraud case detection, time series analysis, outlier detection, supervised learning and other AI-supported algorithms to detect fraudulent traffic in its networks and services. These tools and expertise can continuously identify and immediately stop multiple kinds of fraud in near real-time⁴.

KT has developed an AI-based solution for analysing the root cause of a network failure. Called Dr Lauren, the system collects data on alerts generated during network operation, analyses it using an AI algorithm and automatically identifies the cause and location of a network failure within a minute⁵.

stc is using machine learning to model traffic levels by network site, region, traffic type and device type. By segmenting in this way, the operator can analyse and optimise thousands of possible combinations, providing a more granular understanding of user behaviour and helping in the effective planning of infrastructure expansion.

Telenor is using advanced data analytics techniques to reduce power consumption and CO₂ emissions in its radio networks because it aims to become carbon-neutral by 2030. For its Green Radio project⁶, Telenor developed algorithms that use data to profile and predict the load for each of the thousands of individual radio units in a network. These predictions are then used to put radios in low-power 'sleep-mode' in areas where there is likely to be low demand.

TIM has developed a machine learning solution for intelligent network alarms filtering that helps improve network assurance processes. Thanks to this system, network operation centre operators can deal with more urgent network incidents faster and improve users' quality of service.

⁴ globalcarrier.telekom.com/business-areas/voice-mobile/voice-services/voice-protection

⁵ gsma.com/futurenetworks/wiki/ai-based-network-failure-root-cause-analysis-solution-kt/

⁶ telenor.com/stories/safeguard/lean-green-telco-machine-how-ai-is-greening-mobile-networks/



AI: Driving sustainable development

How AI can support the UN's Sustainable Development Goals

Mobile operators can provide governments and public agencies with the AI solutions and big data analytics they need to tackle a wide range of problems. Operators can deliver valuable insights that can help to address pressing policy challenges, such as climate change and pollution, the need for better healthcare and transport, and sustainable development, while also responding effectively to extreme weather, natural disasters and epidemics.

Some mobile operators already provide AI capabilities to third parties on a commercial basis. They may deliver AI as a platform capability or they may employ AI to process mobile network data for analytics for third-party organisations, such as governments, traffic planning authorities, energy providers and other commercial organisations.





In principle

- **Better cities and public infrastructure:** Municipalities can use data tools and insights developed by mobile operators to enable better planning, service delivery and transport. For example, mobile network data showing population movements could be used to help plan a new bus route or train line.
- **Curbing climate change and protecting the environment:** Mobile operators can help governments understand how climate change and environmental issues will impact communities. For example, mobile operators can develop tools that enable AI systems to forecast how weather patterns will change and predict future population displacement.
- **Managing disasters and pandemics:** Mobile operators can provide public agencies with tools that can provide an early warning of a disaster, support the subsequent response and inform specific recovery and rehabilitation initiatives. For example, a country experiencing an outbreak of a contagious disease could use these tools to help track and mitigate the spread of the disease.
- **Supporting industry and commerce:** Businesses can use mobile operators' insights and tools to achieve greater transparency, thereby improving operational planning and financial access. For example, connected sensors and monitors can collect real-time data that can be used by AI systems to optimise industrial and commercial processes.
- **Driving social inclusion:** Mobile operators' insights and data tools can help enhance equity, social welfare, public access and health, and inform effective solutions to pressing social challenges. For example, AI systems can analyse mobile network data to detect gradual changes in populations and ensure that local public services, such as education and healthcare, are appropriately resourced.





In practice

Sweden:

Telia Travel Emission Insights⁷ gives city and environmental planners⁸ the tools to measure and benchmark the CO₂ emissions from different routes and modes of transport, prioritise which actions will have the biggest impact and create progress reports. The service combines anonymised, location-specific crowd movement data from Telia's mobile network with the CERO model of CO₂ emissions developed at the Swedish Royal Institute of Technology.

Turkey:

Turkcell has developed a real-time analytics tool, called Galata, which can process more than 100 billion events per day to enable the governmental emergency response and aid agencies to make better-informed, time-sensitive decisions before and during natural disasters.

Japan:

KDDI is integrating information from sensors, IoT devices and mobile networks into an AI-based system to help optimise national and local governments' response to natural disasters. The system is designed to ensure evacuation warnings are issued in a timely manner, traffic can be better regulated and safety and shelter for local citizens can be effectively prioritised⁹.

Europe:

Vodafone's Analytics service can help retailers¹⁰ decide where to open new branches or relocate existing stores, based on demographic information and movement data. It can also support targeted marketing campaigns within a precise geographic area.

Indonesia:

XL Axiata, the Jakarta municipal government and Nodeflux have developed a flood detection solution. Mobile sensor networks monitor and evaluate water levels in dams, sewers and waterways and groundwater levels, then leverage AI to predict flooding. Jakarta's government can better anticipate floods, alert citizens and respond more effectively, resulting in less injury and loss of life and property¹¹.

Global:

Mobile network data is being used to address the medical, economic, socio-cultural and political aspects of disease outbreaks, such as the COVID-19 pandemic. These tools have been used during the pandemic to evaluate the effectiveness of interventions, help optimise allocation of health resources, plan appropriate public transport capacity and allocate social support where needed most, among other applications^{12, 13}.

⁷ business.teliacompany.com/crowd-insights/travel-emission-insights

⁸ business.teliacompany.com/blog/municipalities-using-data-insights-to-reduce-travel-emissions

⁹ river.or.jp/jigyo/IDR4M_pamphlet.pdf

¹⁰ vodafone.com/business/cloud-and-hosting/digital-services/vodafone-analytics#retail

¹¹ gsma.com/mobilefordevelopment/wp-content/uploads/2022/11/Mobile-Big-Data-and-Artificial-Intelligence-Towards-sustainable-development-in-Southeast-Asia.pdf

¹² www.gsma.com/betterfuture/aiforimpact/2021report

¹³ doi.org/10.1017/dap.2021.39

Pro-active industry leadership

AI needs to be designed, developed and deployed in a responsible and ethical way that is human-centric and rights-oriented. As an increasingly essential element of the infrastructure on which our society is built, AI needs to be fair, open, transparent and explainable. The mobile industry is committed to the ethical use of AI in its operations and customer interactions, to protect customers and employees, remove any entrenched inequality and ensure that AI operates reliably and fairly for all stakeholders.



In principle

AI Ethics Industry Playbook

The global mobile industry has published the AI Ethics Playbook¹⁴ and a related self-assessment questionnaire¹⁵ as practical tools to help bridge the gap between ethical principles and ethical practice. The Playbook explains how AI systems should be designed, developed and deployed in accordance with the principles of fairness, human agency and oversight, privacy and security, safety and robustness, transparency and explainability, accountability – and with full consideration of the potential environmental impact.

The Mobile Privacy Principles

Working through the GSMA, the mobile industry has developed the Mobile Privacy Principles which describe the way in which privacy should be respected and protected when consumers use mobile applications and services that access, use or collect their personal information. They are not intended to replace or supersede applicable law, but are based on recognised and internationally accepted principles on privacy and data protection. The key overarching objective of these principles is to foster business practices and standards that deliver meaningful transparency, notice, choice and control for mobile users with regards to their personal information and the safeguarding of their privacy.

¹⁴ gsma.com/betterfuture/wp-content/uploads/2022/01/The-Mobile-Industry-Ethics-Playbook_Feb-2022.pdf

¹⁵ gsma.com/aiethics-saq/





In practice

Orange has established a Data and Artificial Intelligence Ethical Charter that enshrines six key principles, including respect for human autonomy and needs, and equity, diversity and non-discrimination. The implementation of the Charter is monitored by Orange's AI Ethics Council. Orange has also established in-country local AI ethics referents to adapt methodologies and tools and support implementation.

stc takes an ethical approach to implementing AI use cases. For example, its start-up incubator employs 'explainable AI' to make data-driven decisions when scoring and shortlisting start-ups and applications. As well as making the model (including its workflow and the variables considered) transparent, the incubator explains why the model predicts that a particular start-up will be successful. This approach provides accountability in the decision-making process and allows the incubator to make informed decisions based on data, while also providing the start-ups with insights into how they were evaluated and what factors were considered.

Telefónica's 'responsible use of AI by design' methodology encompasses AI principles, awareness and training for employees, a questionnaire, technical tools and a governance model¹⁶ that defines roles and responsibilities. It has identified a new role called the 'responsible AI champion'¹⁷ who is the go-to

person for questions related to the ethical use of AI. As part of its governance model, Telefónica has created an AI ethics committee consisting of multidisciplinary experts. It also has an agreement with UNESCO relating to its Recommendation on the Ethics of Artificial Intelligence.¹⁸

Telstra has established a Risk Council for AI and Data, which considers the broader human, societal and environmental impacts of AI systems and the decisions they make, along with reviews to check that they accord with the law in all the jurisdictions in which they operate¹⁹. This applies to AI developed in-house and AI purchased from third parties. When Telstra purchases third-party systems, it remains responsible for their performance. It also ensures these purchased AI technologies are working in line with its ethical principles.

Vodafone has adopted an 'AI ethics by design' approach²⁰, which employs internal controls to govern the end-to-end use of AI. For example, anyone developing an AI-related service needs to carry out a risk assessment to identify use cases that require additional supervision to ensure fairness and avoid unfair preferential treatment. They can draw on a use case library for transparency and best practice templates to ensure their documentation and logging adheres to the required structure and contains the relevant content for auditing.

¹⁶ [Telefónica.com/es/wp-content/uploads/sites/4/2021/06/ia-responsible-governance.pdf](https://www.telefonica.com/es/wp-content/uploads/sites/4/2021/06/ia-responsible-governance.pdf)

¹⁷ business.blogthinkbig.com/a-new-organizational-role-for-artificial-intelligence-the-responsible-ai-champion

¹⁸ [Telefónica.com/es/sala-comunicacion/la-unesco-y-Telefónica-se-comprometen-a-promover-impulsar-e-implementar-la-recomendacion-sobre-la-etica-de-la-inteligencia-artificial/](https://www.telefonica.com/es/sala-comunicacion/la-unesco-y-Telefónica-se-comprometen-a-promover-impulsar-e-implementar-la-recomendacion-sobre-la-etica-de-la-inteligencia-artificial/)

¹⁹ [telstra.com.au/consumer-advice/your-information/machine-learning-and-ai](https://www.telstra.com.au/consumer-advice/your-information/machine-learning-and-ai)

²⁰ [vodafone.com/news/technology/pan-european-ethical-ai-policy-controls](https://www.vodafone.com/news/technology/pan-european-ethical-ai-policy-controls)

Recommendations to drive sustainable growth

The mobile industry believes policymakers and regulators can support the responsible use of AI and a viable market in a number of ways:



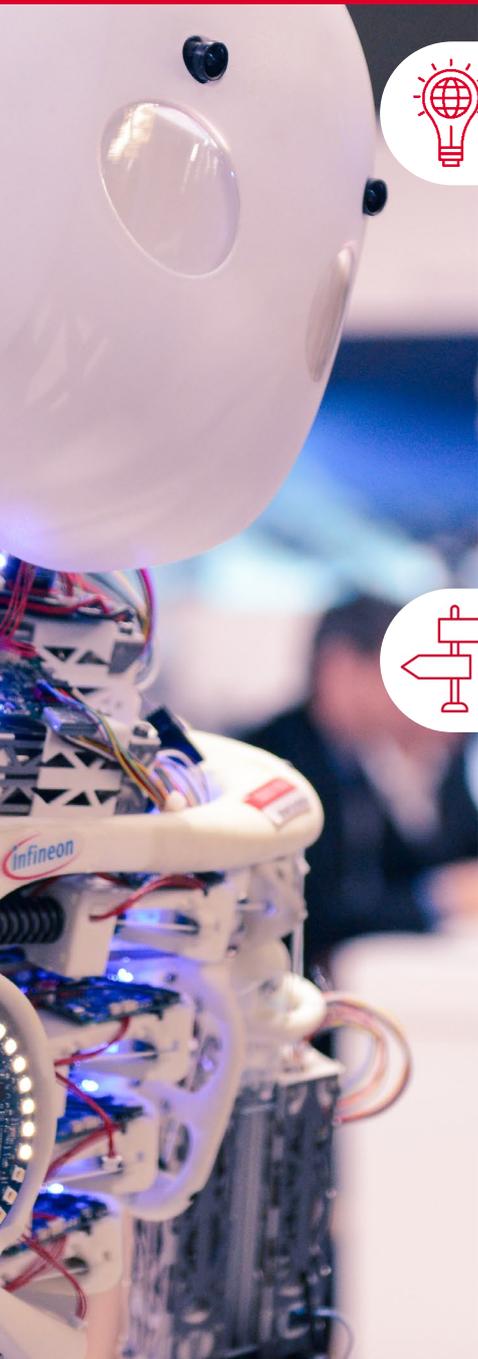
Encourage innovation

- Facilitate and fund further R&D and investment in AI and mobile data-related solutions in both the public and private sectors.
- Enhance key public services, such as infrastructure planning, health care and disaster response by procuring and leveraging AI and big data analytics tools.
- Enable time-limited regulatory sandboxes in which new ideas and concepts can be tested.



Provide clarity and consistency

- Establish clear principles and safeguards for the usage of AI and data analytics that provide certainty.
- Ensure the regulatory environment encourages and facilitates responsible usage of AI and data analytics.
- Invest in capacity building to ensure policymakers' and regulators' actions are guided by best practice.
- Standardise and apply principles and safeguards internationally and consistently to enable AI solutions to benefit from economies of scale.



Next steps



Both the public and private sectors should now be harnessing responsible AI systems and solutions to become more efficient and effective and provide better services.



The telecoms industry is exploring how AI can transform its operations, products and services for the better. Governments can support these efforts by ensuring the regulatory framework supports investment, gives certainty and ultimately creates a trustworthy environment.



Mobile operators are looking to build economically sustainable public private partnerships with national and local governments that can tap the potential of AI and data analytics, while raising awareness and understanding.



Mobile operators are also working with AI researchers, academia and start-ups to drive innovation. Policymakers can encourage and facilitate these interactions by making their country an attractive space for AI talent.

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