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DUBAI FUTURE FOUNDATION

MEGATRENDS
REPORT

FUTURE OPPORTUNITIES REPORT

THE GLOBAL 50

2026

Icons for Human-Machine Collaboration (HMC)
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Introduction

In its fifth edition, The Global 50 continues to focus on the future through the lens of growth, prosperity and well-being. Our view of the future is based on assumptions and uncertainties (which apply over multiple decades), megatrends (which apply over a decade or so), and action through future opportunities. This is an extract of the megatrends section of The Global 50 (2026).

Navigating the Megatrends

As research-led thematic paths relevant for a decade or so, megatrends are interrelated and both shape and are shaped by, day-to-day signals across all aspects of work and life. A megatrend is a pattern evolving from complex interlinkages between global trends, technologies and other factors that impact global growth, prosperity and well-being. The ability to sense, adapt and respond to them is central to ensuring future readiness and laying the foundations for long-term success.

In the 2026 edition of The Global 50, we recognised that Megatrend 4 – Energy Boundaries, has evolved. While energy remains important and relevant, it now falls under the assumption that technology will continue to advance (visit The Global 50 (2026) for more details). The megatrend has now been replaced by **Redefining Finance and Monetary Systems** – with drivers such as tokenisation, central bank digital currencies, AI, payment systems, trends in regulation, data structures, securitisation, evolved asset classes, and others.[1] These developments are shifting how we view, value and use money and wealth, and will have wide-ranging impacts across sectors, organisations, and daily work and life.

It is important to note is that while ten megatrends are presented each year, they are non-exhaustive and taking the long view, energy will continue to be at the heart of progress.[2]

To access the complete report, and other research, please visit the Dubai Future Foundation website:

www.dubaifuture.ae/research/

BOX

The information provided on the **megatrends** in the following pages is indicative only, and the drivers, trends and signals presented are based on information available at the time of publication. For each megatrend, we offer a mix of current facts and future forecasts. Additionally, we identify three potential areas of opportunity within each megatrend that may be of interest to decision-makers and individuals alike.

As The Global 50 is a futures report, many of the areas of opportunity covered in previous editions have not (yet) materialised.

MEGATREND 1

Materials Revolution

Materials are fundamental to all products, foods, medicines and drinks that we consume on a daily basis. Driven by extensive progress in advanced machine intelligence, nanotechnology and materials science, as well as interdisciplinary research and innovation, new opportunities are arising in the use of materials in almost all industrial, technological and consumer sectors.

Areas of Future Opportunity (Past Editions)

Synthetic Biology (2023)
Materials for Climate Change (2023)
Semiconductors (2023)
Tissue Engineering (2024)
Materials for Engineering Parts (2024)
Nanobiomaterials for Dental Applications (2024)
Permanent Magnets (2025)
Biomimetic Materials (2025)
Quantum Materials (2025)

Keywords

Aerospace Materials
Algae-Based Dyes
Biodegradable Food Packaging
Biopolymers
Carbon Capture
Circular Economy
Covalent Organic Frameworks (COFs)
Material Passports
Nanocoatings
Smart Materials

Things to Look Out for in the Short-Term

COF-999 for more efficient carbon capture

A covalent organic framework (COF) material, COF-999 captures carbon dioxide (CO_2) faster and at lower temperatures than other materials and does not degrade as quickly with use over time.[3] COF-999 could significantly reduce the operating costs of carbon capture, utilisation and storage (CCUS) through improved CO_2 adsorption.[4]

Algae-Based Textile Coatings

Algae-based textile coatings offer fully bio-based, naturally coloured fabrics that stay bright and durable, replacing harmful synthetic dyes.[5] Every year, the textile industry releases 180,000 tonnes of dye-contaminated wastewater, polluting drinking water, endangering aquatic life and destroying ecosystems.[6]

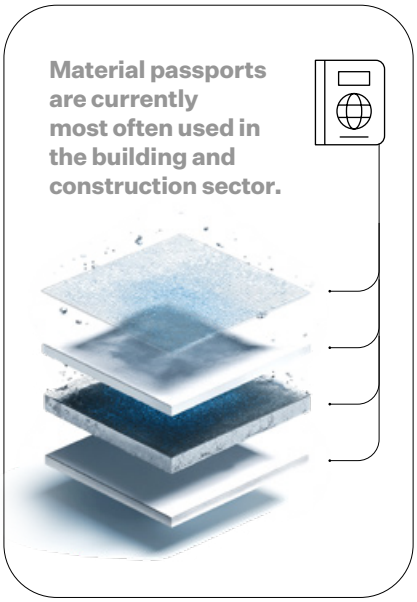
Waste to Packaging

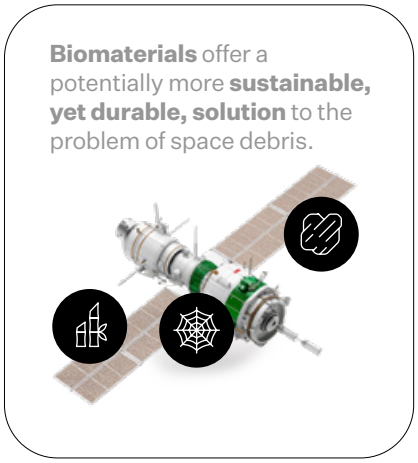
Biopolymers (chitosan, pectin and starch) extracted from fruit peels and food waste can be used to create biodegradable packaging with antimicrobial properties.[7] In pilots, such packaging tripled the shelf life of guava, doubled that for pears and kept mangoes fresh for up to 25 days.[8] This could address the 1.2 billion tonnes of food wasted globally each year, 35% of which is fruit, while offering sustainable alternatives to conventional packaging.[9]

Areas of Future Opportunity

AI-Ready Material Passports
Material passports are not a universal requirement, although they are often used in sustainability and circular economy contexts. Currently, they are only mandatory in the European Union, where digital product passports will be rolled out across various product categories between 2026 and 2030 under the Ecodesign for Sustainable Products Regulation.[10] Material passports are currently most often used in the building and construction sector, although they require manual data inputs and are not updated in real time.[11] Cross-border traceability and interoperable lifecycle-tracking systems are rare, especially in the absence of a standard classification framework.[12] Even with International Organization for Standardization (ISO), European Committee for Standardization (CEN) and Industry Foundation Classes (IFC) frameworks, the lack of standardisation is a major barrier.[13]

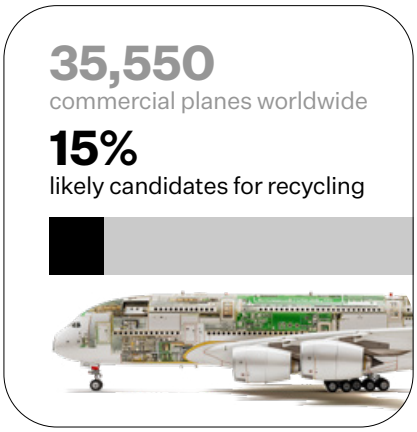
The US GBI Test is trialling accepting various identifiers because future material passport frameworks may accommodate multiple platforms rather than one.[14] In the future, as AI generates formulas for new materials, composites and bioengineered materials, the classification gap will widen. Areas of future opportunity include changes in what constitutes a material when AI design is used and how to disclose such information, particularly in food, pharmaceuticals and advanced manufacturing.





Biomaterial Composites for Space
Materials used in space are chosen to withstand extreme temperatures, radiation and physical damage from meteoroids and other causes; however, they lack adaptability in dynamic conditions.[15] Around 83% of orbital debris is concentrated in low Earth orbit – 73% from satellites and rocket bodies – and, in terms of destructive energy, a 10 cm object moving at orbital velocity (in space) is equivalent to a 250 kg object moving at highway speed on Earth.[16] Such debris can cause considerable physical damage. Biomaterials offer a potentially more sustainable, yet durable, solution to the problem of space debris. Bamboo fibre (with six times steel's strength-to-weight ratio), basalt fibre (with a thermal stability of up to 1,600°C) and spider silk (with exceptional elasticity) can be incorporated into space-grade composites using genetic engineering and additive manufacturing.[17] With AI-driven sensors for real-time damage detection and autonomous repair,[18] these materials could enable self-healing satellites and rocket bodies that biodegrade naturally post-mission.[19]

Aerospace Circular Economy
The total number of commercial planes (active and in storage) worldwide is approximately 35,550, with 15% in storage and likely candidates for recycling.[20] An ongoing commercial plane shortage, expected to persist until 2034, keeps older models flying longer, although many are expected to reach the end of their operational life within the next decade.[21] More broadly, over the next 20 years, more than 13,000 aircraft across the commercial, military and private sectors (44% of the global fleet), traditionally parked in desert 'boneyards', will present a major opportunity for sustainable recycling and recovery.[22] Catalytic conversion offers a breakthrough solution. This low-temperature chemical process uses various catalysts to break down plastics and composite materials into reusable hydrocarbons without harmful emissions.[23] With a strong return on investment within one to two years,[24] catalytic conversion neutralises heavy metals and could reduce the hazardous waste produced by the traditional aerospace recycling process by up to five times.[25]



MEGATREND 2

Boundless Multidimensional Data

As technology advances – quantum computing, blockchain, the Internet of Things (IoT), edge computing, automation, digital realities and more – data will become both more constant and more multidimensional. It will be more available within, and for, governments, businesses and society, in larger volumes and at greater speeds. With options enhanced by 5G, 6G and uninterrupted connectivity through multiple networks, including satellites, access to real-time analytics and insights will improve. Solutions will be developed to minimise the environmental impacts of data capture, transmission and storage.

Areas of Future Opportunity (Past Editions)

Unlocking Value with Cross-Border Open Data (2023)
Big Data Analytics (2023)
Synthetic Datasets (2023)
Bioinformatics (2024)
Data for Climate Accountability (2024)
Data Cooperatives for Insights (2024)
Preparing for 6G (2025)
Multimodal Explainable Artificial Intelligence (2025)
Sports Artificial Intelligence (2025)

Keywords

AI Governance
Cross-Border Data Flows
Data Sovereignty
Digital Economy
Edge Computing
General Data Protection Regulation (GDPR)
Neural Data
Neurotech
Smart City Data Governance
Space-Based Data Centres

Things to Look Out for in the Short-Term

Global Data Regulatory Fragmentation

Some 79% of countries around the world now have data protection laws.[26] However, regulatory frameworks are fragmenting as nations individually try to balance AI governance with privacy and data security needs.[27] These developments will reshape data sovereignty and competition,[28] creating complex compliance landscapes.

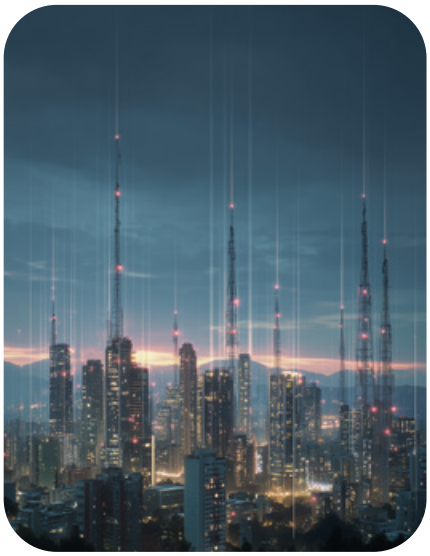
Data Centre Financing

By 2027, 25% of new global computing capacity will come from local data centres, risking the stranding of existing global data centre assets currently providing that capacity.[29] Commercial mortgage-backed securities and asset-backed securities have jointly financed over $50 billion in data centres in the past five years.[30] However, this is still less than the more than $900 billion in investment needed through to 2029, and asset-backed securities alone are expected to reach $40 billion in financing in 2026.[31]

Neural Data Governance

UNESCO's member states adopted a recommendation on neurotechnology (neurotech) in November 2025.[32] While it is not legally binding, it is a global first for ethical standards in neurotech and designates neural data as highly protected, with mandatory transparency and explicit consent for wearables (such as headbands and headphones) that read brain signals.[33] This area is expected to expand, with possible overlaps as neurotech ethics is integrated into national AI governance frameworks.[34]

Areas of Future Opportunity



Frictionless Cross-Border Data Flows
Jurisdictions around the world, from California to Japan and from Canada to Brazil, are adopting regulatory frameworks similar to the European Union's General Data Protection Regulation (GDPR). The Middle East and North Africa region is starting to impose strong cross-border data rules, and AI laws will make compliance increasingly important.[35] Such measures are adding friction to cross-border flows, yet the digital economy makes up 17.3% of global gross domestic product (GDP), worth approximately $20 trillion in 2025.[36] Cross-border data flows are vital in supporting the global economy. Indeed, if every country were to restrict its data flows, global GDP could drop by 4.5%.[37] Nevertheless, empirical analysis shows that eliminating data flow regulations would not be the optimal solution.[38] Combined with trust, data flows across borders could lead to a 1.8% growth in global GDP and a 3.6% growth in exports.[39] In the future, it will be vital to have automated systems that optimise data routing and processing across jurisdictions while maintaining compliance with diverse sovereignty, privacy and security rules.

Space-Based Data Centres
Even after accounting for carbon emissions from rocket launches, space-based data centres could reduce the carbon footprint of data processing by up to 10 times.[40] The Y combinator-backed space technology start-up Starcloud (previously Lumen Orbit)[41] launched its first satellite in partnership with Nvidia's Inception programme with large solar arrays and advanced cooling systems.[42] In 2026 it raised $170 million at a $1.1 billion valuation, bringing its total funding to $200 million.[43] In 2025, China launched the first of 12 out of a planned 2,800 satellites intended for in-orbit data processing.[44] In the UAE, also a space technology start-up, Madari Space plans to launch its first mission in 2026,[45] with stated ambitions for a large-scale orbital data centre constellation by 2028.[46] The EU's ASCEND feasibility study aims to achieve proof of concept in 2031.[47] In 2026, Google announced discussions with SpaceX exploring launches supporting Project Suncatcher, Google's orbital data centre project, which has a prototype planned for 2027.[48] However, despite the momentum, challenges remain, including high launch costs, space debris, radiation exposure, difficulties of repair and solar flares.[49]

Semiconductor Cluster Hubs
The global semiconductor market is expected to reach $1 trillion by 2030, with the computing industry accounting for 41%.[50] While publicly stated numbers vary, GlobalFoundries, Intel, Samsung, the Smart Manufacturing Innovation Centre and the Taiwan Semiconductor Manufacturing Company are the key manufacturers of 7 nm (and below) chips, which are critical for AI.[51] Building semiconductor foundries typically costs around $20 billion and potentially up to $40 billion.[52] While the UK has opted for a design-and-outsource production model,[53] the EU is pushing for regional manufacturing through its Chips Act (2023).[54] Innovation hubs can develop ecosystems that serve as regional distribution hubs to capture value from the semiconductor supply chain through logistics, testing and integration services.

MEGATREND 3

Technological Vulnerabilities

New technological vulnerabilities and threats are inevitably arising from advances in biotechnology, gene editing, precision agriculture, widespread digitalisation and automation, multimodal AI, and the spread of wearables and the Internet of Things (IoT). Some of these vulnerabilities and threats are becoming more severe, frequent and complex, crossing technological, industrial and geographical boundaries. Some, as with biotechnology, are also crossing biological boundaries. Cybercriminals are more organised, using AI to coordinate and commit crimes. More innovative approaches to identifying, assessing and addressing vulnerabilities will be key.

Areas of Future Opportunity (Past Editions)

Artificial Intelligence and Quantum Encryption (2023)
Cyberbiosecurity (2023)
Cybersecurity for Small Businesses and Charities (2023)
Cyber-Risk Insurance (2024)
Cybersecurity for the IoT (2024)
Protecting Against Cyber-Physical Attacks (2024)
Incorporating Psychology into Cybersecurity (2025)
Cyberbiosecurity Awareness and Education (2025)
Balancing Interoperability with Cybersecurity (2025)

Keywords

AI-Enabled Cyberattacks
Data Breaches
Deepfakes
Digital Heritage Collections
Digital Identity
Internet of Medical Things (IoMT) Cybersecurity
Legacy Systems
Post-Quantum Cryptography
Quantum-Resistant Security
Shadow AI

Things to Look Out for in the Short-Term

Deepfake Threats

In May 2024, deepfake attacks targeted the CEOs of Accenture[55] and WPP, the latter being the largest advertising group in the world.[56] While both of these attempts were unsuccessful, the global engineering firm Arup lost $25.5 million in a similar attack.[57] With losses from deepfake fraud in the first quarter of 2025 reaching $200 million, AI-enabled fraud losses are expected to increase to $40 billion by 2027.[58] Interestingly, while humans detect real-world deepfakes at 55–60% accuracy, automated systems drop 45–50%.[59]

Roadmaps for Quantum-Related Cybersecurity

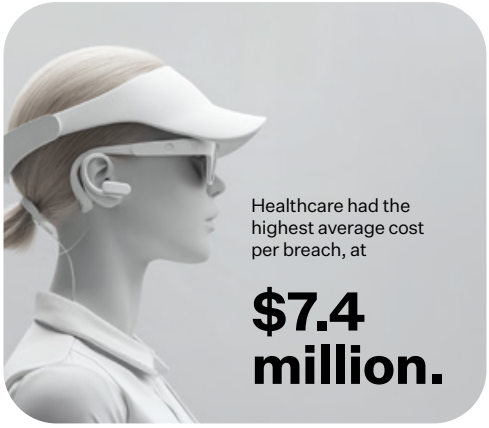
Only 9% of technology leaders have a roadmap in place for post-quantum cryptography (PQC).[60] Quantum computing is expected to pose encryption risks within three to five years, yet companies take an average of three to four years just to move from awareness to a strategic PQC roadmap.[61]

AI Threats

Between March 2024 and February 2025, one in six data breaches involved attackers using AI.[62] Organisations using AI and automation shortened breaches to 204 days compared with 284 days for those that did not, saving $1.9 million.[63] Some 97% of organisations that experienced an AI-related breach lacked proper AI access controls.[64] Additionally, 20% suffered a breach due to shadow AI – AI used without organisational approval or oversight – adding $670,000 to the average breach cost of $4.4 million.[65]

Areas of Future Opportunity

Cyber-Safe Cultural Assets
It took 11 weeks for the British Library to restore its main online catalogue (containing 36 million records of printed and rare books, maps and journals) after a cyberattack in 2023.[66] As of December 2025, more than two years later, it still had not fully recovered,[67] losing $9.4 million[F], approximately 40% of its reserves.[68] While the British Library's case may have been an unusual at a time before the rise of automated cybersecurity, it is essential for libraries, museums and archives to have access to specialised cybersecurity to protect irreplaceable digital collections and legacy systems.[69]



Securing the Internet of Medical Things
There are 500,000 medical technologies that currently impact people's health and quality of life.[70] The Internet of Medical Things (IoMT) comprises specialised medical devices that range from simple wearables, such as smartwatches and fitness trackers, to implantable devices, such as pacemakers, insulin pumps and life-critical infusion pumps.[71] In 2025, healthcare had the highest average breach cost at $7.4 million per breach.[72] The closer devices get to the end of their life, when they may lack security patches, the more exposed they become to attacks.[73] As IoMT cyberthreats erode patient safety, patient privacy, regulatory compliance[74] and more importantly trust,[75] cybersecurity strategy is key. The healthcare cybersecurity market may grow to $32.9 billion by 2028.[76]

Quantum Secure Identity
As quantum computing continues to advance, classic digital signatures, including elliptic curve cryptography and the Rivest–Shamir–Adleman algorithm, will become vulnerable to quantum attacks.[77] One-shot signatures offer a promising post-quantum solution, enabling single-use quantum keys in both traditional and quantum machines.[78] However, challenges remain: secure coding systems that convert inputs into a unique digital fingerprint will need to be rebuilt from scratch; methods to hide how quantum encryption works are not yet established; and enabling practical applications across blockchain, decentralised finance and digital identity management will present both challenges and opportunities.[79]

F Based on the GBP:USD exchange rate of 11 July 2026

MEGATREND 4 NEW

Redefining Finance and Monetary Systems

Driven by shifting investor priorities, generational values and technology, the definitions of value, money and investment are evolving. Financial infrastructure is transforming how we allocate capital, manage finance, and process payments in daily work and life. Competing forms of digital money across centralised, decentralised and hybrid models are enabling this megatrend, while asset types are diversifying into physical, digital and tokenised forms. Existing and new non-bank institutions will continue to reshape access to credit and investment. Meanwhile, the interplay of cross-border flows, varying regulatory frameworks and real-time analytics will redefine net worth, income, how we pay for goods and financial innovation. See Box 4 for more.

Keywords

Algorithmic Asset Value

Anti-Money Laundering and Combating the Financing of Terrorism

Central Bank Digital Currency

Financial Literacy

Intangible Assets

Intelligent Banks

Know Your Customer (KYC)

Real-World Assets

Stablecoins

Tokenisation

Things to Look Out for in the Short-Term

Tokenisation X

Tokenisation is the creation of a digital representation of a financial or physical asset.[80] Examples include stablecoins, central bank digital currencies (CBDCs), bank-issued tokenised deposits,[81] tokenised real estate,[82] art[83] and other real-world assets.[84] While projections vary, the market for real-world tokenised assets could reach $30 trillion by 2034.[85]

Intangible Assets Beyond Intellectual Property

Value creation is shifting from traditional intellectual property (such as patents, trademarks and copyrights) to other intangible assets (such as data, algorithms and know-how).[86] Most large companies' intangible assets have a higher value than their tangible assets, yet 94% of these companies do not have formal processes to commercialise them.[87] Annual intangible investments have grown two and a half times faster than physical investments, reaching $10 trillion in the last ten years (2015-2025), with Sweden leading the way at 17.5% of gross domestic product (GDP).[88]

Growing Interest in Stablecoins

Between July 2023 and July 2025, the total stablecoin market capitalisation climbed from $125 billion to $255 billion, with 90% concentrated among two issuers.[89] Dollar-backed stablecoins now make up 98% of the global market and have grown to over $300 billion in value, and more than 300 active coins.[90] This topic has become particularly important with the signing into law of the Guiding and Establishing National Innovation for US Stablecoins (GENIUS) Act in the USA in July 2025.[91]

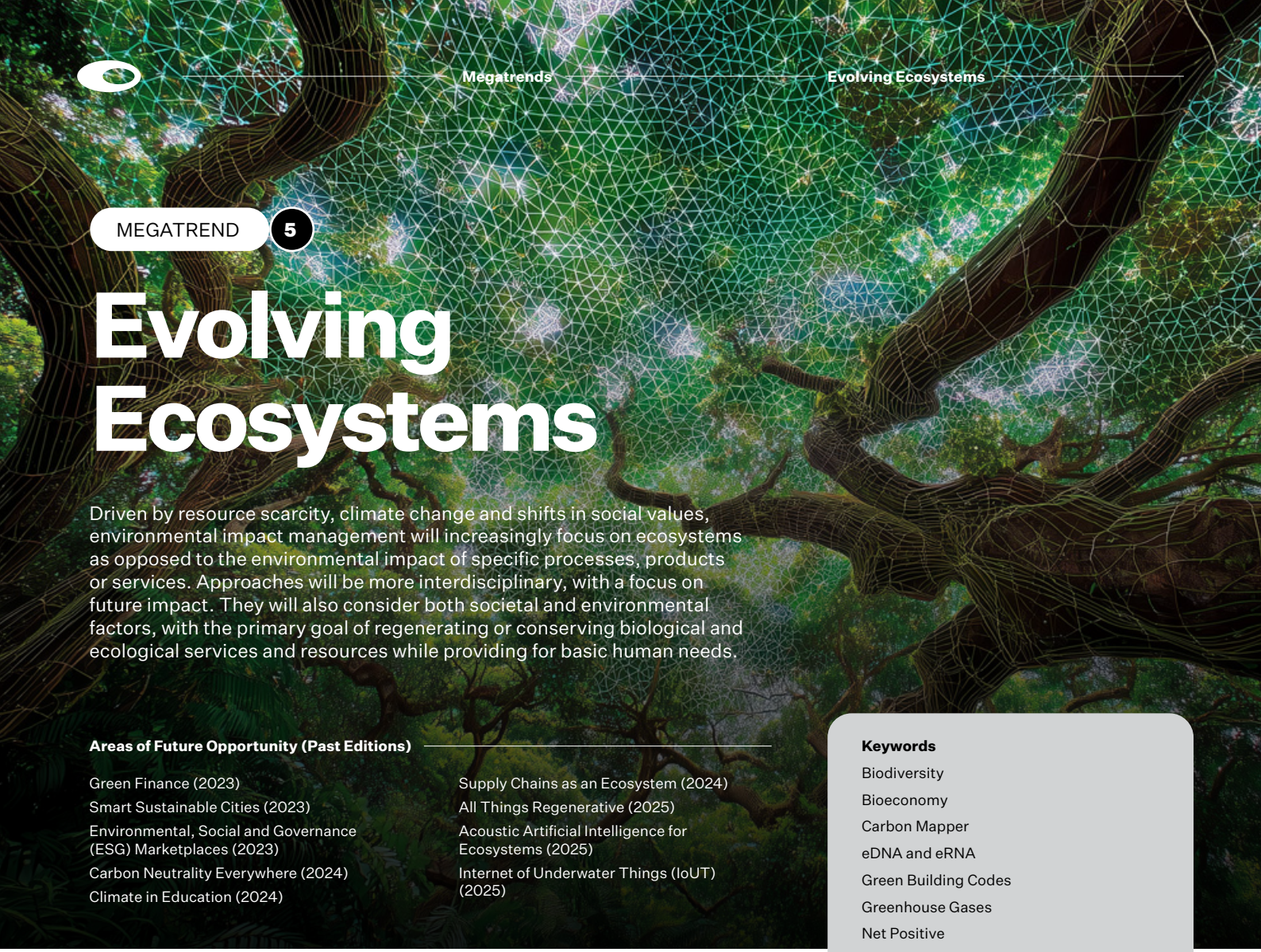
Areas of Future Opportunity

Cross-Border Stablecoin Regulation
Stablecoins vary in market capitalisation, adoption levels and degree of interconnectedness within a financial system.[92] For example, two of the largest stablecoins represent around 90%[93] of the $312 billion stablecoin market,[94] stablecoins more generally integrated across crypto trading, tokenised asset markets, payment systems and other areas. This presents opportunities for regulatory framework development, particularly in cross-border transactions, given stablecoins' market capitalisation and link to the US dollar.[95] International coordination is needed[96] to establish standards for reserves, redemption, anti-money laundering and countering the financing of terrorism (AML/CFT) compliance, monitoring systems, stress-testing and interoperability protocols.[97] These developments should address stablecoins' borderless nature and the increasing role of non-bank institutions – institutions that often operate without the strict oversight applied to traditional banks.[98] This regulatory gap is particularly important as an estimated $129 billion (84% of $154 billion in illicit transactions) in stablecoins was involved in illicit activity in 2025, representing about 41% of these currencies' total year-end market capitalisation.[99]

Next-Generation Financial Literacy
According to a 2023 survey conducted by the OECD, the average financial literacy score is only 60%, with an average of 53% for digital financial literacy,[104] and overall, 41% of people are aware of cryptoassets.[105] However, countries vary considerably in this regard: Spain scores highest at 84%, whereas Malaysia scores 16%, France 15% and Indonesia 3%.[106] Globally, only 3.2% of adults hold cryptoassets, and only 41% say that they know that cryptoassets do not have the same legal status as bank notes and coins.[107] Generation Z (born 1997–2012)[108] has even lower overall financial literacy than older generations.[109] As the financial landscape evolves, new instruments and investment mechanisms will emerge that will require the definition of financial literacy to evolve. This will echo the evolution of financial literacy from managing budgets, protecting against scams, and saving and planning for the future[110] to understanding new asset classes, digital money and programmable money.[111]

Managing the Rise of Intelligent Banking
Many banking institutions rely on legacy systems that are incompatible with AI, requiring infrastructure investment and cultural change. By adopting incremental, agile approaches with security-first designs, banks can enable transformation through pilot projects.[100] Once integrated, AI enables real-time transaction monitoring, immediate fraud detection, and automated know-your-customer checks and onboarding, while generative AI provides financial case summaries to aid decision-making.[101]

In contrast, legacy systems are slow, inflexible and time-consuming; lack application programming interfaces and real-time information; often contain data silos; and are subject to quality concerns.[102] There are opportunities to enable this transition, and opportunities will also be present in the need to protect this new, complex network, which will come with its own systemic risks. For example, many organisations cannot fully explain or validate model outputs, and there may be issues with interoperability across jurisdictions with different sets of legal and regulatory boundaries and local trends and behaviours.[103]



MEGATREND 5

Evolving Ecosystems

Driven by resource scarcity, climate change and shifts in social values, environmental impact management will increasingly focus on ecosystems as opposed to the environmental impact of specific processes, products or services. Approaches will be more interdisciplinary, with a focus on future impact. They will also consider both societal and environmental factors, with the primary goal of regenerating or conserving biological and ecological services and resources while providing for basic human needs.

Areas of Future Opportunity (Past Editions)

Green Finance (2023)
Smart Sustainable Cities (2023)
Environmental, Social and Governance (ESG) Marketplaces (2023)
Carbon Neutrality Everywhere (2024)
Climate in Education (2024)
Supply Chains as an Ecosystem (2024)
All Things Regenerative (2025)
Acoustic Artificial Intelligence for Ecosystems (2025)
Internet of Underwater Things (IoUT) (2025)

Keywords

Biodiversity
Bioeconomy
Carbon Mapper
eDNA and eRNA
Green Building Codes
Greenhouse Gases
Net Positive
Net Zero
Overfishing
Satellites

Things to Look Out for in the Short-Term

Carbon Mapper Satellites

The California-based non-profit Carbon Mapper continues to launch satellites for space-based monitoring of greenhouse gas emissions and, more specifically, methane and carbon dioxide.[112] It enabled the Tanager-1 satellite of NASA's Jet Propulsion Laboratory,[113] which was fitted with a fifth-generation imaging spectrometer and launched in 2024.[114] With three more 'Tanager' satellites planned,[115] there will be a constellation capable of detecting 80% of global methane and carbon dioxide emissions.[116]

Biodiversity Economy

Over 50% of Europe's protected habitats and species have a poor conservation status.[117] Over 75% of emerging infectious diseases, such as Ebola disease and Nipah virus infection, arise in areas where ecosystems and biodiversity have been disrupted.[118] A biodiversity economy places conservation, restoration and sustainable use of nature at the centre of economic growth. Only 16 countries have implemented such a policy in practice, though nearly 60 have developed one.[119] Momentum will grow in 2026 as the G20 and the Food and Agriculture Organization make progress on 10 bioeconomic standards.[120]

Management of Marine Fish Stocks

The most comprehensive global evaluation of fish stocks by the Food and Agriculture Organization of the United Nations (FAO) shows that 64.5% of 2,570 marine stocks are being fished sustainably, while 35.5% are overfished.[121] However, this evaluation also shows that strong management techniques work; for example, 92.7% of stocks in the north-east Pacific, and 85% in the south-west Pacific, are sustainably fished.[122] With improved monitoring, more regions can replicate these gains.

Areas of Future Opportunity

From Green Building Codes to Climate Building Codes
Building codes need to start looking beyond net zero commitments. Future climate scenarios suggest that homes and other structures built today need to be designed for substantially different climates. As things stand, these buildings are likely to last only 10 to 80 years – much less in the hot Gulf Cooperation Council countries, even those with new building codes.[123] Many cities have adopted green building codes and other construction-related codes, but these need to evolve from using green building standards to focusing on climate-resilient standards. For example, Japan's Net Zero Energy Building Roadmap mandates that all buildings meet net zero standards by 2030; however, without major upgrades, it is unlikely this will be achieved.[124]

eDNA and eRNA are methods of collecting samples and detecting **genetic material** shed by species.

Global eDNA and eRNA Networks for Biodiversity Tracking
Traditional biodiversity assessments are labour intensive, expensive, seasonally restricted, and potentially harmful to both species and the environment. Environmental DNA (eDNA) and environmental RNA (eRNA) methods are a more cost-effective alternative for continuous monitoring.[125] Based on collecting samples and detecting genetic material shed by species into water, soil or sediment,[126] they allow detection without direct capture or ecosystem disturbance.[127] Such monitoring could help to identify pathogens that impact biodiversity and, by extension, even human pandemics, as 60% of emerging human diseases are zoonotic (i.e. transferred from animals to humans), 70% of which originate from wildlife.[128] Global eDNA and eRNA networks could improve biodiversity conservation by creating large datasets across ecosystems worldwide, helping to provide a baseline against which other similar environments could be compared.[129] This widespread tracking of pathogens over space and time could lead to the formation of an advanced warning system for outbreaks.[130]

AI-enabled Mapping of Soil Ecosystems
Soil is non-renewable[131] and contains up to half of Earth's biodiversity through its microbiota[132] – bacteria, fungi and other microorganisms critical for agricultural systems. Despite 95% of the global food supply depending on sustainable soil function, research indicates that (for example) 60–70% of soil in the European Union is considered degraded.[133] Traditional methods could identify about 1% of soil microbiota, but emerging technologies – including advanced microscopy, AI and robotics – could enable deeper insights.[134] Soil quality assessments have evolved from observing crop growth to physico-chemical analysis and, recently, identifying living microorganisms within the soil.[135] Beyond moisture measurement, advanced robotic sensors can scan soil samples and provide thousands of high-resolution images that AI can analyse to identify and map healthy fungal networks within soil.[136] Eventually, AI-enhanced microscopy could enable comprehensive analysis of full soil ecosystems within hours of sampling,[137] for faster identification and deeper understanding of soil degradation.

MEGATREND 6

Borderless World – Fluid Economies

Increasingly, unmediated transactions in finance, health, education, trade, services and even space are blurring jurisdictional boundaries, shifting liabilities, and creating larger numbers of cross-border communities and networks. Advances in communications, computing and advanced machine intelligence will accelerate a borderless world that will change the way we work, live and communicate.

Areas of Future Opportunity (Past Editions)

Legal Transformation (2023)
Expanding the Digital Economy (2023)
Supranational Social Policies (2023)
Collaborative Patents (2024)
Software Development for Interoperability (2024)
'Global Social Responsibility' (2024)
Global Cooperation for Cross-Border Digital Asset Regulation (2025)
Exploring Artificial Intelligence Personhood for Legal Boundaries (2025)
Transdisciplinary Education for Global Innovation (2025)

Keywords

Air Freight
Algorithmic Risks
Blockchain
Decentralised Autonomous Organisations
Digital Public–Private Partnerships
Global Commons
Global Trade
Intellectual Property Non-Fungible Tokens
Open Innovation
Prize Competitions

Things to Look Out for in the Short-Term

Global Trade Uncertainty

Trade policy uncertainty was a constant in 2025.[138] Primarily driven by US-led policy shifts that expanded the use of tariffs (ranging from 10% and 145%) to more countries and sectors,[139] these fluctuations triggered market reactions and global responses that have driven the World Policy Uncertainty Index and the World Trade Uncertainty Index to their highest levels since 2020.[140] As a result, global trade restructuring will likely continue as India, Gulf Cooperation Council countries and the Association of Southeast Asian Nations pursue partner diversification.[141]

Air Cargo Shifts

Global air cargo continues to grow in demand from approximately 20 billion cargo tonne-kilometres (CTK) in 2017 to just over 24 billion cargo tonne-kilometers (CTK) in 2026 (May data).[142] Demand is expected to continue expanding due to increased e-commerce flows from Asia to North America, from Europe to Asia, and within Asia.[143] At the same time, the 2026 maritime shipping route disruptions have further intensified these shifts, with air freight rates rising by as much as 70% on some routes.[144]

Rise of Cross-Border Open Innovation

AI may unlock up to $560 billion in value from R&D annually and could double the speed of R&D in science and software.[145] Open innovation – recognised by the National Aeronautics and Space Administration (NASA)[146] and others[147] as a key mechanism for sourcing ideas outside an organisation – may grow as companies look for insights with, and beyond, AI.[148] Open innovation can boost progress, enable crowdsourcing, build communities,[149] and help organisations further their corporate social responsibility objectives.[150]

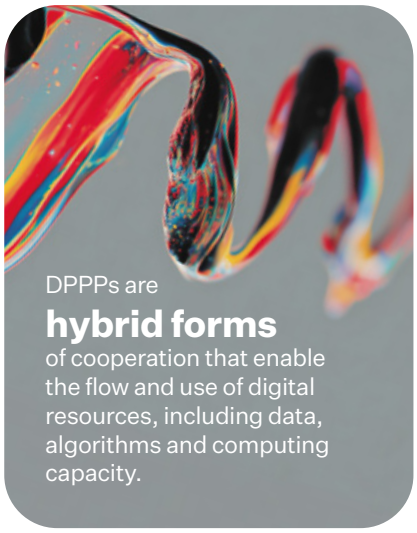
Areas of Future Opportunity

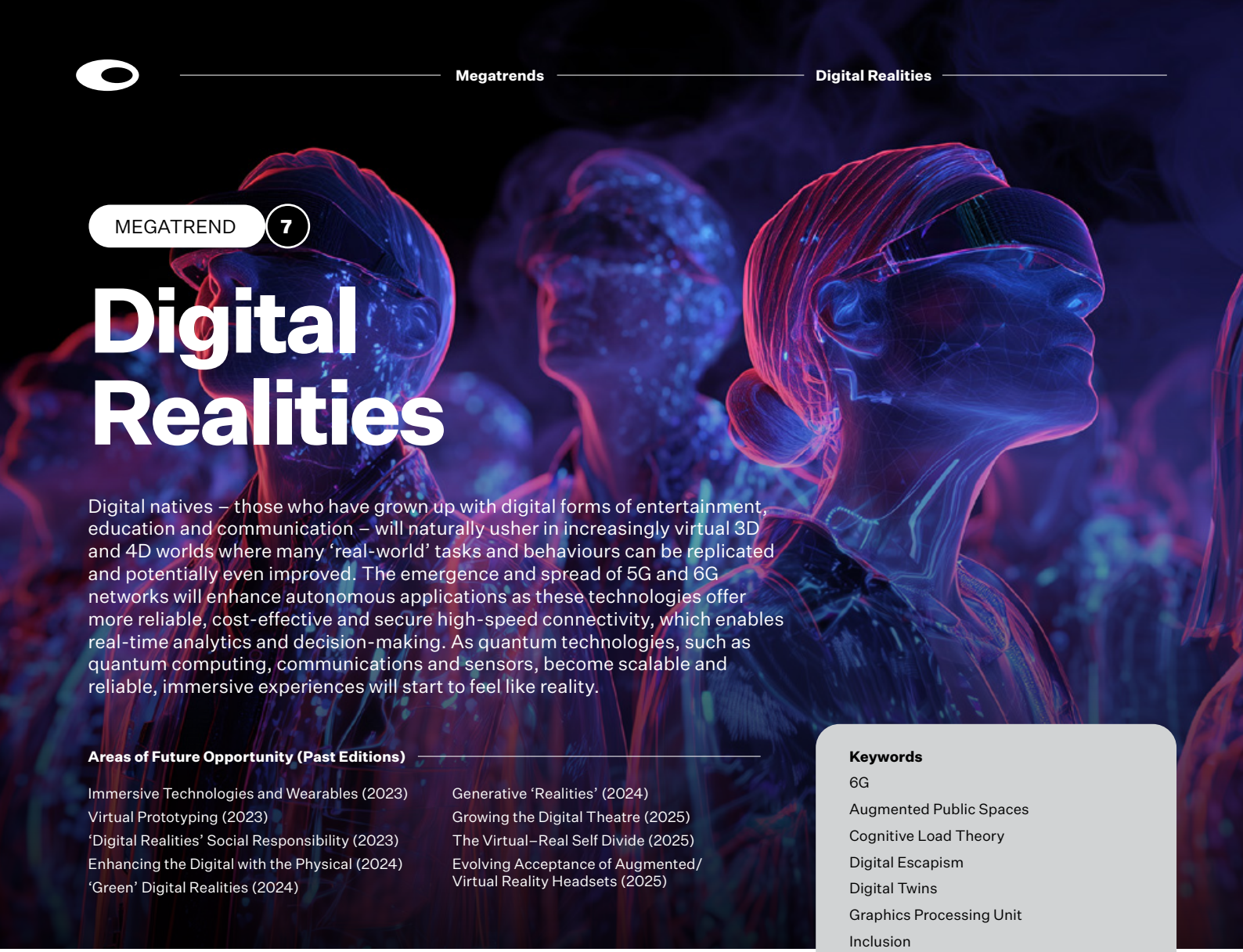
Cyberspace as a Global Commons
The digital economy's growth calls for a reconceptualisation of territorial, jurisdictional and temporal boundaries. This shift positions cyberspace – the interconnected system of networks, computer systems, the internet and infrastructure that enables digital connectivity[151] – as a global commons. A global commons is an area of shared resources beyond national jurisdictions[152] – for example, the Antarctic, oceans and outer space.[153] However, there is a risk of cyberspace-related resources being overused by some at the expense of others.[154] Research on outer space, for example, demonstrates that the idea of shared resources does not play out in the legal agreements, treaties and contracts governing space activities.[155] Establishing cyberspace as a global commons requires four key steps: identifying common principles, operationalising those principles, navigating buy-in for effective governance frameworks and empirically documenting current practice. This includes examining whether cyberspace is already treated as a global commons in treaties, bilateral agreements, memoranda of understanding, industry standards, and multi-stakeholder frameworks such as the Internet Corporation for Assigned Names and Numbers and the Internet Governance Forum.[156]

Decentralised science allows scientists around the world to collaborate without central control.

DeSci for Cross-Border Scientific Collaboration
Decentralised science (DeSci) is an opportunity to reimagine cross-border scientific collaboration by addressing barriers such as lack of transparency, gatekeeping of funding and knowledge, and restrictive intellectual property frameworks.[157] By leveraging blockchain, smart contracts, and decentralised autonomous organisations, DeSci can be used to govern the distribution of research funding and create transparent, equitable ecosystems for international research cooperation. DeSci enables scientists around the world to collaborate through decentralised protocols that distribute research tasks and share expertise without geographical constraints, offer transparent governance mechanisms, and offer flexible participation through tokenised models such as intellectual property non-fungible tokens (NFTs). This ecosystem ensures secure data storage and peer-to-peer verified funding.[158] More importantly, it allows scientists to follow a set of shared values,[159] building trust and focusing on research rather than governance.

Sustainable Digital Public–Private Partnerships
Digital Public-Private Partnerships (DPPPs) are hybrid forms of cooperation that enable the flow and use of digital resources, including data, algorithms and computing capacity. They aim to balance public value creation, private innovation and regulatory legitimacy. Unlike traditional public–private partnerships, which focus on building and financing physical infrastructure, DPPPs treat shared digital resources and services as strategic factors of production. Examples include digital diagnostics, mobility as a service and digital ID systems. Such agreements already exist at the project level, such as Microsoft's support of the World Health Organization during the COVID-19 pandemic, through its provision of digital solutions to provide platforms for clinical trials and through its support in gathering and organising national-level health data.[160] With continued growing digitalisation around the world, a key area of opportunity is to find mechanisms that can help stabilise DPPPs in the long term without limiting innovation.[161] It will also be necessary to coordinate legal and regulatory systems to ensure both institutional legitimacy and international competitiveness so that these hybrid structures can be established, maintained and transferred effectively.[162]





MEGATREND 7

Digital Realities

Digital natives – those who have grown up with digital forms of entertainment, education and communication – will naturally usher in increasingly virtual 3D and 4D worlds where many 'real-world' tasks and behaviours can be replicated and potentially even improved. The emergence and spread of 5G and 6G networks will enhance autonomous applications as these technologies offer more reliable, cost-effective and secure high-speed connectivity, which enables real-time analytics and decision-making. As quantum technologies, such as quantum computing, communications and sensors, become scalable and reliable, immersive experiences will start to feel like reality.

Areas of Future Opportunity (Past Editions)

Immersive Technologies and Wearables (2023)
Virtual Prototyping (2023)
'Digital Realities' Social Responsibility (2023)
Enhancing the Digital with the Physical (2024)
'Green' Digital Realities (2024)
Generative 'Realities' (2024)
Growing the Digital Theatre (2025)
The Virtual–Real Self Divide (2025)
Evolving Acceptance of Augmented/ Virtual Reality Headsets (2025)

Keywords

6G
Augmented Public Spaces
Cognitive Load Theory
Digital Escapism
Digital Twins
Graphics Processing Unit
Inclusion
Latency
Smart Glasses
Tensor Processing Unit

Things to Look Out for in the Short-Term

Advancing Commercialisation of 6G

The International Telecommunication Union's 6G network standardisation efforts are intended to make commercial 6G systems available by 2030[163] while responding to concerns from the International Air Transport Association about interference.[164] It is anticipated that 85% of mobile data will be transmitted through 5G by 2031 compared with 48% at the end of 2025.[165] More broadly, 6G will deliver greater speed and enable digital twins and enhanced connectivity for Internet of Things (IoT) sensor networks and devices.[166]

Augmented Public Spaces

Meta, which dominated the smart glasses space with a 70% global market share in 2026,[167] will face growing competition, such as Huawei's Eyewear 2[168] and Warby Parker and Google's smart glasses powered by AI.[169] Despite potential growth from 2.7 million units sold in 2024 to 18.7 million units by 2029 (nearly seven-fold increase in five years), the market remains small compared with the 1.09 billion mobile phones expected to be sold by the end of 2026.[170] Privacy concerns will persist.[171]

Prescription Digital Escapism

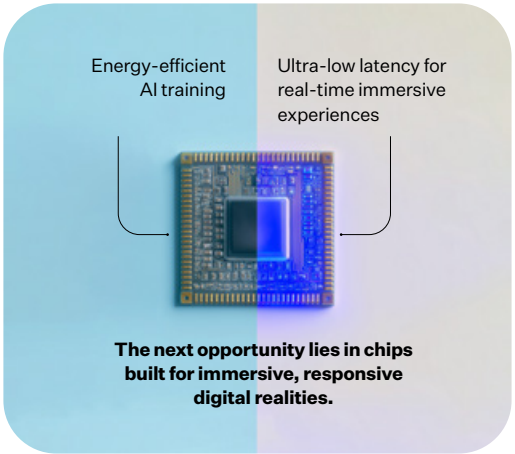
We are increasingly reliant on AI.[172] Connectivity is reaching areas that were previously offline, and 94.7% of all internet users have adopted social media.[173] Rather than complete disconnection or unmanaged escapism,[174] prescription-based digital therapeutics may increasingly address digital wellness in, and beyond, 2026. These options can monitor stress patterns, adapt interventions, and set personalised boundaries between connectivity and rest.[175] The US Food and Drug Administration has authorised 13 prescription digital therapeutics[176] and approved 192 digital therapeutics applications.[177] Austria, Belgium, France and Germany are integrating them into their national healthcare systems.[178]

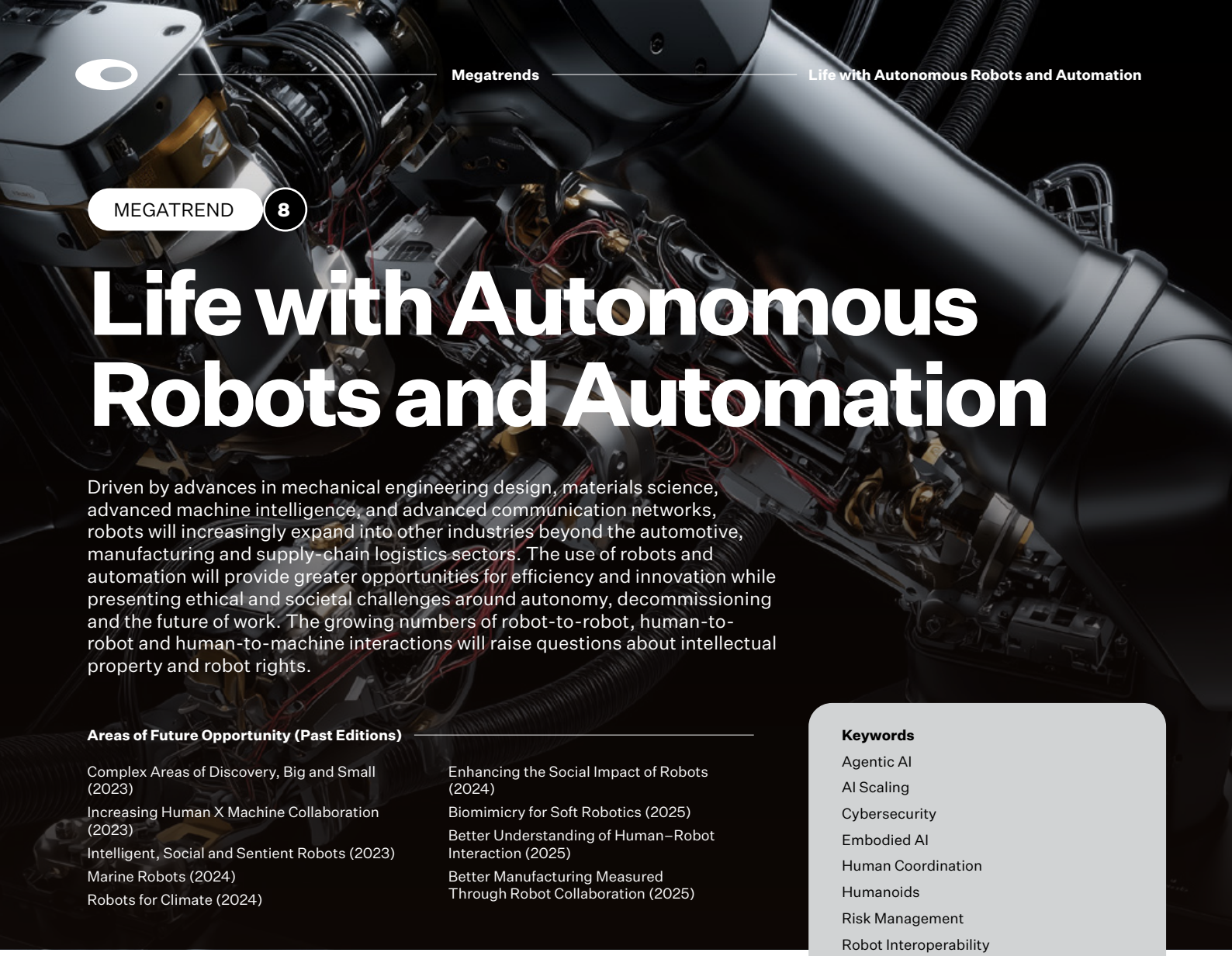
Areas of Future Opportunity

CLT-Guided Immersive Realities
Cognitive load theory (CLT) helps explain how the human brain processes information during learning, informing instructional design approaches.[179] Its key concepts are intrinsic load (the difficulty of the content), extraneous load (the quality of the instructional design) and germane load (the amount of effort needed to process information to achieve lasting knowledge).[180] CLT aims to find a delicate balance between these concepts and manage the demands on a learner's working memory.[181] As such, CLT can be used as a basis for (re) designing or assessing immersive experiences to optimise user engagement and effectiveness.

Immersive Realities for All
Disabled people are among the world's largest minority groups, making up one in six individuals.[182] Immersive experiences can build public awareness about barriers that disabled people face, increasing the social inclusion of marginalised groups.[183] Furthermore, it is important to ensure that immersive technologies are accessible to disabled people as users. In education, training and social contexts, there is a risk of excluding disabled people if accessibility is not embedded from the start. Inclusive design principles for immersive experiences co-developed with disabled people across a range of experiences can prevent emerging technologies from reintroducing the very exclusions they originally intended to address.[184]

Advanced Chips for Digital Realities
In next-generation digital realities, immersive experiences are seamless, realistic and responsive, blurring the line between the physical and the digital.[185] This requires specialised processors optimised for such use. Tensor processing units (TPUs) have gained attention[186] as they are energy efficient and less dependent on critical minerals compared with traditional graphics processing units (GPUs).[187] Their production is projected to more than double by 2028, with AI companies (such as Anthropic, which alone is buying around a million units) considering them for the future.[188] However, TPUs are more effective for training AI models than for running real-time immersive experiences, which need varied inputs[189] and low latency (under 20 milliseconds).[190] This creates an area of future opportunity for advanced GPU chips that have low latency and the ability to interpret neural signals together with hardware-based security[191] to deliver experiences quickly enough to maintain immersion.[192]





MEGATREND 8

Life with Autonomous Robots and Automation

Driven by advances in mechanical engineering design, materials science, advanced machine intelligence, and advanced communication networks, robots will increasingly expand into other industries beyond the automotive, manufacturing and supply-chain logistics sectors. The use of robots and automation will provide greater opportunities for efficiency and innovation while presenting ethical and societal challenges around autonomy, decommissioning and the future of work. The growing numbers of robot-to-robot, human-to-robot and human-to-machine interactions will raise questions about intellectual property and robot rights.

Areas of Future Opportunity (Past Editions)

Complex Areas of Discovery, Big and Small (2023)
Increasing Human X Machine Collaboration (2023)
Intelligent, Social and Sentient Robots (2023)
Marine Robots (2024)
Robots for Climate (2024)
Enhancing the Social Impact of Robots (2024)
Biomimicry for Soft Robotics (2025)
Better Understanding of Human–Robot Interaction (2025)
Better Manufacturing Measured Through Robot Collaboration (2025)

Keywords

Agentic AI
AI Scaling
Cybersecurity
Embodied AI
Human Coordination
Humanoids
Risk Management
Robot Interoperability
Robotic Deployment
Swarm Robotics

Things to Look Out for in the Short-Term

Continued Adoption of AI

AI is already dominating technology budgets, consuming 36% of digital initiative budgets and competing with data architecture and cybersecurity, which are typically underfunded.[193] It has proven challenging to link AI to revenue gains or cost reductions,[194] and very few organisations report mature AI adoption.[195] However, 74% of respondents to a global survey in 2025 said that AI was a top strategic priority, compared to 60% in 2024, with continued future adoption in customer service, marketing, productivity, software development, and worker productivity more generally.[196]

Rise of the Retail Humanoids

Deployment and adoption of humanoids is growing with the industry receiving $2.5 billion in venture capital investments in 2024 and could reach $5 trillion by 2050 and more than 1 billion units in use worldwide.[197] As generative AI and sensor technologies advance, robots are gaining capabilities in intelligence, perception and handling[198] that make them more adaptive.[199] Growth will depend on battery life which currently run for two hours and expected to increase to six hours by 2030.[200] Becoming more affordable, Noetix's Bumi costs $1,400[201] (single fee) and 1X's NEO $499 per month or $20,000 (single fee)[202]

Expanding Risk Management for Agentic AI

By 2028, up to 15% of daily work, from cybersecurity to real-time systems monitoring, may be carried out by AI agents that act autonomously.[203] Amazon Web Services maps agentic AI risk by identifying the extent of an AI's agency: none, prescribed, supervised or full.[204] One survey found that 80% of organisations have already experienced increased operational risks from AI agents, ranging from unauthorised access to data exposure.[205]

Areas of Future Opportunity

Standards for Robot Deployment
Despite advances in robotics, real-world deployment is still a challenge. Persisting hurdles include stability,[206] flexible movement,[207] energy efficiency and safe interaction with people and environments.[208] Robots need to be adaptable enough to move from controlled laboratory environments to real-world scenarios where they must handle shifting environments and interactions on their own. A new cross-disciplinary field focused on deployment could look at the integration of design, control, learning and interaction with standardised benchmarking based on real-world performance (not just simulation metrics). Statistics from the International Federation of Robotics show that 542,000 industrial robots were installed in 2024 (more than double the number 10 years ago), with the total expected to grow beyond 700,000 in 2028.[209] The number of service robots surged by 9% to nearly 200,000 units in 2024 and the number of medical robots increased by 91%.[210]

Robot Installations

Industrial robots ↑ **+100%** 2014 - 2024

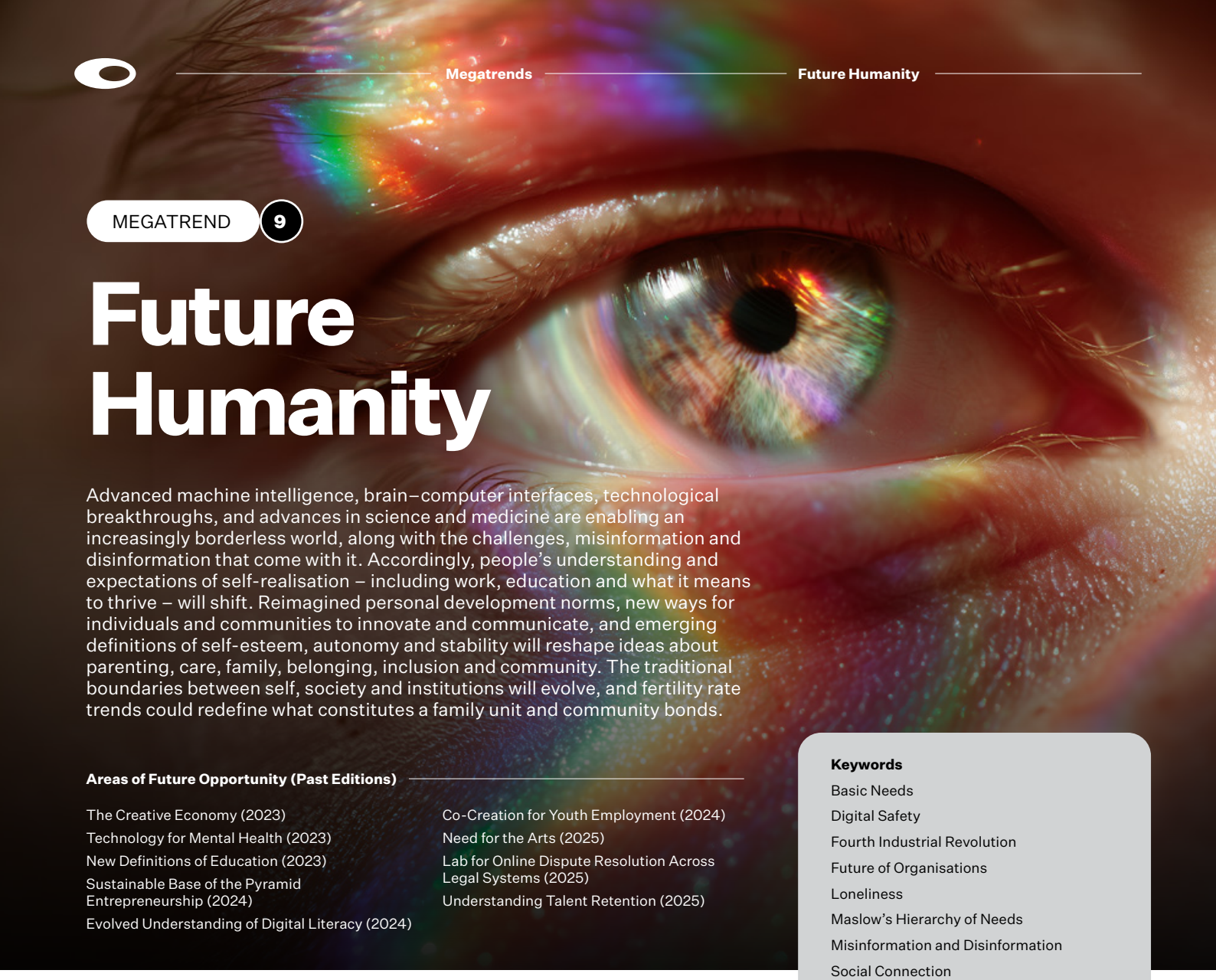
Service robots ↑ **9%** 2024

Medical robots ↑ **91%** 2024

Human-inspired behavioural rules can make robotic swarms more predictable, interpretable and trustworthy.

Human-Mirrored Robotic Swarms
Swarm robots are decentralised robots that self-organise in a way that is inspired by natural swarms, such as bees, fish and birds.[211] While there have been technical advances, no commercial deployment yet exists[212] because of regulatory challenges and difficulties establishing trust in swarm systems due to uncertainty about how they will behave, especially regarding their collective decision-making.[213] Swarms could become more trustworthy and interpretable when they adopt behavioural models that are based on basic, reproducible principles that emulate the dynamics of human behaviour.[214]

Interoperability for Embodied AI
As AI, embodied systems (robots and avatars), and the Internet of Things (IoT) converge, interoperability will become more of an issue. Beyond impacts on the user experience, challenges with interoperability will create technological vulnerabilities across connected systems. Establishing coordinated, interoperable frameworks will require collaboration between standards-development organisations, industry stakeholders and policymakers to develop protocols that balance innovation with security and privacy.[215]



MEGATREND 9

Future Humanity

Advanced machine intelligence, brain–computer interfaces, technological breakthroughs, and advances in science and medicine are enabling an increasingly borderless world, along with the challenges, misinformation and disinformation that come with it. Accordingly, people's understanding and expectations of self-realisation – including work, education and what it means to thrive – will shift. Reimagined personal development norms, new ways for individuals and communities to innovate and communicate, and emerging definitions of self-esteem, autonomy and stability will reshape ideas about parenting, care, family, belonging, inclusion and community. The traditional boundaries between self, society and institutions will evolve, and fertility rate trends could redefine what constitutes a family unit and community bonds.

Areas of Future Opportunity (Past Editions)

The Creative Economy (2023)
Technology for Mental Health (2023)
New Definitions of Education (2023)
Sustainable Base of the Pyramid Entrepreneurship (2024)
Evolved Understanding of Digital Literacy (2024)
Co-Creation for Youth Employment (2024)
Need for the Arts (2025)
Lab for Online Dispute Resolution Across Legal Systems (2025)
Understanding Talent Retention (2025)

Keywords

Basic Needs
Digital Safety
Fourth Industrial Revolution
Future of Organisations
Loneliness
Maslow's Hierarchy of Needs
Misinformation and Disinformation
Social Connection
Trust
Youth Mental Health

Things to Look Out for in the Short-Term

Ongoing Digital Safety Dilemma

In December 2025, Australia began blocking children under 16 years of age from accessing social media, with non-compliant companies facing fines of up to $50 million.[216] The USA[217] and Denmark are also considering bans,[218] while the UK[219] and the UAE[220] have already announced bans. These changes reflect public sentiment on addressing concerns about youth mental health.[221] These calls for action are not new,[222] and, globally, 65% of people support the idea of such bans.[223] However, bans alone cannot prevent mental health concerns;[224] redesigning platforms with consideration for mental health is essential.[225]

Future of Organisations

The impact of AI on the future of work has been the predominant topic in 2025 – specifically, jobs lost, created or reimagined.[226] Among those surveyed for the World Economic Forum's 2025 *Future of Jobs Report*, 86% believed AI will reshape businesses and 58% indicated that robots and autonomous systems will be among the primary forces.[227] Questions may refocus on what comes next for organisations beyond jobs and decision-making, including employee collaboration, human agency, meaning and well-being, and avoiding related risks.[228]

Bespoke Approaches to Accuracy and Trust

Misinformation (unknowingly spreading false news) and disinformation (knowingly spreading false news to harm)[229] will persist in 2026. While AI hallucinations are a growing concern,[230] risks of disinformation will be amplified and their sources will be increasingly difficult to establish. Communities may start to develop bespoke approaches to evaluating accuracy and trust, recognising that a single, universal framework may no longer be sufficient.

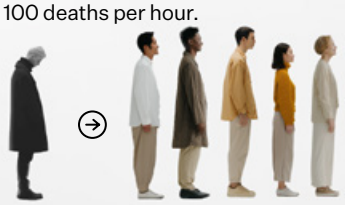
Areas of Future Opportunity

Psychobiography for the Future of Cities

Psychobiography is a form of social science that uses detailed life stories to analyse how an individual's psychology, experiences and decisions shape who they become.[231] While the core concept focuses on individuals, it can be extended to the planning and development of cities undergoing major technological transformations driven by Fourth Industrial Revolution[232] technologies. Applying psychobiography to urban contexts could help inform more intentional choices today about what cities and communities become in the future.[233] Studying global cities and communities that have prototyped and implemented AI systems, robotics and humanoids provides insights and offers an opportunity to unpack key questions about ethics, acceptance, urban identities, and physical and virtual community spaces.[234]

1 in 6

people worldwide are affected by **loneliness**, contributing to roughly 100 deaths per hour.



Social Connection as Public Policy

'Social rewilding' involves rethinking how we spend our free time and focusing on creating genuine human connections and real-world experiences.[235] Social connections could become harder to establish and maintain at work as the number of robots in the workplace is expected to significantly increase, raising questions about security, control, identity and responsibility.[236] One in six people are affected by loneliness, and the issue is linked to roughly 100 deaths per hour (i.e. more than 871,000 deaths annually).[237] Social connection may need to become a new public health policy for communities and individuals, focused on awareness, support, and interaction-focused environments and spaces.[238]

New Definitions of Needs

New poverty measurement frameworks[239] are emerging beyond the Human Development Index.[240] The basic needs poverty line (BNPL)[241] includes the minimum food, water, clothing, heating and housing required by every human being.[242] In 2011, 17.3% of the world's population could not meet these needs — food insecurity data, used to project the trend forward, suggests this figure reached 30% by 2020.[243] While 847 million people lived in extreme poverty ($3/day) in 2024,[244] decent living standards[245] include broader needs, such as climate control, computers, education, healthcare, lighting, nutrition, sanitation and transportation.[246] Abraham Maslow's hierarchy of needs, published over 50 years ago, continues to be the foundation of how needs are understood today (Box 2). It progresses from safety to belonging, and from self-esteem to fulfilling one's potential, which is rare.[247] As AI transforms workflows and enables scalable technologies,[248] the shape of Maslow's pyramid and the number of levels may change. Used intentionally, more people may achieve self-actualisation through AI while social needs may prove more fundamental than Maslow theorised.[249]

MEGATREND 10

Advanced Health and Nutrition

Progress in advanced machine intelligence, nano- and biotechnology, additive manufacturing, and the Internet of Things (IoT) will change our understanding and experience of health and nutrition. Driven by unprecedented developments and responses to climate change, resource scarcity, and the desire for longevity, this megatrend will improve health across all age groups. It will reduce, if not eradicate, some communicable and non-communicable diseases and enhance the sustainable use of, and access to, water and food. See Box 5 to see how DFF engaged the public on this megatrend.

Areas of Future Opportunity (Past Editions)

Additive Manufacturing for Food (2023)
Diversified Sources of Food (2023)
Personalised Medicine and Genomics (2023)
Deep Learning to Combat Cognitive Ageing (2024)
Nanonutraceuticals for Gut Health (2024)
Diet Choices by Geography (2024)
Air Quality Epigenetics (2025)
Expanding Precision Medicine Through Diverse Genomic Research (2025)
Biochar for Crops (2025)

Keywords
Casgevy
CRISPR
Flavonoids
Geroprotectors
Healthspan
Mental Health
Neurodegenerative Diseases
Nootropics
Phenotyping
Smart Farming

Things to Look Out for in the Short-Term

Expanding CRISPR Portfolio in Health

Despite funding constraints, CRISPR's disease coverage continues to expand.[250] CRISPR-based Casgevy, approved by the US Food and Drug Administration in December 2023[251] for sickle cell disease and beta thalassaemia, now has 50 treatment sites across North America, Europe and the Middle East.[252] With AI and advanced sequencing, CRISPR-Cas may expand gene editing into epigenomic expression.[253] In a Cleveland Clinic study, CRISPR-Cas9 therapy reduced LDL ('bad') cholesterol by 50% on average, with effects visible within two weeks and sustained for 60 days. It also reduced triglycerides by 55%, offering an alternative to daily pills or monthly injections. The study will continue to expand in 2026.[254]

Increasing Interest in Research on Geroprotectors

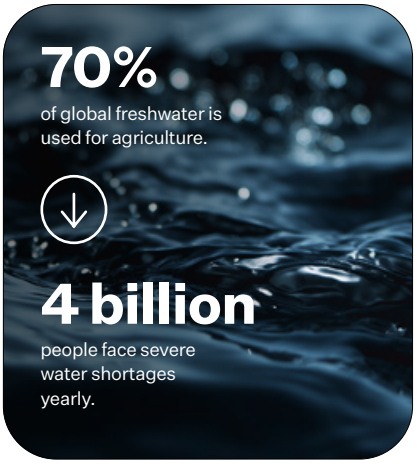
Geroprotectors slow, prevent or reverse age-related decline, helping to improve healthspan.[255] Preclinical studies show promising results for compounds such as metformin and SGLT2 inhibitors.[256] To date, no intervention has proven both effective and safe in slowing human ageing,[257] with the possible exception of collagen amino acids (with limited research).[258] Interest in this area of research may expand alongside the mediating or moderating effects of other interventions, such as exercise.[259]

AI Regulation–Practice Gap in Healthcare

AI in healthcare can support efforts to meet public health goals.[260] Yet, even when all stakeholders agree on regulations, and even with successful pilots, implementation is challenging.[261] Despite 85% of healthcare leaders exploring or adopting GenAI,[262] mature AI integration in healthcare remains limited (the most recent available data, from 2021, shows just 9%).[263] Additionally, while 48% of clinicians use AI for work, only 16% use it for clinical decision-making.[264] While bias, data quality, transparency and explainability are concerns, focus may shift into real-world clinical workflows.[265] Initiatives such as AI for Good are likely to have an impact.[266]

Areas of Future Opportunity

Digital Phenotyping for Scalable Precision Medicine
Digital phenotyping is not new. The continuous, real-time collection of behavioural, environmental, social, medical and psychological data through wearables and sensors could enable and/or inform both the detection and long-term tracking of disease,[267] and precision nutrition.[268] When integrated with genomics, digital phenotyping represents an area of future opportunity that could enable affordable and scalable precision medicine,[269] and potentially more responsive public health. In addition to safeguarding patient data, international cooperation will be key.



From Efficient Agriculture to Sustainable Agriculture
Agriculture accounts for nearly 70% of the freshwater we use globally.[270] Yet, at the same time, 4 billion people experience severe water shortages for a combined total of at least one month per year, and by 2050, droughts will impact three out of four people.[271] 'Agriculture 4.0' is a term used to describe farming from approximately 2000 to today. Key features are the use of real-time data flows, predictive analytics and automation to optimise agriculture.[272] In contrast, the term 'Agriculture 5.0' is used to describe the farming of the future. It will incorporate environmental and social aspects, making smart agriculture human-centred and sustainable while maintaining productivity.[273] In other words, Agriculture 5.0 adopts a nexus approach that concentrates on producing food both more sustainably and more efficiently.

Scaling the Link Between Food and Mental and Brain Health
Diet is a promising strategy for improving mental and brain health, particularly in the lowest-income countries, where up to 85% of people receive inadequate treatment for their mental health.[274] From a public health perspective, diet may provide an accessible, scalable and cost-effective intervention that could complement or supplement conventional medical care.[275] Since the COVID-19 pandemic, an additional 53.2 million cases of major depression and 76.2 million cases of anxiety have arisen.[276] Studies on flavonoid-rich foods, including blueberries, cocoa and oranges, have shown significant improvements in mood and reduced anxiety, particularly among those with a previously low fruit intake.[277] When it comes to brain health, neurodegenerative diseases cause approximately 11 million deaths globally each year.[278] Based on the latest data, nearly 57 million people live with dementia, which highlights the urgency of tackling this disease.[279] Nootropic foods, fortified with natural anti-inflammatory compounds such as curcumin, support cognitive function through their effect on the gut–brain connection.[280] Alongside advances in delivery technologies (such as nanoencapsulation), further trials will be needed to validate these foods' effectiveness as a public health strategy in some areas.[281]

مؤسسة دبي للمستقبل
DUBAI FUTURE FOUNDATION

About the Dubai Future Foundation

The Dubai Future Foundation aims to realise the vision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, for the future of Dubai and consolidate its global status as a leading city of the future. In partnership with government entities, international companies, start-ups and entrepreneurs in the UAE and around the world, the Dubai Future Foundation drives joint efforts to collectively imagine, design and execute the future of Dubai.

Under the supervision and with the support of His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai, Chairman of the Executive Council of Dubai and Chairman of the Board of Trustees of Dubai Future Foundation, the Dubai Future Foundation works on a three-pronged strategy: to imagine, design and execute the future. It does this through the development and launch of national and global programmes and initiatives, preparing plans and strategies for the future, issuing foresight reports and supporting innovative and qualitative projects. These contribute to positioning Dubai as a global capital for the development and adoption of the latest innovative solutions and practices to serve humanity.

The Dubai Future Foundation focuses on identifying the most prominent challenges facing cities, communities and sectors in the future and transforming them into promising growth opportunities by collecting and analysing data, studying global trends, and keeping pace with and preparing for rapid changes. It is also looking at future sectors, their integration, and the reshaping of current industries.

The Dubai Future Foundation oversees many pioneering projects and initiatives, such as the Museum of the Future, Area 2071, The Centre for the Fourth Industrial Revolution UAE, Dubai Future Accelerators, One Million Arab Coders, Dubai Future District, Dubai Future Solutions, Dubai Future Forum and Dubai Metaverse Assembly. Its many knowledge initiatives and future design centres contribute to developing specialised local talent for future requirements and empowering them with the necessary skills to contribute to the sustainable development of Dubai.

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This report is provided in English as the authoritative and operative version.

Any Arabic translation of The Global 50 is solely for convenience. While efforts have been made to ensure accuracy, the English version shall prevail in case of any discrepancies or inconsistencies between the two translations.

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