IoD SCIENCE, INNOVATION AND TECHNOLOGY EXPERT ADVISORY GROUP

Glossary of terms

This glossary was produced by the Institute of Directors' Science, Innovation and Technology Expert Advisory Group with the aim of contextualising specialist terms in this space. In line with the spirit of the times, and the group's view that AI should augment human intelligence, not replace it - ChatGPT and other AI tools have been used in the preparation of the glossary. But the responsibility for any omissions, or errors, remain with the authors.

The risks and opportunities identified in this glossary are intended as examples to get the conversation started in the boardroom, rather than as an exhaustive list. The same goes for the list of related terms at the end of each definition.

More terms will be added to this glossary in the future, and the EAG will look for input from members on terms they think would be useful to include.

With thanks to the members of the Expert Advisory Group:

Faisal Khan, Chair, Institute of Directors' Expert Advisory Group on Science, Innovation and Technology

Michael Ambjorn, CEO PropTech Denmark

Dr Phil Clare, CEO Queen Mary Innovation

Paul Corcoran, Managing Director Interimconsult

Dr Jonathan R. Everhart, CEO & Chief Investment Officer - Global ReEnergy Holdings

Rob Noble, Chair of Forestreet, The Webinar Vet, MBA-IT & Fidem Consulting

Pauline Norstrom, CEO Anekanta®Consulting and Anekanta®AI

Niran Olarinde, Director, Strategy & Technology, Siep Global Consulting Ltd

Professor Rameen Shakur, Founder and Chairman Cambridge Heartwear Ltd, Cambridge Science Park

A very special thank you to the Information and Advisory Service (IAS) at the IoD who assisted with some of the initial mapping and research.

Please note, this glossary reflects the views and opinions of the members of the Expert Advisory Group, not the IoD itself.

Contents

IoD Competency Framework Elements
Explorative questions

The glossary is a resource which is complementary to the IoD Competency Framework, which you can find out more about here - and each glossary term now cross-references with questions relevant to the appropriate top 3-5 elements of the framework.

These questions aim to guide directors and executives in assessing how blockchain technology (for example) can be effectively integrated into their organisational practices, aligning with strategic objectives and ethical standards.

Last but not least, with AI prompting now an increasingly board-level skill requirement, the glossary also now includes an early version of the Director's Prompt Engineering Guide - which is also available as a freestanding download for current and prospective members of the IoD.

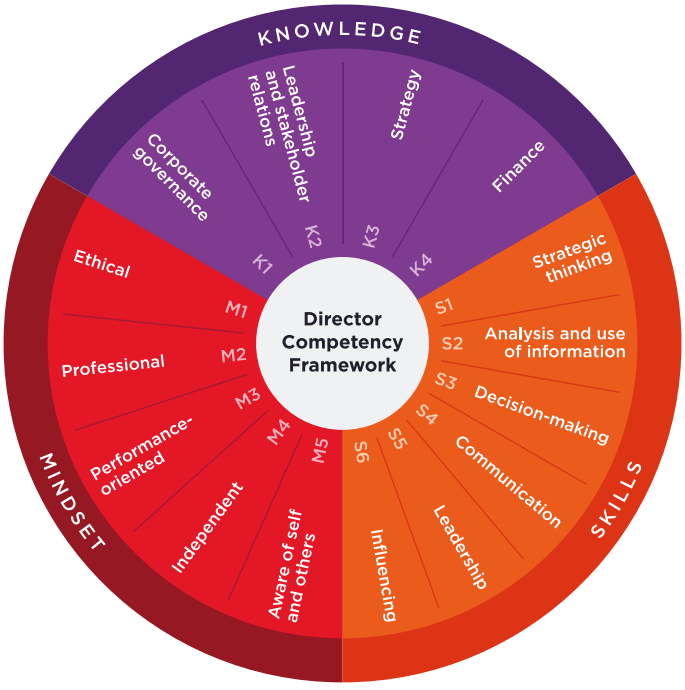
K3 - Strategy: How can concept or technology be integrated into our organisational strategy to enhance transparency, security, and efficiency in our operations and transactions?

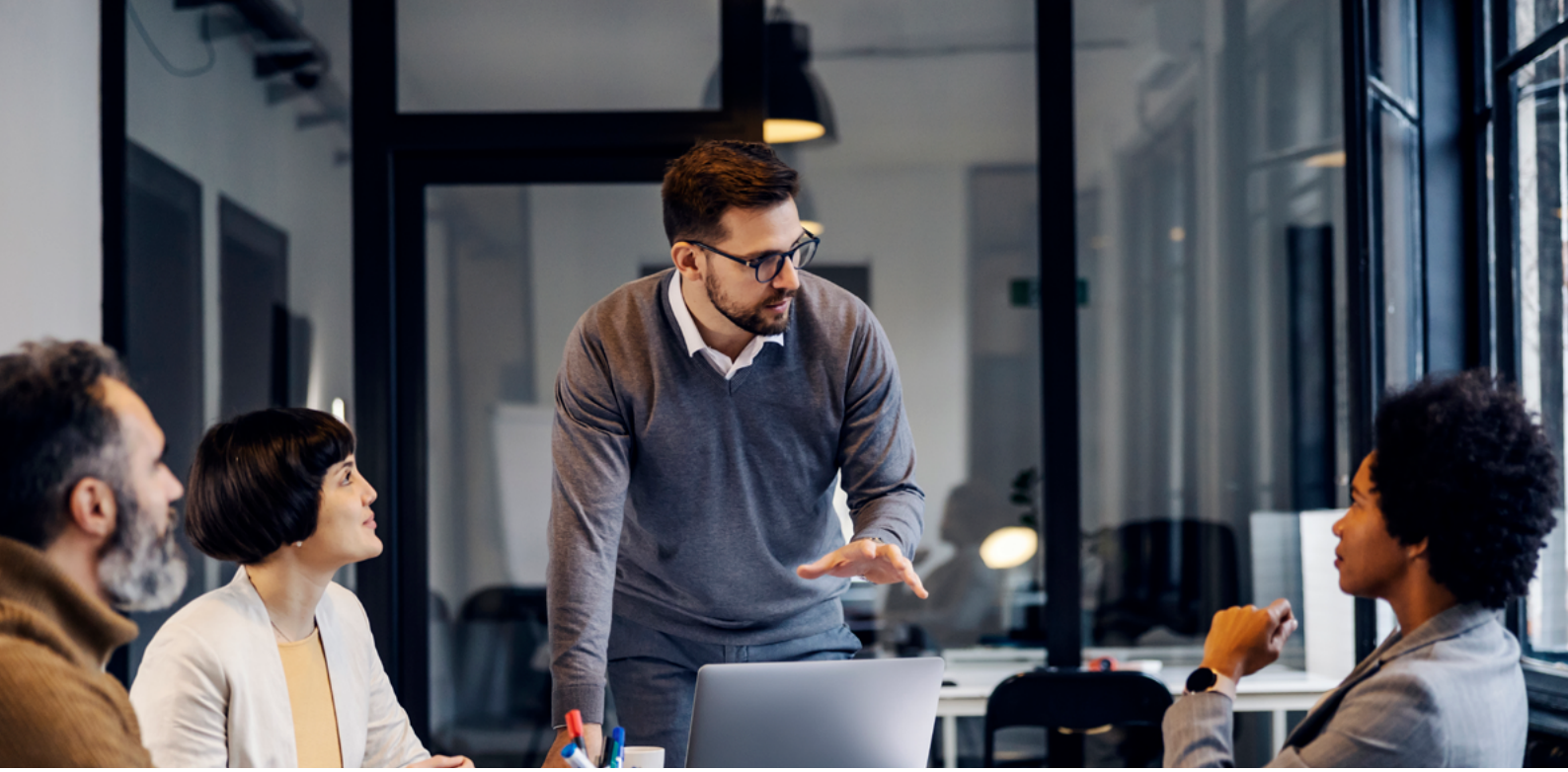
K4 - Finance: In what ways can the concept or technology improve our financial processes, such as transaction management, audit trails, and asset tracking, to enhance financial integrity and efficiency?

S2 - Analysis and Use of Information: How can we leverage the concept or technology for better data management and verification to support informed decision-making?

S3 - Decision-Making: How might the concept or technology influence our decision-making processes, particularly in areas requiring high levels of security and trust?

M1 - Ethical: What are the ethical considerations, including data privacy and the environmental impact of the concept or technology, that we should consider in our implementation and governance?





Prompt Engineering for Board Directors

Guide to crafting effective prompts for strategic insights at board level

In order to get a Generative AI system to produce output, it needs good prompts. Crafting effective prompts is in other words crucial for harnessing the full potential of a conversational AI tool like the generative AI chat tools. With skill, practice (and a fair amount of due diligence) they can help provide strategic insights at the board level. At the most advanced level, coding skills are needed. Here is a brief primer that can help you explore the basics, using plain English to prompt.

Do note that each tool is different, so experimentation is essential, and you'll improve with experience. Whichever tool you use, critical thinking is essential - including when it comes to the data you choose to share with a tool like this. Ignorance is not an excuse. Please refer to the Information Commissioner's resources and guidance on Artificial Intelligence for organisations.

The most basic prompt follows the RTF format:

Role: assign a role to the tool - e.g. "you are now an expert in corporate finance"

Task: make the task clear, - e.g. "make a checklist for our annual review of auditor"

Format: especially helpful to constrain the effort - e.g. "output in no more than five bullets"

A well-structured prompt enables these tools to generate more accurate, relevant, and insightful responses.

And now 8 quick keys to unlock greater value - along with example prompts

Clear objective
Start with a clear goal in mind. Understand what strategic insight you seek or the decision you need support with. The AI can't read your mind and it can't guess your intent as such.

Example: Instead of "Tell us about market trends," use "Provide an analysis of recent trends in the renewable energy market and their implications for our investment strategy."

Specificity is key:
The more specific the prompt, the more tailored the response. Include key details like industry specifics, geographical focus, time frames, or any particular aspects you want to explore. And you may find it helpful to develop a 'stock explainer' for your organisation and what it does

Example: "What are the strategic risks and opportunities for a telecommunications company expanding into the Southeast Asian market in the next two years?"

Leverage context
Provide context to enable the generative AI chat tool to align its responses with your organisation's strategic framework. However, avoid sharing confidential or sensitive information.

Example: "Considering our company's focus on sustainability, how can we leverage emerging technologies to enhance our supply chain efficiency?"

Ask for diverse perspectives
Encourage the generative AI chat tool to present multiple viewpoints or scenarios. This can enrich discussions and aid in comprehensive decision-making.

Example: "Identify and compare potential strategies for digital transformation in the financial sector, highlighting benefits and risks."

Encourage depth and detail:
Prompt the generative AI chat tool to provide detailed analyses or step-by-step breakdowns to deepen understanding.

Example: "Outline a step-by-step strategic plan for entering the electric vehicle market in Europe, considering current regulatory and economic factors."

Utilise the generative AI chat tool for scenario analysis:
Use the generative AI chat tool to run through hypothetical scenarios, exploring outcomes and strategic responses.

Example: "Simulate the potential impacts on our revenue if a new competitor enters our primary market within the next year."

Request summaries and reports:
Ask the generative AI chat tool to summarise complex reports, research findings, or data analyses, making it easier for board members to grasp key insights quickly.

Example: "Summarise the key findings of the latest Gartner report on AI adoption in healthcare and its strategic implications for our company."

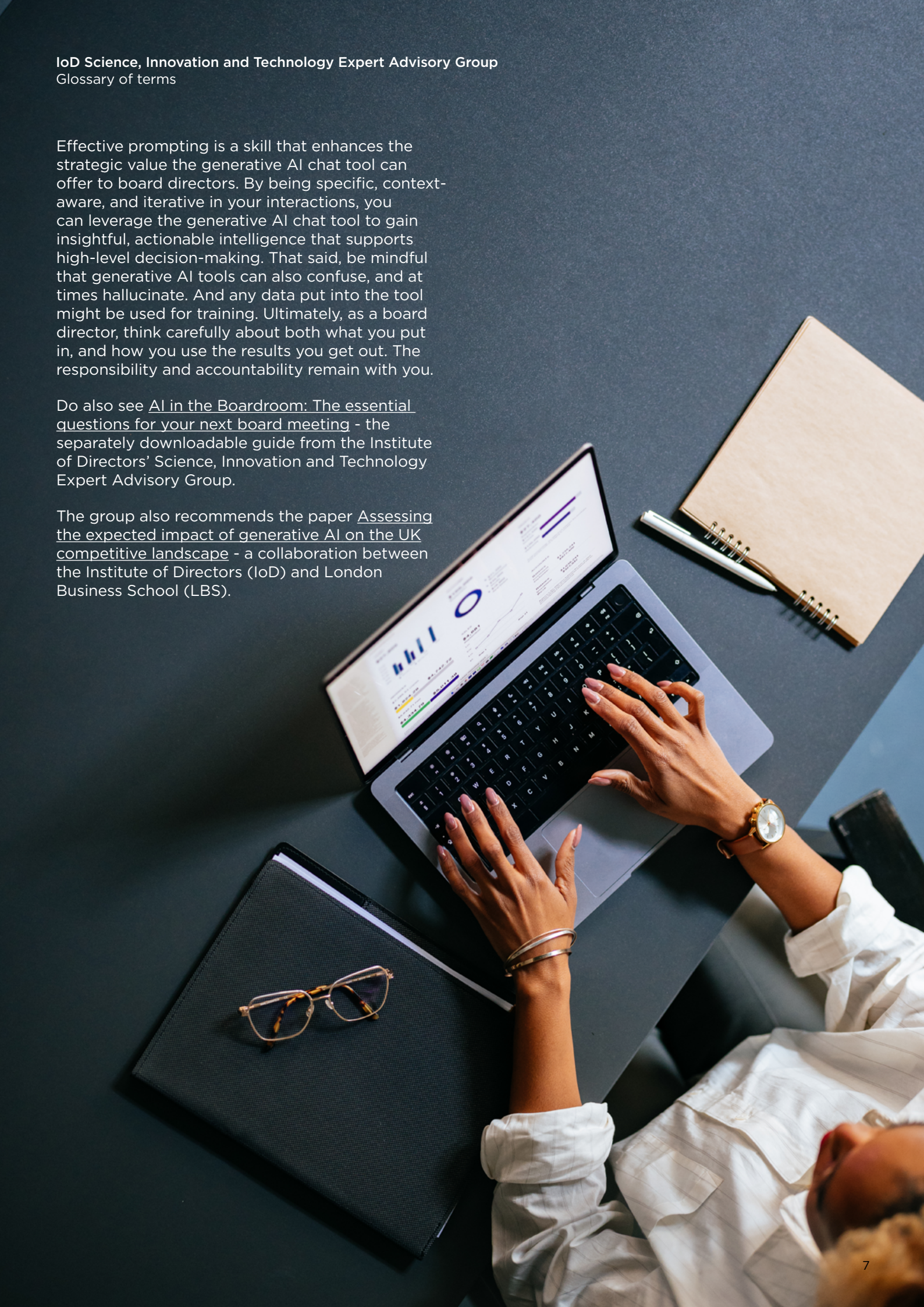
Continuous engagement:
Engage with the generative AI chat tool iteratively. Refine your prompts based on the responses received to delve deeper or clarify certain aspects.

Example: After receiving an initial response, you might follow up with, "Based on the provided analysis, what are the top three strategic priorities we should focus on?"

Effective prompting is a skill that enhances the strategic value the generative AI chat tool can offer to board directors. By being specific, context-aware, and iterative in your interactions, you can leverage the generative AI chat tool to gain insightful, actionable intelligence that supports high-level decision-making. That said, be mindful that generative AI tools can also confuse, and at times hallucinate. And any data put into the tool might be used for training. Ultimately, as a board director, think carefully about both what you put in, and how you use the results you get out. The responsibility and accountability remain with you.

Do also see AI in the Boardroom: The essential questions for your next board meeting - the separately downloadable guide from the Institute of Directors' Science, Innovation and Technology Expert Advisory Group.

The group also recommends the paper Assessing the expected impact of generative AI on the UK competitive landscape - a collaboration between the Institute of Directors (IoD) and London Business School (LBS).



Artificial Intelligence A

A branch of computer science and engineering that involves creating computer systems that can perform tasks that typically require human intelligence, such as recognizing speech, making decisions, translating languages, and identifying patterns. AI integrates various disciplines and technologies, including machine learning, natural language processing, robotics, and Generative AI to enhance decision-making and automate complex processes.

Examples, opportunities and risks

Example use cases

- Predictive Analytics
- Autonomous Vehicles
- Personalised Medicine
- Customer Service Bots
- Smart Home Devices

Opportunities

- Predictive Analytics
- Autonomous Vehicles
- Personalised Medicine
- Customer Service Bots
- Smart Home Devices

Risks

- Predictive Analytics
- Autonomous Vehicles
- Personalised Medicine
- Customer Service Bots
- Smart Home Devices

Board risk appetite

The board's risk appetite for AI should focus on harnessing its potential to transform operations and enhance services while carefully managing ethical issues and societal impacts. Strategic investments should be made in AI technologies that align with the organisation's goals and values, ensuring proper governance frameworks are in place to address data privacy, security, and ethical challenges.

Related terms

Machine Learning, Deep Learning, Neural Networks, Natural Language Processing (NLP), Robotics, Cognitive Computing, AI Ethics, Data Science, Chatbots, AI Regulation

Agile Development

A

Agile development is a methodology for software development that emphasises customer collaboration, flexibility, early and continuous delivery, iterative development, and working software. This approach involves breaking projects down into smaller, manageable units called "sprints" or "iterations," allowing teams to adapt to changes in project requirements and customer needs more efficiently. Agile promotes collaboration with customers, among cross-functional teams, frequent re-evaluation of plans, and delivery of functional bits of the application as soon as they're ready.

Examples, opportunities and risks

Example use cases

- Software Development
- Product Management
- Marketing Campaigns
- Business Process Improvement
- Educational Program Development

Opportunities

- Enhanced Flexibility
- Faster Time to Market
- Improved Customer Satisfaction
- Increased Team Productivity
- Continuous Feedback Integration

Risks

- Scope Creep
- Team Burnout
- Lack of Documentation
- Overemphasis on Delivery
- Misalignment with Business Goals

Board risk appetite

The board's risk appetite for agile development should focus on embracing its iterative process to foster innovation and responsiveness while carefully managing potential drawbacks like scope creep and alignment issues. Strategic decisions should include investing in training for agile methodologies, promoting a culture of collaboration, and ensuring projects are closely aligned with strategic business objectives. The board should also emphasise the importance of maintaining balance between speed and quality to sustain long-term benefits.

Related terms

Scrum, Lean Software Development, Kanban, Continuous Integration, DevOps, Product Backlog, Sprint Planning, User Stories, Iterative Development, Cross-Functional Teams

Blockchain

B

A digital database of transactions. The details of each transaction are recorded in blocks that are linked in a chain to other blocks. The database is distributed among its users to allow for validation of transactions and to prevent tampering of the data within each block and providing enhanced security, increased transparency, and improved traceability.

Examples, opportunities and risks

Example use cases

- Supply Chains
- Financial Transactions
- Smart Contracts
- Healthcare Records
- Voting Systems

Opportunities

- Enhanced Security
- Increased Transparency
- Improved Traceability
- Enhanced Privacy
- Data Integrity and Accountability

Risks

- Energy Consumption
- Regulatory, Compliance and Legal Issues
- Security Risks
- Reputational Risks
- Operational Risks due to Technological Complexity

Board risk appetite

Board members need to carefully consider these risks when deciding whether to implement a blockchain in their organisation / use other blockchains. Overkill for most challenges, and speed and scalability are an issue.

Related terms

Distributed Ledger Technology (DLT), Decentralised Ledger, crypto, cryptocurrency

Cloud computing

C

Cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—by accessing vast computing and storage capabilities over the Internet ("the cloud") to offer faster innovation, flexible access to resources, and economies of scale. Users typically pay only for cloud services they use, helping lower operating costs, run technology-based services and infrastructure more efficiently, and scale as their business needs change.

Examples, opportunities and risks

Example use cases

- Data Storage and Backup
- Disaster Recovery
- Web-Based Email Services
- Virtual Desktops
- Big Data Analytics

Opportunities

- Cost Reduction
- Scalability
- Accessibility
- Flexibility
- Enhanced Collaboration

Risks

- Data Security
- Network Dependency
- Service Downtime
- Vendor Lock-In
- Compliance Challenges

Board risk appetite

The board's risk appetite for cloud computing should focus on maximising the strategic benefits of flexibility and cost efficiency while managing risks related to data security, compliance, and operational dependence on service providers. Strategic decisions should involve careful selection of cloud services that align with the organisation's risk management framework and business objectives, ensuring robust data protection measures and reliable service availability.

Related terms

Xaas; SaaS, PaaS, IaaS, Virtualization, Public Cloud, Private Cloud, Hybrid Cloud, Cloud Migration, Data Sovereignty, Cloud Security

Cryptocurrency

C

Digital currencies that are not maintained by any central bank or authority, and which use a decentralised and distributed system to record transactions and the creation of new currency. Advanced cryptography is used to help prevent fraud and maintain its integrity. It operates on decentralized technology called blockchain, allowing users to make secure payments and store money without the need for a central authority.

Examples, opportunities and risks

Example use cases

- Peer-to-Peer Payments
- Remittances
- Online Transactions
- Decentralized Finance (DeFi)
- Asset Tokenization

Opportunities

- Financial Inclusion
- Lower Transaction Costs
- Enhanced Privacy
- Immediate Settlement
- Diversification of Asset Classes

Risks

- Market Volatility
- Regulatory Challenges
- Security Risks
- Scalability Issues
- Illicit Activities

Board risk appetite

The board's risk appetite for engaging with cryptocurrency should balance the potential for innovation and financial inclusion against the risks of market volatility, regulatory uncertainty, and security challenges. Strategic initiatives should focus on leveraging the technology for competitive advantages while ensuring robust security measures and compliance with financial regulations.

Related terms

Blockchain, Bitcoin, Ethereum, Digital Wallet, Smart Contracts, Tokenomics, Altcoins, Crypto Exchanges, ICOs, Distributed Ledger Technology (DLT)

Cybersecurity and Cybersecurity Risk Management

C

Cybersecurity involves protecting systems, networks, and programs from digital attacks. Cybersecurity risk management refers to the process of identifying, analyzing, and responding to cybersecurity threats, ensuring that an organisation's information assets are protected with minimal risk exposure.

Steps include use of security software and firewalls, strong password management, two-step verification, backing up data and ensuring all systems are up to date.

With the increasing activity of global threat actors and significant harm resulting from cyber-attacks, boards need to invest in risk management frameworks, strong corporate governance and compliance with the emerging regulatory environment.

Examples, opportunities and risks

Example use cases

- Network Security
- Incident Response
- Data Encryption
- Identity and Access Management (IAM)
- Threat Intelligence

Opportunities

- Enhanced Data Protection
- Improved Compliance
- Reputation Management
- Business Continuity
- Strategic Risk Management

Risks

- Phishing Attacks
- Ransomware
- Data Breaches
- Insider Threats
- IoT Vulnerabilities

Board risk appetite

The board's risk appetite for cybersecurity should focus on establishing a resilient security posture that aligns with the organisation's overall risk management strategy. This includes proactive investments in advanced security technologies, comprehensive training programs, and strong incident response protocols. The goal is to mitigate potential disruptions and protect against evolving cyber threats while supporting business objectives and compliance requirements.

Related terms

Information Security, Network Defence, Malware Analysis, Security Information and Event Management (SIEM), Penetration Testing, Vulnerability Assessment, Compliance Audits, Data Privacy, Cyber Insurance, Security Architecture

Deep Learning

D

Deep learning is a sophisticated subset of machine learning that uses neural networks with many layers (hence "deep") to analyse various forms of data. These complex models are capable of learning from large amounts of unstructured data, making deep learning essential for tasks that require high-level reasoning and abstraction, such as visual recognition, speech recognition, and language processing.

Examples, opportunities and risks

Example use cases

- Facial Recognition
- Natural Language Processing
- Autonomous Driving
- Predictive Analytics
- Personalised Medicine

Opportunities

- Enhanced Analytical Capabilities
- Automation of Complex Tasks
- High Accuracy in Predictions
- Scalable Learning Models
- Innovative Product Development

Risks

- High Resource Consumption
- Training Data Requirements
- Black Box Nature
- Ethical and Privacy Concerns
- Susceptibility to Bias

Board risk appetite

The board's risk appetite for deep learning should focus on harnessing its powerful analytical capabilities while managing the significant resources and ethical challenges involved. Strategic decisions should include investments in robust data infrastructure and expert talent, alongside implementing strong governance frameworks to address privacy, bias, and transparency in AI applications.

Related terms

Neural Networks, Machine Learning, Artificial Intelligence, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Generative Adversarial Networks (GANs), AI Ethics, Data Science, Big Data, AI Regulation

DevOps

D

DevOps is a set of practices that combines software development (Dev) and IT operations (Ops) aimed at shortening the systems development life cycle and providing continuous delivery and update of operations and services with high software availability and quality. DevOps emphasises collaboration, automation, and integration between developers and IT professionals to improve the speed and quality of software development and deployment.

Examples, opportunities and risks

Example use cases

- Continuous Integration
- Continuous Deployment
- Automated Testing
- Infrastructure as Code
- Real-Time Monitoring

Opportunities

- Faster Deployment
- Enhanced Collaboration
- Increased Efficiency
- Improved Product Quality
- Reduced IT Costs

Risks

- Cultural Resistance
- Complexity in Management
- Security Challenges
- Integration Difficulties
- Reliance on Automation

Board risk appetite

The board's risk appetite for DevOps should focus on embracing the cultural and technical changes necessary to foster a collaborative environment that accelerates development cycles and enhances operational efficiencies. Strategic decisions should prioritise investments in training and tools that support automation and integration, while also ensuring robust security practices to manage the increased speed and frequency of deployments. The goal is to balance the speed of innovation with the necessity of maintaining system integrity and security.

Related terms

Agile Development, Continuous Delivery, Automation Tools, Software Lifecycle Management, Performance Monitoring, System Administration, Cloud Computing, Security Operations, Configuration Management, Microservices

Distributed Ledger Technology

D

A digital system that allows secure records (or ledgers) of electronic transactions to be accessed and maintained simultaneously by a shared, or distributed, network of participants rather than a central authority.

Examples, opportunities and risks

Example use cases

- Asset Tokenization
- Identity Verification
- Trade Finance
- Regulatory Compliance
- Supply Chain Visibility

Opportunities

- Enhanced Transparency
- Operational Efficiency
- Improved Security
- Innovation Adoption
- Market Differentiation

Risks

- Regulatory Uncertainty
- Technology Adoption
- Cyber Threats
- Integration Challenges
- Reputation Risk

Board risk appetite

The board's risk appetite for adopting Distributed Ledger Technology should balance innovation-driven growth with prudent management of potential regulatory, operational, and cybersecurity risks. It is crucial to align DLT initiatives with the organisation's strategic goals and regulatory environment, ensuring robust risk assessment and mitigation strategies are in place. Overkill for most challenges, and speed and scalability are an issue.

Related terms

Blockchain, Smart Contracts, Digital Assets, Crypto Art, Digital Collectibles, Metaverse, Tokenomics, Web3 Technology

Edge Computing

E

Edge computing refers to the practice of processing data using devices near the edge of your network, where the data is being generated, instead of using a centralised data-processing warehouse. This approach reduces latency and bandwidth use by bringing computation and data storage closer to the devices where it is being gathered, rather than relying on a central location that can be thousands of miles away.

Examples, opportunities and risks

Example use cases

- Autonomous Vehicles
- Smart Grids
- Real-Time Analytics
- IoT Device Management
- Content Delivery Networks

Opportunities

- Reduced Latency
- Bandwidth Savings
- Real-Time Decision Making
- Enhanced Data Security
- Increased Operational Efficiency

Risks

- Security Challenges
- Management Complexity
- Scalability Issues
- Hardware Dependence
- Integration with Existing Infrastructure

Board risk appetite

The board's risk appetite for edge computing should concentrate on exploiting the technology's ability to enhance responsiveness and operational efficiency while addressing challenges like security and integration complexity. Strategic investments should focus on developing robust edge infrastructure that complements centralised systems, ensuring data protection and smooth scalability to meet future needs.

Related terms

Cloud Computing, Decentralised Computing, Network Architecture, Data Processing, Real-Time Computing, IoT, AI at the Edge, Micro Data Centers, 5G Technology, Distributed IT

Generative AI

G

Generative AI refers to artificial intelligence algorithms and technologies that can generate new content, including text, images, audio, and video, based on their training data. These systems use techniques like deep learning and neural networks to produce outputs that are often indistinguishable from content created by humans.

Examples, opportunities and risks

Example use cases

- Content Creation
- Art and Music Production
- Personalised Advertising
- Product Design
- Real-time Language Translation

Opportunities

- Creative Innovation
- Scalable Content Production
- Customization and Personalization
- Enhanced User Experiences
- Cost Efficiency in Design and Media

Risks

- Intellectual Property Issues
- Ethical Misuse
- Quality Control
- Bias in AI Models
- Over-reliance on Automation

Board risk appetite

The board's risk appetite for generative AI should be focused on leveraging its capabilities for innovation and efficiency while rigorously managing ethical considerations and intellectual property rights. It's essential to implement robust guidelines and quality controls to prevent misuse and ensure the responsible deployment of AI technologies that reflect the organisation's values and comply with existing laws.

Also refer to the paper Assessing the expected impact of generative AI on the UK competitive landscape - a collaboration between the Institute of Directors (IoD) and London Business School (LBS).

Related terms

Deep Learning, Neural Networks, Machine Learning, AI Ethics, Creative AI, AI Content Moderation, Text-to-Image Models, Natural Language Generation, Synthetic Media, AI Regulation

IoT - Internet of Things

The Internet of Things (IoT) refers to the network of physical devices, vehicles, home appliances, and other items embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. This technology enables objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems.

Examples, opportunities and risks

Example use cases

- Smart Homes
- Wearable Health Monitors
- Smart Cities
- Industrial Internet
- Connected Vehicles

Opportunities

- Enhanced Connectivity
- Automation and Control
- Efficiency and Cost Reduction
- Improved Data Collection
- Resource Optimization

Risks

- Security Vulnerabilities
- Privacy Concerns
- Data Overload
- Network Dependency
- Integration Complexity

Board risk appetite

The board's risk appetite for IoT should focus on leveraging its potential to transform operations and enhance service offerings while managing the inherent risks associated with security, privacy, and technological dependency. Strategic initiatives should include robust security measures, data privacy protocols, and a clear integration strategy to ensure that IoT deployments align with the organisation's operational needs and compliance standards.

Related terms

Smart Devices, Connected Devices, Edge Computing, IoT Platforms, Sensor Technology, Data Analytics, Machine Learning, Cybersecurity, Digital Twins, Network Architecture

Machine Learning M

Machine Learning (ML) is a subset of artificial intelligence that involves training algorithms to learn from and make predictions or decisions based on existing data, without being explicitly programmed. ML enables computers to improve their performance on tasks over time as they are exposed to more data.

Examples, opportunities and risks

Example use cases

- Fraud Detection
- Recommendation Systems
- Speech Recognition
- Predictive Maintenance
- Medical Diagnosis

Opportunities

- Data-Driven Insights
- Automation of Routine Tasks
- Improved Product and Service Personalization
- Enhanced Decision-Making
- Efficiency in Data Analysis

Risks

- Data Privacy
- Algorithmic Bias
- Model Overfitting
- Lack of Transparency (Black Box)
- Dependency on Data Quality

Board risk appetite

The board's risk appetite for machine learning should focus on maximising the technology's potential to enhance operational efficiency and decision-making while addressing critical issues like data privacy, algorithmic bias, and transparency. Strategic initiatives should prioritise establishing robust data governance frameworks and ethical AI practices to ensure sustainable and responsible use of machine learning.

Related terms

Artificial Intelligence, Neural Networks, Deep Learning, Supervised Learning, Unsupervised Learning, Data Mining, Predictive Analytics, Natural Language Processing, AI Ethics, Big Data

Metaverse

M

The next generation internet connectivity allows users to physically access and interact with new environments using virtual and augmented reality, enabled by access to the Internet of Things and artificial intelligence applications.

Examples, opportunities and risks

Example use cases

- Virtual Real Estate
- Remote Workspaces
- Interactive Learning
- Social and Entertainment Events
- e-Commerce Platforms

Opportunities

- Immersive Experiences
- Global Collaboration
- New Revenue Models
- Enhanced Learning Tools
- Virtual Tourism

Risks

- Privacy Concerns
- High Implementation Costs
- Technological Dependency
- User Disengagement
- Digital Divide

Board risk appetite

The board's risk appetite for the Metaverse should involve strategic investments that harness the potential for immersive experiences and global collaboration while managing risks related to privacy, technological reliance, and the cost of implementation. It is important for initiatives to be scalable, secure, and inclusive, ensuring that they align with the organisation's broader goals and ethical standards.

Related terms

Virtual Reality (VR), Augmented Reality (AR), Digital Twins, Web3, Blockchain, NFTs, 3D Modeling, Virtual Goods, Social Platforms, Digital Ecosystems

Neural Network

N

Neural networks are a subset of machine learning models inspired by the structure and function of the human brain. They consist of layers of interconnected nodes or "neurons" that process information through their connections. Neural networks are particularly effective for complex pattern recognition and learning from large amounts of data, enabling applications across various fields.

Examples, opportunities and risks

Example use cases

- Image Recognition
- Voice Assistants
- Financial Market Analysis
- Autonomous Vehicles
- Disease Diagnosis

Opportunities

- Advanced Pattern Recognition
- Real-Time Processing
- Adaptive Learning Capabilities
- Cross-Industry Applications
- Improvement in AI Performance

Risks

- Computational Demands
- Overfitting Data
- Transparency Issues
- Data Bias
- Ethical Implications

Board risk appetite

The board's risk appetite for neural networks should involve careful consideration of the technology's potential against its demands and ethical implications. Emphasising investments in computing infrastructure and expertise in data science, the board should advocate for transparent and responsible AI practices to ensure neural networks are used effectively and ethically across business operations.

Related terms

Deep Learning, Machine Learning, Artificial Intelligence, Backpropagation, Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), Transfer Learning, Activation Functions, AI Ethics, Data Science

Non-Fungible Tokens (NFT) N

A non-fungible token (NFT) is a record on a blockchain which is associated with a particular digital or physical asset. It is a unique, non-replaceable digital asset (I.e. non-fungible). The NFT acts as a certificate of authenticity or a proof of ownership of the digital asset to which it is assigned.

Examples, opportunities and risks

Example use cases

- Art Tokenization
- Collectibles
- Digital Identity
- Event Ticketing
- Virtual Real Estate

Opportunities

- Brand Enhancement
- Customer Engagement
- Revenue Diversification
- Digital Ownership
- Market Expansion

Risks

- Intellectual Property
- Market Volatility
- Legal Compliance
- Technology Scalability
- Public Perception

Board risk appetite

Extremely high - including if you're a FinTech startup. These risks need to be carefully weighed by boards considering engagement with NFTs, ensuring that due diligence, risk management strategies, and compliance frameworks are in place.

Related terms

Blockchain, distributed ledger technology, Web3

Quantum Computing

Q

Quantum computing harnesses the phenomena of quantum mechanics to process information exponentially faster than classical computing technologies. This technology is anticipated to revolutionise various industries by handling complex computations that are currently infeasible for traditional systems.

Examples, opportunities and risks

Example use cases

- Cryptography
- Drug Discovery
- Traffic Optimization
- Weather Forecasting
- Financial Modelling

Opportunities

- Solving Complex Problems
- Advancing Material Science
- Enhancing Artificial Intelligence
- Improving Data Security
- Accelerating Research

Risks

- Technology Immaturity
- High Costs
- Data Privacy Issues
- Skill Shortages
- Disruptive Potential

Board risk appetite

The board's risk appetite for quantum computing should be cautiously optimistic, focusing on long-term strategic investments while managing expectations due to the technology's current developmental stage. Emphasis should be on partnerships with academic institutions and industry leaders to stay at the forefront of quantum advancements, ensuring readiness for integration once the technology matures, and addressing potential disruptions and security implications.

Related terms

Superposition, Entanglement, Quantum Bits (Qubits), Quantum Algorithms, Quantum Cryptography, Quantum Simulation, Quantum Annealing, Quantum Supremacy, Quantum Sensors, Quantum Networks

Robotics and Robotic Process Automation

R

Robotics involves the design, construction, and use of robots to perform tasks traditionally done by humans, often in environments that are unsafe or inefficient for human workers. Robotic Process Automation (RPA) refers to software technology that automates routine, rule-based digital tasks by mimicking human interactions with digital systems, improving efficiency and accuracy.

Examples, opportunities and risks

Example use cases

- Manufacturing Automation
- Customer Service Bots
- Supply Chain Management
- Healthcare Robotics
- Data Entry and Processing

Opportunities

- Labour Cost Reduction
- Increased Productivity
- Enhanced Accuracy
- Scalability of Operations
- Continuous Operation

Risks

- Job Displacement
- High Initial Investment
- Maintenance Costs
- Integration Complexity
- Dependence on Technology

Board risk appetite

The board's risk appetite for robotics and RPA should focus on strategic implementation to optimise operational efficiency and reduce costs while managing the societal and ethical implications of job displacement and technological reliance. Investments should prioritise scalable solutions that integrate seamlessly with existing systems and enhance business resilience.

Related terms

Artificial Intelligence, Machine Learning, Automation, Cognitive Computing, Industrial Robots, Software Bots, Process Automation, Smart Factories, Cyber-Physical Systems, AI Ethics

Sustainability

S

Sustainability refers to the ability to maintain and support environmental, social, and economic conditions without depleting natural resources or compromising the ability of future generations to meet their needs. In a business context, it involves adopting practices that promote long-term ecological balance and corporate social responsibility.

Examples, opportunities and risks

Example use cases

- Renewable Energy Adoption
- Sustainable Supply Chains
- Eco-Friendly Packaging
- Water Conservation Initiatives
- Corporate Social Responsibility Programs

Opportunities

- Long-term Viability
- Regulatory Compliance
- Cost Savings
- Stakeholder Engagement
- Enhanced Brand

Risks

- Implementation Costs
- Supply Chain Disruptions
- Regulatory Changes
- Greenwashing Accusations
- Economic Volatility

Board risk appetite

The board's risk appetite for sustainability should focus on integrating eco-friendly and socially responsible practices that align with business objectives and enhance long-term stakeholder value. This includes a willingness to invest in sustainable technologies and processes, even if they involve upfront costs, to ensure compliance, resilience, and market leadership in an increasingly environmentally conscious world.

Related terms

Environmental, Social, and Governance (ESG), Green Energy, Circular Economy, Corporate Social Responsibility (CSR), Life Cycle Assessment, Carbon Footprint, Biodiversity, Sustainable Development, Eco-Innovation, Social Impact, Net Zero, Net Positive

Telehealth

T

Telehealth encompasses a broad range of technologies and tactics to deliver virtual medical, health, and education services. It extends beyond clinical treatment to include services like health education, administrative meetings, and provider training, using telecommunications technology to support long-distance healthcare and patient well-being.

Examples, opportunities and risks

Example use cases

- Remote Patient Monitoring
- Health Education
- Virtual Health Consultations
- Telemental Health Services
- Mobile Health Applications

Opportunities

- Expanded Access
- Enhanced Patient Engagement
- Cost Reductions
- Increased Healthcare Capacity
- Improved Public Health

Risks

- Privacy and Security
- Dependence on Technology
- Accessibility Barriers
- Regulatory Hurdles
- Quality of Care

Board risk appetite

The board's risk appetite for telehealth should focus on expanding access to healthcare while mitigating risks related to privacy, security, and technological dependencies. Adoption should prioritise ensuring equitable access, maintaining high standards of care, and complying with evolving regulations. Strategic initiatives should integrate robust security measures and continuous monitoring to align with organisational goals and patient needs.

Related terms

eHealth, Digital Health, Virtual Care, Remote Clinical Services, Health Informatics, Telemedicine, Patient Portals, Electronic Health Records, Internet of Medical Things (IoMT), Telepsychiatry

Telemedicine T

A branch of telehealth focusing on the use of digital and telecommunications technologies. Telemedicine involves providing clinical services remotely. It allows healthcare professionals to diagnose, consult, and treat patients online, enhancing accessibility and efficiency in healthcare delivery.

Examples, opportunities and risks

Example use cases

- Remote Diagnostics
- Virtual Consultations
- Chronic Disease Management
- Mental Health Therapy
- Prescription Management

Opportunities

- Access to Care
- Cost Efficiency
- Patient Convenience
- Reduced Healthcare Disparities
- Continuous Monitoring

Risks

- Data Security
- Regulatory Compliance
- Technical Limitations
- Patient-Provider Relationship
- Dependence on Internet Connectivity

Board risk appetite

The board's risk appetite for telemedicine should focus on leveraging technology to enhance patient care and accessibility while addressing the critical challenges of data security, regulatory compliance, and technological dependencies. It's vital to prioritise robust cybersecurity measures and ensure reliable, high-quality service delivery, which aligns with healthcare regulations and patient expectations.

Related terms

eHealth, Digital Health, Remote Patient Monitoring, Health Information Technology, Mobile Health Apps, Electronic Health Records (EHR), Virtual Health Care, Internet of Medical Things (IoMT), Patient Portals, Clinical Decision Support Systems

Web3

W

A term used to describe a new paradigm for applications on the Internet that are built using decentralised networks; the main idea being the creation of applications that run on blockchain technology, enabling peer-to-peer interactions without the need for intermediaries.

Examples, opportunities and risks

Example use cases

- Decentralised Finance (DeFi)
- Decentralised Autonomous Organizations (DAOs)
- Non-Fungible Tokens (NFTs)
- Social Media on Blockchain
- Decentralised Identity

Opportunities

- User Empowerment
- Data Privacy
- Transaction Transparency
- Reduced Dependency on Tech Giants
- Innovation in Digital Interactions

Risks

- Regulatory Ambiguity
- User Adoption Challenges
- Security Vulnerabilities
- Scalability Issues
- Complex User Interfaces

Board risk appetite

The board's risk appetite for adopting Web3 should focus on seizing transformative opportunities in digital interactions while cautiously navigating the technological, regulatory, and market uncertainties. Emphasis should be on advancing technological capabilities that align with the organisation's strategic vision and enhancing user trust through improved privacy and security measures. Adoption should be measured and responsive to the evolving Web3 ecosystem.

Related terms

Blockchain, Distributed Ledger Technology (DLT), Smart Contracts, Cryptocurrencies, Tokenomics, Decentralised Applications (DApps), Metaverse, Ethereum, Digital Sovereignty, Crypto Wallets

XaaS - Everything as a Service X

XaaS, or Everything as a Service, encompasses a broad category of services delivered over the internet that replaces traditional on-premise systems. This model includes Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS), among others, allowing businesses to access a wide range of functionalities without the need for extensive physical infrastructure.

Examples, opportunities and risks

Example use cases

- Cloud-Based Software Solutions
- Development Platforms
- IT Infrastructure
- Data Storage Solutions
- Business Process Outsourcing

Opportunities

- Operational Agility
- Reduced IT Overhead
- Enhanced Scalability
- Immediate Access to Latest Technologies
- Capital Expenditure Reduction

Risks

- Service Dependence
- Data Security
- Compliance Challenges
- Vendor Lock-In
- Service Downtime

Board risk appetite

The board's risk appetite for XaaS should focus on balancing the enhanced agility and efficiency it provides against the risks of reduced control and increased reliance on service providers. While IaaS offers flexibility and potential cost savings with more control over the infrastructure, it requires significant technical expertise and poses higher operational complexity. Conversely, PaaS and SaaS provide easier management and lower immediate risks but at the cost of decreased flexibility and potential long-term costs. Strategic decisions should weigh these factors, aiming for an optimal mix that supports business needs while managing risks associated with security, compliance, and service continuity.

Related terms

Cloud Computing, SaaS, PaaS, IaaS, Managed Services, Cloud Services, Digital Transformation, On-Demand Services, Subscription-Based Models, Cloud Strategy - plus a range of creative additional expressions of 'as a service' such as Space-as-a-Service (property) and indeed another Space-as-a-Service (satellites) not to mention Nature-as-a-Service (think nature-based solutions) and so on. Health Care, Internet of Medical Things (IoMT), Patient Portals, Clinical Decision Support Systems

Onsite	IaaS	PaaS	SaaS
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualisation	Virtualisation	Virtualisation	Virtualisation
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

You manage **Service provider manages**

IaaS – Infrastructure as a Service

Infrastructure as a Service (IaaS) is a form of cloud computing that provides virtualized computing resources over the internet. IaaS allows businesses to purchase resources on-demand and as-needed instead of having to buy hardware outright. This model enables organisations to manage their networks, storage, servers, and data centre space without having to invest in physical hardware and infrastructure.

Examples, opportunities and risks

Example use cases

- Virtual Data Centres
- Disaster Recovery
- Website Hosting
- Big Data Analysis
- Development and Testing Environments

Opportunities

- Scalability
- Cost Efficiency
- Flexibility
- Focus on Core Business
- Improved Disaster Recovery

Risks

- Dependency on Service Provider
- Security Concerns
- Regulatory Compliance
- Data Privacy Issues
- Network Downtime

Board risk appetite

The board's risk appetite for IaaS should focus on leveraging the scalability and cost efficiency of cloud infrastructure while managing risks associated with security, service provider dependency, and compliance. Strategic decisions should prioritize selecting reliable service providers, investing in robust security measures, and ensuring data governance practices are in place to protect sensitive information and maintain operational continuity.

Related terms

Cloud Computing, Platform as a Service (PaaS), Software as a Service (SaaS), Virtual Machines, Cloud Storage, Public Cloud, Private Cloud, Hybrid Cloud, Cloud Migration, Data Sovereignty

Also, refer to diagram under XaaS - Everything as a Service

PaaS – Platform as a Service

Platform as a Service (PaaS) is a cloud computing model that provides customers with a platform allowing them to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app. PaaS can include development tools, database management systems, middleware, and business analytics solutions, providing a comprehensive environment that supports the entire software development lifecycle.

Examples, opportunities and risks

Example use cases

- Application Development
- Database Management
- Business Analytics
- Integration Services
- Middleware Services

Opportunities

- Streamlined Development
- Reduced Time to Market
- Cost Efficiency
- Scalability
- Maintenance Reduction

Risks

- Platform Dependence
- Limited Customization
- Vendor Lock-In
- Integration Issues
- Data Security Concerns

Board risk appetite

The board's risk appetite for PaaS should focus on leveraging the platform's capabilities to accelerate development and reduce operational costs while carefully managing the risks associated with dependency on a single vendor and data security. Strategic decisions should involve choosing platforms with robust security measures, clear compliance standards, and flexibility to integrate with existing systems. The goal is to enhance operational agility and scalability without compromising control over critical aspects of technology management.

Related terms

Cloud Computing, SaaS, IaaS, Application Hosting, DevOps, Continuous Integration, Software Development Tools, Cloud Migration, Cloud Security, API Management

Also, refer to diagram under XaaS - Everything as a Service

SaaS – Software as a Service

Software as a Service (SaaS) is a software distribution model in which applications are hosted by a third-party provider and made available to customers over the internet. This model allows users to access software and its functions remotely as a web-based service. SaaS eliminates the need for organisations to install and run applications on their own computers or in their data centres, reducing the expense of hardware acquisition, provisioning, and maintenance, as well as software licensing, installation, and support.

Examples, opportunities and risks

Example use cases

- Customer Relationship Management (CRM)
- Human Resources Management
- Accounting and Invoicing
- Project Management
- Enterprise Resource Planning (ERP)

Opportunities

- Lower Upfront Costs
- Scalability and Accessibility
- Automatic Updates
- Cross-Device Compatibility
- Streamlined Collaboration

Risks

- Data Security
- Dependence on Internet Connectivity
- Vendor Lock-In
- Limited Customization
- Data Control

Board risk appetite

The board's risk appetite for SaaS should focus on capitalising on the cost efficiencies and scalability while managing risks associated with data security and vendor dependence. Strategic decisions should prioritise selecting SaaS providers with robust security measures, clear data management policies, and reliable uptime commitments. The goal is to ensure that SaaS applications integrate smoothly with the organisation's existing infrastructure and support its overall strategic objectives without compromising operational control or data security.

Related terms

Cloud Computing, PaaS, IaaS, Cloud Services, Subscription Model, Web-Based Software, Application Hosting, Cloud Applications, Data Privacy, Managed Services

Also, refer to diagram under XaaS - Everything as a Service

About the Science, Innovation and Technology EAG

The Science, Innovation and Technology Expert Advisory Group is one of a number of Expert Advisory Groups that the IoD Governance and Policy Unit has established to help tap into the expertise of IoD members on the key issues for UK directors, providing insight from those who have substantial front-line experience.