DANIEL BURRUS' TOP 25

TECHNOLOGY HARD TRENDS SHAPING 2027...AND BEYOND

AI • QUANTUM • ROBOTICS • HUMAN POTENTIAL

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Embrace Tomorrow's Certainties: A Definitive Guide to the Top 25 Technology Trends Set to Transform Your Future

In 1983, I identified **20 core technologies, including AI, Distributed Computing, Nanotechnology, Genetic Engineering, Photovoltaics and Fiber Optics, that would drive decades of technological change and value creation.** AI has been part of my research from the beginning. Today, it is accelerating the capabilities of nearly every technology in this report.

Through seven books, thousands of articles, and decades of advising business leaders, I have focused on a practical question: **How can we use what we know about the future to make better decisions today?** My Anticipatory Planning and Innovation Methodology answers that question by separating Hard Trends, which are future certainties, from Soft Trends, which are possibilities we can influence.

This report applies that approach to **25 Technology-Driven Hard Trends shaping 2027 and beyond.** From AI agents and robotics to quantum technologies and precision medicine, these trends will reshape how we work, compete, and create value. Understanding their direction gives you a stronger foundation for deciding where to invest, what to reinvent, and how to lead.

Recognize Exponential Growth Opportunities:

AI is accelerating discovery, development, and adoption across industries. The greatest opportunities often emerge where technologies converge. Use this report to identify how those connections could **multiply your capabilities, expand your markets, and unlock new sources of growth.**

Separate Certainty From Possibility:

Hard Trends reveal a predictable direction of change. Soft Trends are open to influence. Knowing the difference helps you **reduce uncertainty, challenge assumptions, and act with greater confidence**—while recognizing where your decisions can shape the outcome.

Daniel Burrus

Leading Technology Futurist,
AI Strategist,
& Disruptive Innovation Expert

Turn Technology Trends Into Business Advantage:

Knowing a technology exists is only the beginning. Ask what it makes possible for your customers, employees, and organization. Each trend offers a starting point for **solving problems, improving productivity, and creating products, services, and business models.**

Become a Positive Disruptor:

The value of foresight comes from what you do with it. As you explore these trends, identify opportunities to **anticipate customer needs, prevent problems, and reinvent how you deliver value**. Choose a few priorities and take the first step now.

Know What's Next—and use it to shape what comes next.

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Unlock **Opportunities** and Drive **Innovation** in Your Industry

Turn the Top 25 Technology Trends into **strategic action and measurable business value**. Identify the trends that will shape your industry, anticipate changing customer needs, and uncover opportunities to reinvent your products, services, and processes.

Use the insights in this report to **strengthen planning, focus investments, and accelerate innovation**. By connecting these trends to your organization's priorities, you can move beyond reacting to change and begin shaping your future with greater confidence.

Your next competitive advantage starts with the action you take today.

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Burrus Top 25 Technology Trends for 2027

1. **Generative AI's Productivity Revolution**
   Generative AI is driving a productivity revolution by creating human-like content and transforming how industries work and innovate.

2. **Agentic AI, Multiagent Systems and Ultra-Intelligent eAgents**
   Agentic AI and multiagent systems will enable personalized eAgents to autonomously plan, act, collaborate, and achieve complex goals across applications and platforms.

3. **Human–AI Co-Intelligence and Augmented Human Capabilities**
   AI will augment human thinking, decision-making, creativity, communication, and physical capabilities, advancing human–machine collaboration and performance.

4. **AI-Native Software Engineering and Autonomous Development**
   AI development platforms and autonomous coding agents will transform software design, creation, testing, security, and continuous improvement.

5. **AI Governance, Observability and Control Platforms**
   Governance and monitoring platforms will strengthen transparency, accountability, control, and oversight as AI adoption and autonomy grow.

6. **Real-Time Data, Synthetic Data and Streaming AI Analytics**
   AI-powered real-time analytics and synthetic data will deliver actionable insights, predict change, and enable decisions at the speed of need.

7. **AI Infrastructure, Supercomputing and Cloud Services**
   Advanced AI chips, supercomputing, data centers, and distributed cloud services will expand access to powerful computing, accelerating AI adoption and digital transformation across industries.

8. **Web 3, Blockchain and Digital Assets**
   Blockchain, cryptocurrencies, stablecoins, tokenized assets, and smart contracts will expand opportunities for digital ownership, programmable payments, and decentralized applications across industries.

9. **Edge AI and the Internet of Everything**
   The convergence of AI, IoT, advanced sensors, edge computing, and intelligent devices will create an increasingly connected Internet of Everything capable of real-time autonomous action.

10. **Advanced Connectivity: 5G Advanced, 6G and Satellite Networks**
    5G Advanced, emerging 6G networks, and expanding satellite connectivity will deliver faster, lower-latency global communications and enable new intelligent products, services, and business models.

11. **Spatial Computing, AR/VR/MR and Digital Twins**
    Advances in spatial computing, Augmented Reality, Virtual Reality, Mixed Reality, and Digital Twins will create increasingly immersive environments for design, simulation, training, collaboration, and commerce.

12. **Physical AI: Robotics, Autonomous Systems, Humanoids and Drones**
    AI-enabled robots, humanoids, autonomous vehicles, machines, and drones will increasingly perceive, learn, adapt, and act independently across physical environments.

13. **AI-Native Personal Computing, Mobile Devices and Wearables**
    AI embedded in computers, smartphones, tablets, and wearables will deliver personalized, context-aware intelligence wherever users go.

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Burrus **Top 25**
Technology
Trends for 2027

14 Anticipatory Cybersecurity and AI Security Platforms
AI-powered cybersecurity will increasingly move beyond detection and response to predict, prevent, and autonomously counter emerging threats.

15 Digital Identity, Digital Provenance and Content Authenticity
Identity verification, biometrics, digital credentials, and content provenance will become increasingly essential to establishing trust in an AI-driven world.

16 Confidential Computing and Privacy-Enhancing Technologies
Confidential computing and advanced privacy technologies will enable secure processing, analysis, and sharing of sensitive data with greater protection and control.

17 Quantum Computing, Quantum Sensing and Quantum Simulation
Quantum computing, sensing, and simulation will advance scientific discovery, optimization, materials development, cybersecurity, and medicine.

18 Post-Quantum Cryptography and Quantum-Safe Migration
Organizations will increasingly adopt quantum-resistant encryption and migrate critical systems to protect data and infrastructure from future quantum-enabled threats.

19 Sovereign AI, Geopatriation and Regional AI Ecosystems
Data sovereignty, regulation, security, and geopolitics will accelerate regional AI infrastructure, models, cloud platforms, and technology ecosystems.

20 Advanced Manufacturing and Next-Generation 3D Printing
AI, advanced automation, and next-generation 3D printing will accelerate customized, distributed, and on-demand production across industries.

21 Intelligent Grids, Distributed Energy and Advanced Energy Storage
Intelligent grids, microgrids, distributed energy, and advanced storage will improve efficiency, reliability, resilience, and renewable energy integration.

22 Next-Generation Nuclear and AI Power Infrastructure
Growing AI computing demand will accelerate investment in next-generation nuclear and other high-capacity energy systems to support expanding digital infrastructure.

23 Advanced Materials and Critical-Mineral Technologies
AI-driven materials science, manufacturing, recycling, and critical-mineral technologies will enable lighter, stronger, smarter, more sustainable products and infrastructure.

24 Genomics, Synthetic Biology and Biomanufacturing
AI-assisted genomics, gene editing, synthetic biology, and biomanufacturing will advance healthcare, agriculture, materials, food production, and sustainable manufacturing.

25 Precision Medicine, Programmable Therapeutics and AI-Driven Drug Discovery
AI, genomics, mRNA, gene editing, and biological modeling will accelerate personalized medicine, programmable therapies, and new treatment discovery and development.

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1 GENERATIVE AI's PRODUCTIVITY REVOLUTION

Generative AI will accelerate productivity and innovation by creating human-like content across text, images, video, audio, and code, transforming how industries work and create value.

How Will Generative AI Transform Productivity?

- **Rapid multimodal content generation**: Generative AI creates original content that appears human-produced, accelerating work across content creation, software development, customer service, and marketing. Its expanding capabilities will reshape how organizations create content and generate insights.
- **First-draft digital assistants**: GenAI helps professionals develop ideas, draft content, and solve problems creatively. These tools streamline work and free time for higher-value activities, with people providing judgment, refinement, and oversight.

What Is on the Horizon for Generative AI?

- **Artificial General Intelligence (AGI)**: AGI represents the pursuit of AI with broad capabilities comparable to human intelligence, potentially exceeding them in many areas. Its timing remains uncertain, making clear guidelines and safeguards essential as capabilities advance.
- **Large Behavior Models (LBMs)**: Advances in generative AI, vision systems, and robotics will enable models that learn from actions and behaviors. These capabilities will help robots perform more complex tasks and adapt to changing environments, expanding opportunities for automation.

As generative AI's capabilities and adoption grow, organizations can turn first-draft assistance into lasting productivity gains. Clear guidelines, human oversight, and responsible use will be essential to translating this potential into business value.

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2 AGENTIC AI, MULTIAGENT SYSTEMS AND ULTRA-INTELLIGENT eAGENTS

Agentic AI and multiagent systems will increasingly work autonomously across applications and platforms, creating highly personalized eAgents capable of planning, acting, collaborating, and achieving complex goals.

How Will Agentic AI and Multiagent Systems Work Together?

- **Goal-directed action**: Agentic AI can plan steps, use software tools, and act within defined permissions to complete a task. Applications will increasingly connect sales, service, purchasing, and other business processes.
- **Teams of AI agents**: Multiagent systems divide complex work among specialized agents that share information and coordinate activities. For example, separate agents could research suppliers, compare options, and prepare an order for approval.

What Makes Ultra-Intelligent eAgents Different?

- **Personalized assistance**: Personal eAgents will increasingly combine Generative AI and Agentic AI with an understanding of a user's preferences and goals, serving as digital assistants across connected devices and services.
- **Business execution**: Business eAgents can monitor requests, organize information, and complete authorized follow-up activities. Access controls, spending limits, and escalation rules will determine what they can do independently.

Ultra-intelligent eAgents will expand the opportunity to deliver highly personalized service at scale. Organizations that define clear goals, connect reliable information, and maintain human accountability will be better positioned to turn autonomous action into measurable value.

3 HUMAN–AI CO-INTELLIGENCE AND AUGMENTED HUMAN CAPABILITIES

AI will increasingly augment human thinking, decision-making, creativity, communication, and physical capabilities, creating new levels of human–machine collaboration and performance.

How Does Human–AI Co-Intelligence Improve Thinking?

- **Augmented thinking**: AI can analyze information, identify patterns, and suggest alternatives at the moment of need. People contribute experience, context, judgment, and the ability to decide which problems are worth solving.
- **Collaborative creativity**: Professionals can use AI to explore ideas, challenge assumptions, and compare possible approaches, accelerating work in design, planning, communication, and problem-solving.

How Are Augmented Human Capabilities Expanding?

- **Personalized support:** AI assistants can adapt explanations, translate information, and help users develop skills. Their value increases when people actively question and evaluate the guidance they receive.
- **Augmented movement**: Exoskeletons, advanced prosthetics, biosensors, and assistive devices can support mobility and reduce physical strain. Combining these technologies with AI enables more responsive assistance suited to the individual and the task.

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4 AI-NATIVE SOFTWARE ENGINEERING AND AUTONOMOUS DEVELOPMENT

AI-enabled development platforms and autonomous coding agents will transform how software is designed, created, tested, secured, and continuously improved.

What Makes Software Development AI-Native?

- **AI throughout development**: AI-native platforms integrate intelligence into planning, design, coding, testing, and maintenance. Developers can describe desired functions in natural language and use AI to translate those requirements into working software.
- **Autonomous coding agents**: Agents can undertake defined development tasks, examine existing code, propose changes, and run tests. Human developers guide architecture, review results, and authorize important changes.

How Will These Capabilities Transform Business Applications?

- **Faster experimentation**: Teams can create prototypes, test ideas, and refine internal tools more quickly, making software development accessible to more business functions.
- **Continuous improvement**: AI can help locate defects, update documentation, and identify security weaknesses throughout the software life cycle. Generated code still requires independent testing and review before deployment.

AI-native engineering will accelerate the creation and improvement of software across industries. Businesses can use these capabilities to modernize existing systems and address overlooked needs, with greater attention to clear requirements, secure development, and the quality of the finished application.

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5 AI GOVERNANCE, OBSERVABILITY AND CONTROL PLATFORMS

As AI adoption accelerates, advanced governance and monitoring platforms will provide greater transparency, accountability, control, and oversight of increasingly autonomous AI systems.

What Do AI Governance and Observability Platforms Provide?

- **Visibility into AI activity**: Observability tools track model performance, data inputs, outputs, and agent actions. This helps organizations understand how systems behave and identify failures, unexpected costs, or changes in reliability.
- **Clear accountability**: Governance platforms organize AI inventories, ownership, policies, evaluations, and supporting records, giving leaders a more consistent way to manage AI across departments.

How Will Control Platforms Support More Autonomous AI?

- **Boundaries for action**: Access permissions, approval requirements, and spending limits help determine what an AI system may do. High-impact actions can be routed to a person before execution.
- **Ongoing evaluation**: Monitoring can identify declining performance, inappropriate outputs, or unusual behavior. Organizations can use this information to investigate problems, adjust controls, or pause an application when needed.

As AI becomes part of daily operations, effective oversight will become a business capability in its own right. Governance, observability, and control platforms will help organizations expand AI use with greater confidence, supported by people who remain responsible for decisions and outcomes.

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6 REAL-TIME DATA, SYNTHETIC DATA AND STREAMING AI ANALYTICS

AI-powered real-time analytics and rapidly growing synthetic data will enable organizations to identify actionable insights, predict change, and make faster decisions at the speed of need.

How Will Streaming AI Analytics Improve Decisions?

- **Insights at the speed of need**: Streaming analytics examines information as it arrives from transactions, sensors, applications, and other sources. AI can identify changing conditions and alert people or authorized systems before a delayed report would reveal the issue.
- **Anticipatory applications**: Businesses can use these insights to spot equipment problems, changing demand, delivery disruptions, and unusual activity, creating more opportunities to predict and prevent problems.

What Role Will Synthetic Data Play?

- **Training and testing**: Synthetic data is generated to represent useful characteristics of real data. It can help train models, simulate situations, and test systems when suitable real-world examples are limited.
- **Quality and relevance**: Generated data must be checked against real conditions. Both synthetic data and live data require careful evaluation to avoid reinforcing errors or producing misleading results.

7 AI INFRASTRUCTURE, SUPERCOMPUTING AND CLOUD SERVICES

Advanced AI chips, supercomputing, data centers, and distributed cloud services will expand access to powerful computing, accelerating AI adoption and digital transformation across industries.

What Is Powering the Next Generation of AI?

- **Advanced computing architectures**: Specialized AI chips, accelerators, faster memory, and high-speed networks help systems process more information efficiently. Supercomputing expands capabilities for model training, scientific discovery, simulation, and complex business applications.
- **Infrastructure built for intelligence:** AI data centers combine computing, storage, networking, and cooling to support demanding workloads. Growing adoption will increase investment in capacity, energy efficiency, and reliable power.

How Will Cloud Services Expand Access?

- **Distributed delivery:** Public, private, and hybrid cloud platforms allow organizations to place workloads where speed, cost, security, and business requirements are best served. Edge infrastructure extends selected capabilities closer to users and devices.
- **AI-as-a-Service:** Cloud-based models, development tools, and computing resources enable businesses to test applications and expand capacity without building every capability themselves. Effective adoption requires careful management of integration, usage costs, and provider dependencies.

AI infrastructure and cloud services will expand access to advanced intelligence, helping businesses accelerate innovation, modernize operations, and develop new offerings while managing cost and complexity.

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8 WEB 3, BLOCKCHAIN AND DIGITAL ASSETS

Blockchain, cryptocurrencies, stablecoins, tokenized assets, and smart contracts will expand opportunities for digital ownership, programmable payments, and decentralized applications across industries.

How Will Blockchain and Web 3 Create Business Value?

- **Shared records and smart contracts:** Blockchain networks allow participants to maintain shared transaction records, while smart contracts automate defined actions when specified conditions are met. Applications include supply-chain coordination, asset transfers, and business agreements.
- **Digital ownership and tokenization:** Tokens can represent assets, access rights, or credentials, creating new ways to record and transfer value. Selected NFT applications can support unique digital items and membership benefits, while enforceable ownership depends on the underlying rights and agreements.

How Are Cryptocurrencies and Digital Finance Evolving?

- **Cryptocurrencies and stablecoins:** Cryptocurrencies enable blockchain-based transfers, while stablecoins aim to track a reference asset's value. Payment uses require reliable infrastructure, liquidity, safeguards, and regulatory compliance.
- **Decentralized applications and finance:** Programmable blockchain networks enable exchanges, lending, and other services, creating opportunities to streamline transactions while maintaining security, governance, and accountability.

Web 3 and digital assets will create opportunities to rethink how organizations exchange value and manage digital ownership. The strongest applications will connect these capabilities to practical business needs, supported by dependable technology, clear rights, and trusted operations.

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EDGE AI AND THE INTERNET OF EVERYTHING

The convergence of AI, IoT, advanced sensors, edge computing, and intelligent devices will create an increasingly connected Internet of Everything capable of real-time autonomous action.

How Does Edge AI Add Intelligence to Connected Devices?

- **Local decision-making**: Edge AI processes information near its source, such as a machine, camera, vehicle, or sensor. This reduces the delay involved in sending every measurement to a distant data center.
- **Connected intelligence**: Devices can share selected information with other systems while handling immediate tasks locally, creating more responsive networks of products, equipment, and infrastructure.

Where Will the Internet of Everything Create Value?

- **Industrial applications**: Connected sensors and AI can identify equipment wear, detect product defects, and adjust operations within approved limits. These capabilities support maintenance before a breakdown interrupts production.
- **Intelligent environments**: Buildings, farms, transportation systems, and cities can use local intelligence to manage resources and respond to changing conditions. Security and device management become increasingly important as networks expand.

The Internet of Everything will connect more of the physical world to digital intelligence. Organizations that combine local action with coordinated oversight can improve reliability, reduce wasted resources, and create services that respond at the moment they are needed.

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10 ADVANCED CONNECTIVITY: 5G ADVANCED, 6G AND SATELLITE NETWORKS

5G Advanced, emerging 6G networks, and expanding satellite connectivity will deliver faster, lower-latency global communications and enable new intelligent products, services, and business models.

How Are Advanced Wireless Networks Expanding Connectivity?

• **5G Advanced**: The continued evolution of 5G will improve network capabilities for connected devices, industrial applications, and demanding mobile services. Public and private networks give organizations different options for coverage and control.
• **Satellite networks**: Expanding satellite systems will extend connectivity to remote locations and complement ground-based networks. Performance will vary with coverage, capacity, equipment, and operating conditions.

What Will 6G Add to the Longer-Term Opportunity?

- **Next-generation development**: 6G research and standards work are advancing toward the IMT-2030 framework. Ongoing development and testing will help shape future capabilities rather than deliver widespread commercial 6G service.
- **Integrated communications**: Combining terrestrial wireless, satellite, and local networks will support more continuous access for people, machines, and intelligent services across different environments.

Advanced connectivity will expand where businesses can operate and how quickly connected systems can respond. Leaders can act on available network improvements while preparing products, infrastructure, and business models for the capabilities still being developed.

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11 SPATIAL COMPUTING, AR/VR/MR AND DIGITAL TWINS

Advances in spatial computing, Augmented Reality, Virtual Reality, Mixed Reality, and Digital Twins will create increasingly immersive environments for design, simulation, training, collaboration, and commerce.

How Are Spatial Computing and Immersive Technologies Evolving?

- **Augmented and Mixed Reality**: AR overlays digital information on physical surroundings, while MR enables richer interaction between physical and virtual objects. Applications include guided maintenance, product visualization, and collaboration.
- **Virtual Reality**: VR creates immersive digital environments for training, design, and simulation. Employees can practice complex procedures or explore a proposed environment before entering the physical setting.

What Role Will Digital Twins Play?

• **Virtual representations**: Digital twins use models and relevant data to represent physical assets or processes. Updating these representations with operating information can help teams understand performance and changing conditions.
• **Testing before implementation**: Organizations can compare designs, simulate disruptions, and evaluate operational changes before committing physical resources. Reliable results depend on the quality of the model and the data supporting it.

12 PHYSICAL AI: ROBOTICS, AUTONOMOUS SYSTEMS, HUMANOIDS AND DRONES

AI-enabled robots, humanoids, autonomous vehicles, machines, and drones will increasingly perceive, learn, adapt, and act independently across physical environments.

What Makes Physical AI Different?

- **Intelligence in action**: Physical AI combines perception, planning, and movement so machines can respond to their surroundings. Sensors, vision systems, and AI models help robots and autonomous equipment interpret conditions and select actions.
- **Learning through simulation**: Virtual environments and demonstrations can help systems learn tasks before operating in the real world, although performance must still be validated under actual working conditions.

Where Will Robotics and Autonomous Systems Expand?

- **Robots and humanoids**: Industrial robots, collaborative robots, and increasingly capable humanoids will take on selected handling, inspection, and repetitive tasks. Suitable designs will depend on the work, environment, and cost.
- **Vehicles and drones**: Autonomous and semi-autonomous systems will expand applications in logistics, agriculture, infrastructure inspection, and other fields. Human oversight, operating boundaries, and safety controls remain central to deployment.

Physical AI will bring more digital capabilities into practical, hands-on work. Organizations can begin with well-defined tasks where improved consistency, reduced physical strain, or safer operations create a clear business benefit.

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AI-NATIVE PERSONAL COMPUTING, MOBILE DEVICES AND WEARABLES

AI embedded directly into computers, smartphones, tablets, wearables, and other personal devices will deliver highly personalized, context-aware intelligence wherever users go.

How Are Personal Devices Becoming AI-Native?

- **Embedded intelligence**: Dedicated AI processors and smaller models allow computers, phones, and tablets to handle more AI tasks directly on the device, supporting faster responses and selected offline capabilities.
- **Context-aware assistance**: With appropriate permissions, AI can use information from documents, calendars, cameras, and conversations to provide more relevant support. Devices will increasingly connect this local intelligence with larger cloud-based services.

How Will Wearables Extend These Capabilities?

- **Assistance during activity**: Smart glasses, earbuds, watches, and other wearables can deliver information while users move and work, supporting translation, communication, navigation, and guided tasks.
- **Personal monitoring**: Advanced sensors can help users track activity and selected health indicators. Medical uses require appropriate validation, while everyday applications depend on clear consent and control over personal information.

AI-native devices will make intelligent assistance a more continuous part of daily life and work. Businesses can use them to improve service and employee support while designing experiences that respect attention, privacy, and the user's ability to choose.

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14 ANTICIPATORY CYBERSECURITY AND AI SECURITY PLATFORMS

AI-powered cybersecurity will increasingly shift from detecting and responding to attacks toward predicting, preventing, and autonomously countering emerging threats.

How Will Cybersecurity Become More Anticipatory?

- **Predict and prevent**: AI can analyze behavior, vulnerabilities, and network activity to identify signs of an emerging threat. Security teams can use these insights to address weaknesses before an attack succeeds.
- **Faster containment**: Automated systems can isolate suspicious devices, restrict access, or trigger additional verification within defined policies, reducing the time available for an attack to spread.

Why Do AI Systems Need Their Own Security Platforms?

- **New attack surfaces**: AI applications introduce risks involving sensitive data, manipulated inputs, model behavior, and connected tools. An agent with broad permissions can turn an incorrect instruction into an unauthorized action.
- **Layered protection**: AI security platforms can monitor interactions, test for weaknesses, and enforce restrictions. Employee education and independent verification remain important as attackers also use AI to improve deception.

Anticipatory cybersecurity will expand the opportunity to prevent disruption, supported by rapid response when prevention fails. Organizations that protect both their existing systems and their growing use of AI will be better prepared to maintain operations and customer trust.

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15 DIGITAL IDENTITY, DIGITAL PROVENANCE AND CONTENT AUTHENTICITY

Advanced identity verification, biometrics, digital credentials, and content provenance technologies will become increasingly essential for determining who and what can be trusted in an AI-driven world.

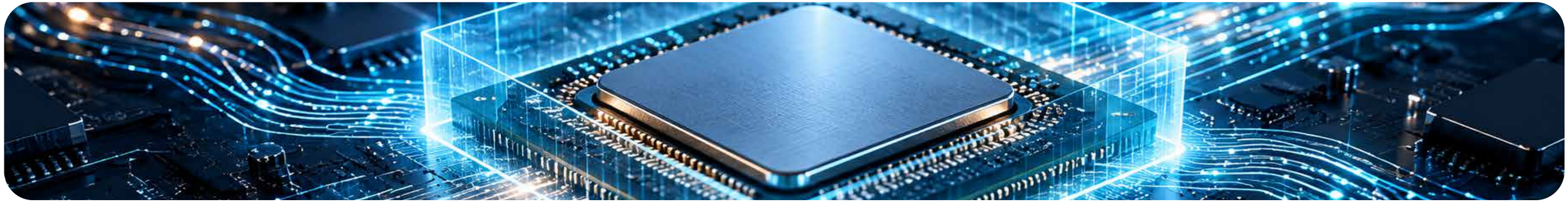
How Will Digital Identity Strengthen Trust?

- **Stronger verification**: Biometrics, passkeys, digital credentials, and device-based checks can help verify people and control access. Combining methods allows protection to match the sensitivity of the activity.
- **Identity for machines**: AI agents and connected systems also need verifiable identities and limited permissions so organizations can determine which system acted and whether it was authorized.

What Does Digital Provenance Reveal About Content?

- **Recorded history**: Content provenance technologies can document how an image, video, recording, or document was created and modified. Cryptographically signed records help reveal changes to the associated content and metadata.
- **Better-informed evaluation**: Content credentials and verification tools provide useful evidence about origin and editing. They do not, by themselves, establish that a claim is true, and missing credentials do not prove that content is false.

As AI-generated content and automated interactions increase, identity and provenance will become essential parts of digital trust. Businesses can strengthen verification at important decision points and give customers clearer ways to evaluate the information they receive.



16

CONFIDENTIAL COMPUTING AND PRIVACY-ENHANCING TECHNOLOGIES

Confidential computing and advanced privacy technologies will enable organizations to securely process, analyze, and share sensitive data while maintaining greater protection and control.

What Does Confidential Computing Protect?

- **Data during processing**: Confidential computing uses protected computing environments to help safeguard information while applications are using it, complementing encryption for stored data and data moving across networks.
- **Controlled access**: Hardware-based protections and verification mechanisms can help organizations limit exposure to other software or infrastructure operators, depending on the design and configuration of the system.

How Do Privacy-Enhancing Technologies Expand Collaboration?

- **Analysis with less exposure**: Techniques such as secure multiparty computation and homomorphic encryption can support selected calculations without revealing all underlying data to the parties performing them.
- **Privacy-aware learning**: Federated learning allows model training across separate data locations, while differential privacy can limit what published results reveal about individuals. Each approach involves trade-offs in accuracy, cost, or complexity.

Confidential computing and privacy-enhancing technologies will create more options for using sensitive information responsibly. Organizations can pursue collaborative analysis and AI applications while selecting protections that fit the data, the task, and the level of trust required.

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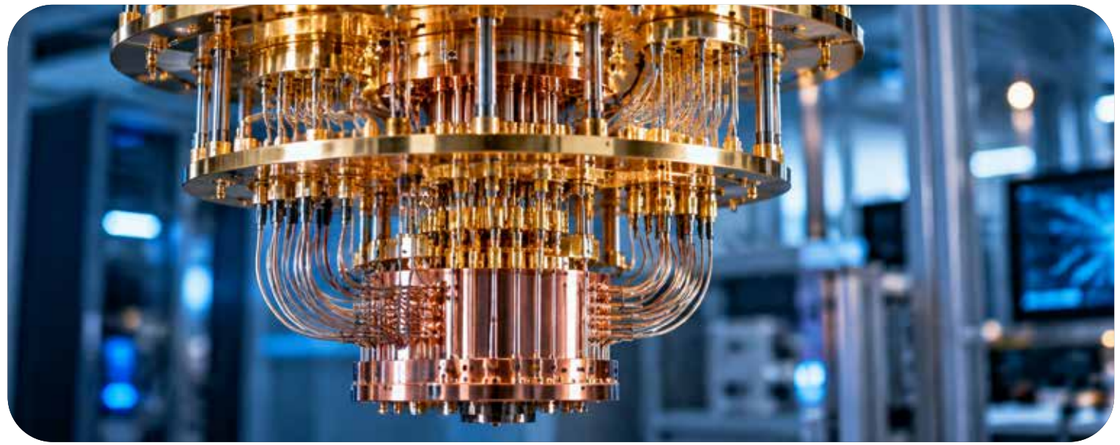
17 QUANTUM COMPUTING, QUANTUM SENSING AND QUANTUM SIMULATION

Advances in quantum computing, sensing, and simulation will unlock new capabilities in scientific discovery, optimization, materials development, cybersecurity, medicine, and advanced research.



How Do Quantum Computing and Simulation Expand Research?

- **Specialized computation**: Quantum computers use quantum properties to process information in ways that differ from conventional computers. Researchers are developing applications in molecular modeling, materials science, and selected computational problems.
- **Quantum simulation**: Simulating quantum systems can help scientists explore how matter behaves. Progress could support the development of new materials and chemicals that are difficult to model accurately with conventional methods alone.

What Makes Quantum Sensing a Distinct Opportunity?

- **Precision measurement**: Quantum sensors use quantum effects to measure quantities such as time, gravity, and magnetic fields with high sensitivity, supporting applications in navigation, imaging, and infrastructure assessment.
- **Different development paths**: Quantum sensing, simulation, and general-purpose quantum computing are advancing at different rates. Useful applications will depend on performance, reliability, cost, and the problem being addressed.

Quantum technologies will create new tools for scientific and industrial discovery. Businesses can identify relevant problems and research partnerships now while evaluating demonstrated capabilities carefully, especially where broad commercial computing advantages remain under development.

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POST-QUANTUM CRYPTOGRAPHY AND QUANTUM-SAFE MIGRATION

Organizations will increasingly adopt quantum-resistant encryption and begin migrating critical systems to protect data and digital infrastructure from future quantum-enabled cyber threats.

Why Does Quantum-Safe Migration Need to Begin Early?

- **Long-lived information**: Future cryptographically capable quantum computers could break widely used public-key encryption. Information collected today may remain sensitive long enough to be exposed when that capability arrives.
- **Complex dependencies:** Cryptography is embedded in applications, devices, communications, and supplier services. Discovering those dependencies and coordinating upgrades takes time, especially for systems designed to remain in use for many years.

What Does Post-Quantum Cryptography Change?

• **Quantum-resistant methods:** Post-quantum algorithms are designed to withstand attacks from both conventional and quantum computers. NIST has published standards that provide a foundation for implementation and migration.

• **Planned transition**: Organizations can inventory their cryptography, prioritize sensitive information, test compatible solutions, and work with vendors on upgrades. Crypto-agility makes it easier to replace algorithms as requirements evolve.

Quantum-safe migration is a practical opportunity to prepare for a future threat before it becomes an immediate crisis. Beginning with discovery and prioritized testing can help organizations protect valuable information while avoiding rushed, disruptive changes later.

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19 SOVEREIGN AI, GEOPATRIATION AND REGIONAL AI ECOSYSTEMS

Data sovereignty, regulation, security, and geopolitical priorities will accelerate the development of regional AI infrastructure, models, cloud platforms, and technology ecosystems.

What Is Driving Sovereign AI and Geopatriation?

- **Greater control**: Governments and organizations increasingly want more influence over where data is stored, how AI is operated, and who controls critical infrastructure. Security, regulatory requirements, and continuity of service shape these decisions.
- **Geopatriation**: Organizations may move data or computing workloads into preferred jurisdictions to reduce geopolitical exposure and meet local requirements. The appropriate location depends on the business and its operating obligations.

How Will Regional AI Ecosystems Develop?

- **Local infrastructure and models**: Regional data centers, cloud services, and AI models can support local languages, industry needs, and public-sector priorities. Local talent and research partnerships help strengthen these capabilities.
- **Connected but controlled operations**: International businesses will need to balance regional requirements with access to global tools and expertise. Data location alone does not establish full control over software, providers, or supply chains.

Sovereign AI will increasingly influence technology sourcing, partnerships, and market entry. Organizations that understand where their data, models, and services depend on others can make more informed choices about resilience, access, and regional opportunity.

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20 ADVANCED MANUFACTURING AND NEXT-GENERATION 3D PRINTING

AI-enabled manufacturing, advanced automation, and next-generation additive manufacturing will accelerate highly customized, distributed, and on-demand production across industries.

How Will AI Transform Manufacturing Operations?

- **Intelligent production**: AI can connect design, scheduling, quality inspection, and maintenance, helping manufacturers identify problems and adjust processes before defects or delays accumulate.
- **Flexible automation**: Advanced equipment can support more variation in products and production runs, allowing manufacturers to respond more effectively to changing customer requirements.

What Is Next-Generation 3D Printing Making Possible?

- **Complex, customized parts**: Additive manufacturing builds objects layer by layer, enabling selected shapes and internal structures that are difficult to produce conventionally. Applications include tooling, replacement parts, and customized medical devices, to name a few.
- **Distributed production**: Qualified digital designs can be manufactured closer to the point of use, reducing selected inventory and shipping needs. Material performance, certification, production speed, and unit cost determine where this approach makes sense.

AI-enabled manufacturing and advanced 3D printing will expand options for customization and on-demand production. Manufacturers can combine these capabilities with established methods to shorten development cycles, improve quality, and reduce dependence on long, inflexible supply chains.

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INTELLIGENT GRIDS, DISTRIBUTED ENERGY AND ADVANCED ENERGY STORAGE

Intelligent electrical grids, microgrids, distributed energy systems, and advanced storage technologies will increase energy efficiency, reliability, resilience, and renewable energy integration.

How Will AI Make Electrical Grids More Intelligent?

- **Better forecasting**: AI can analyze demand, weather, and equipment data to help utilities anticipate changing conditions and coordinate available resources before imbalances affect service.
- **More responsive operations**: Advanced sensors and controls can help detect faults, manage electricity flows, and support maintenance, improving visibility across increasingly complex networks.

What Roles Do Distributed Energy and Storage Play?

- **Local resilience**: Microgrids combine local generation, storage, and controls. Properly designed systems can continue serving selected loads during a wider grid outage, supporting facilities with critical power needs.
- **Flexible energy use**: Batteries and other storage technologies can hold energy for later use, reduce peak demand, and help balance variable renewable generation. Different applications require different combinations of power, duration, safety, and cost.

Intelligent grids, distributed resources, and advanced storage will help electricity systems respond to growing and changing demand. Businesses can use these developments to improve reliability, manage energy costs, and plan facilities around a more flexible power infrastructure.

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NEXT-GENERATION NUCLEAR AND AI POWER INFRASTRUCTURE

Growing demand for AI computing power will accelerate investment in next-generation nuclear technologies and other high-capacity energy systems designed to support rapidly expanding digital infrastructure.

Why Is AI Expanding the Demand for Power Infrastructure?

- **Continuous computing needs**: AI data centers require substantial electricity for processing, networking, and cooling. Reliable power availability is becoming a central factor in where facilities can be built and how quickly they can expand.
- **Infrastructure beyond generation**: Transmission connections, substations, cooling systems, and backup capacity must develop alongside computing capacity. Delays in any of these areas can constrain deployment.

What Role Could Next-Generation Nuclear Play?

- **Reliable generation**: Small Modular Reactors and other advanced nuclear designs are being developed to provide dependable electricity with low operational carbon emissions. Their size and configurations may create additional options for serving industrial demand.
- **Deployment requirements**: Commercial expansion depends on licensing, financing, fuel availability, construction, and proven operation. Investment announcements and development projects should be distinguished from generating capacity already in service.

Growing AI demand will accelerate attention to both energy supply and the infrastructure that delivers it. Long-term planning and partnerships between technology providers, utilities, and energy developers will help connect digital expansion with realistic power availability.

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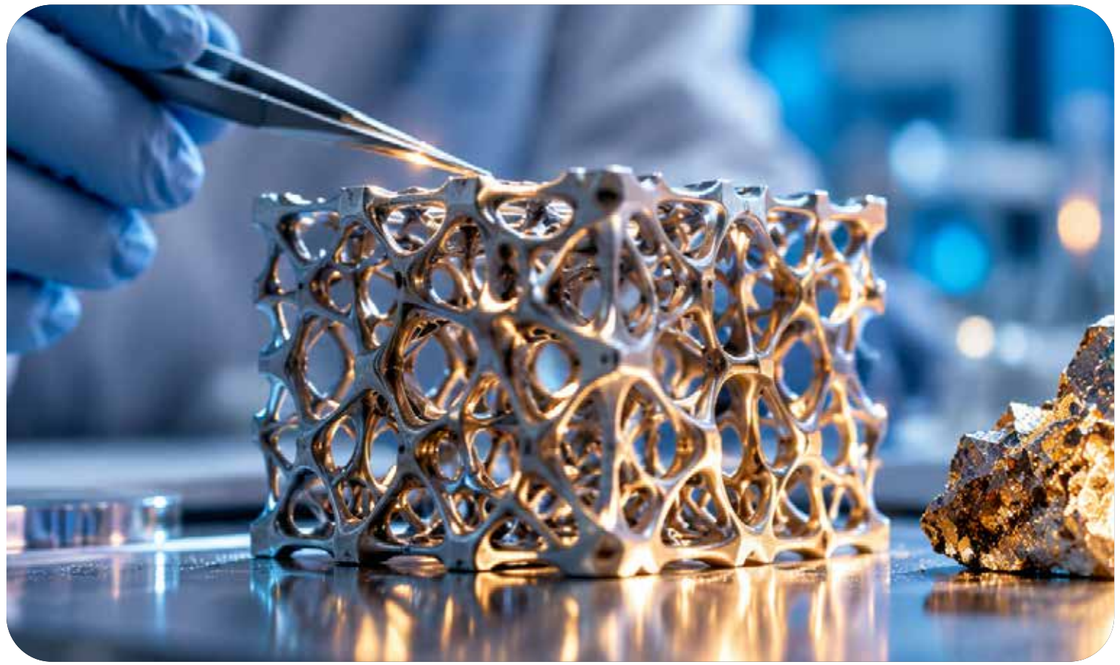
23 ADVANCED MATERIALS AND CRITICAL-MINERAL TECHNOLOGIES

AI-accelerated materials science, advanced manufacturing, recycling, and new critical-mineral technologies will enable lighter, stronger, smarter, and more sustainable products and infrastructure.



How Is AI Accelerating Materials Development?

- **Faster discovery**: AI can help researchers screen possible materials, predict properties, and prioritize experiments. This can reduce the search required to find candidates for batteries, electronics, construction, and other applications.
- **New performance combinations**: Advanced composites, coatings, and engineered materials can improve strength, weight, heat tolerance, or conductivity. Laboratory results must still translate into reliable and economical manufacturing.

Why Are Critical-Mineral Technologies Becoming More Important?

- **Resource recovery**: Improved recycling and separation techniques can recover valuable minerals from used batteries, electronics, and industrial waste, creating additional sources of supply.
- **More supply options**: Advances in extraction, processing, and material substitution can help address supply constraints. Opportunities depend on local resources, environmental performance, and the economics of producing materials at scale.

Advanced materials and critical-mineral technologies will increasingly influence product performance and supply-chain resilience. Businesses can identify where new materials, recovery methods, or alternative inputs create opportunities to improve products and reduce exposure to limited sources of essential resources.

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GENOMICS, SYNTHETIC BIOLOGY AND BIOMANUFACTURING

AI-assisted genomics, gene editing, synthetic biology, and biomanufacturing will accelerate breakthroughs in healthcare, agriculture, materials, food production, and sustainable manufacturing.

How Are Genomics and Synthetic Biology Advancing?

- **AI-assisted genomics**: AI helps researchers examine genetic information and identify relationships that guide experiments. Gene-editing tools such as CRISPR enable targeted changes to DNA for research and selected applications.
- **Designed biological systems**: Synthetic biology combines engineering and biological science to develop organisms or cellular processes with useful functions, opening opportunities across healthcare, agriculture, materials, and food production.

What Will Biomanufacturing Make Possible?

- **Biology as a production platform**: Engineered cells and microorganisms can produce enzymes, ingredients, chemicals, and other materials. Fermentation and related processes provide alternatives for selected products traditionally made through other methods.
- **Scaling from research to production**: AI and automation can help improve experimental design and process control. Commercial success also requires consistent quality, suitable feedstocks, reliable yields, and competitive production costs.

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PRECISION MEDICINE, PROGRAMMABLE THERAPEUTICS AND AI-DRIVEN DRUG DISCOVERY

AI, genomics, mRNA, gene editing, and advanced biological modeling will accelerate personalized medicine, programmable therapies, and the discovery and development of new treatments.

How Will Precision Medicine Become More Personalized?

- **More complete patient information**: Combining genomic, clinical, and other relevant data can help clinicians identify disease patterns and select treatments suited to particular patient groups or individuals.
- **Programmable therapeutics**: Technologies such as mRNA, gene editing, and engineered cells allow researchers to design interventions around specific biological targets. Applications differ widely in maturity and require evidence of safety and effectiveness.

How Is AI Changing Drug Discovery and Development?

- **Better research targeting**: AI can help identify biological targets, analyze molecular structures, and prioritize compounds for laboratory testing, enabling researchers to explore more possibilities and focus experiments.
- **Improved development decisions**: Biological models and data analysis can support trial design, patient selection, and evaluation. Computational predictions still require experimental and clinical validation before a treatment can be relied upon.

Precision medicine and AI-driven discovery will create new opportunities to improve prevention, diagnosis, and treatment. Their impact will depend on connecting faster scientific progress with sound clinical evidence, dependable manufacturing, and practical access for the patients who can benefit.

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Know What's Next.
Act Before the Competition.

1

Identify Hard Trends and Related Opportunities

- Identify the Hard Trends that will impact your business and your customers over the next five years.
- What opportunities will these trends create?

2

Focus on Transforming Processes

- How will you transform your products, services, or processes over the next five years?
- How will you transform your career over the next five years?
- Based on the Hard Trends, what skills will you need to stay relevant and create greater value?

3

Redefine and Reinvent Products and Services

- What products or services are ripe for reinvention?
- Which could you redefine or reinvent with the least investment of time or money?

4

Refine Your Priorities

- Narrow your list of strategic actions to a few "must-do" priorities.
- Identify the first step you can take now.

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The Certainty Behind What's Next

How Daniel Burrus identifies the Top 25 Technology-Driven Hard Trends

For decades, Burrus Research has studied technologies reshaping business and society. Daniel Burrus applies his Hard Trend methodology to identify more than emerging technologies—he identifies the direction of change and the opportunities it creates. These four criteria help distinguish developments worth watching from trends leaders need to act on.

1. Exponential Growth and Technological Maturity

For a trend to make the list, it must be **advanced enough to drive exponential growth**. Burrus emphasizes that these trends aren't speculative; they must be rapidly evolving and ready to deliver significant advancements. Each trend must have a clear path to impacting business strategies and society within the coming year and beyond.

2. Cross-Industry Relevance and Impact

Burrus prioritizes trends that can **transform multiple sectors simultaneously**. Technologies like **Artificial Intelligence** and **Blockchain** impact healthcare, finance, retail, and more. Their broad reach reshapes industries, creating new opportunities for innovation and growth.

3. Certainty Based on Hard Trends

The selected trends must be **anchored in Hard Trends**, *future certainties* driven by measurable forces like technological advancements, demographic shifts, and regulatory changes. This distinction is crucial: Hard Trends offer the confidence needed for bold, low-risk actions, unlike Soft Trends that may or may not occur.

4. Burrus's Anticipatory Business Model

As founder of Burrus Research, Burrus uses this methodology to help clients **shift from a reactive to an anticipatory mindset**. His approach demystifies technological change, offering clarity and strategic foresight. By leveraging these trends, organizations can gain a competitive edge, innovate proactively, and position themselves as industry leaders.

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Daniel Burrus is a trusted, globally recognized futurist and AI strategy expert known for his accurate technology forecasts and practical, actionable approach to helping organizations anticipate disruption.

***The New York Times* has referred to him as one of the top three business gurus in the highest demand as a speaker.**

Shaping the Future of Your Business

Drawing on decades of accurate forecasting, Daniel Burrus helps leaders anticipate how AI will reshape their industries—and turn that foresight into practical strategies for growth, innovation, and competitive advantage.

Anticipatory Strategy: Using his Hard Trend methodology, Burrus helps organizations identify future certainties, uncover opportunities, and anticipate challenges before they become problems. Leaders gain a clearer foundation for deciding where to invest, what to prioritize, and how to act before the competition.

Human-First AI: Burrus helps leaders realize AI's benefits without losing the trust of customers, employees, and stakeholders. His approach emphasizes responsible adoption, human judgment, and accountability—using technology to enhance human capabilities, not simply replace them.

Workforce Reinvention: Beyond upskilling and reskilling, Burrus helps organizations rethink how work gets done: what to eliminate, automate, augment, and keep human. The focus is on preparing people for changing roles, moving them toward higher-value work, and turning AI adoption into measurable business results.

With Daniel Burrus's guidance, organizations can move beyond reacting to disruption and begin anticipating opportunity. His blend of technological foresight, business strategy, and practical application helps leaders make more confident decisions, create new value, and actively shape their future.

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