LTIMindtree

AI Technology Trends Radar

Foreword

Nachiket Deshpande
Whole-Time Director and
Chief Operating Officer
LTIMindtree

Welcome to a new future – a future shaped by the relentless march of artificial intelligence, a future we are crafting with determination and strategic foresight.

I am delighted to present the first **"AI Technology Trends Radar Report"**. This report will take you on a journey through the progressive landscape of next-generation AI technologies. The AI technology trends radar delves into the most significant developments and emerging trends impacting industries and services. Built using a structured methodology and powered by the LTIMindtree Crystal platform, it reflects our collective wisdom, the insights we have garnered through experience, and the vision that guides us forward.

Our expert team has meticulously analysed a wide range of AI technology trends to offer actionable and strategic insights. Today, we stand at the vantage point of an extraordinary era in which algorithms breathe life into data and open portals to new realms of intelligence. In this first edition of the AI radar, we will traverse the landscapes of deep learning outcomes, AI's generative capabilities, explainable AI, and many more. Whether you're a seasoned technologist or a curious explorer, this publication illuminates the path ahead, from predictive intelligence to operational brilliance to quantum-inspired algorithms, heralding a revolution like never before.

Furthermore, as stewards of this revolution, we bear the additional responsibility to wield AI ethically. We hope this report becomes a trusted companion in your journey of **AI in Everything, Everything in AI, AI for Everyone**, fostering a future where technology drives meaningful advancements and creates value for all.

Opening Insights
The Evolution of AI Technology

Rohit Kedia
Chief Growth Officer
Technology Services
LTIMindtree

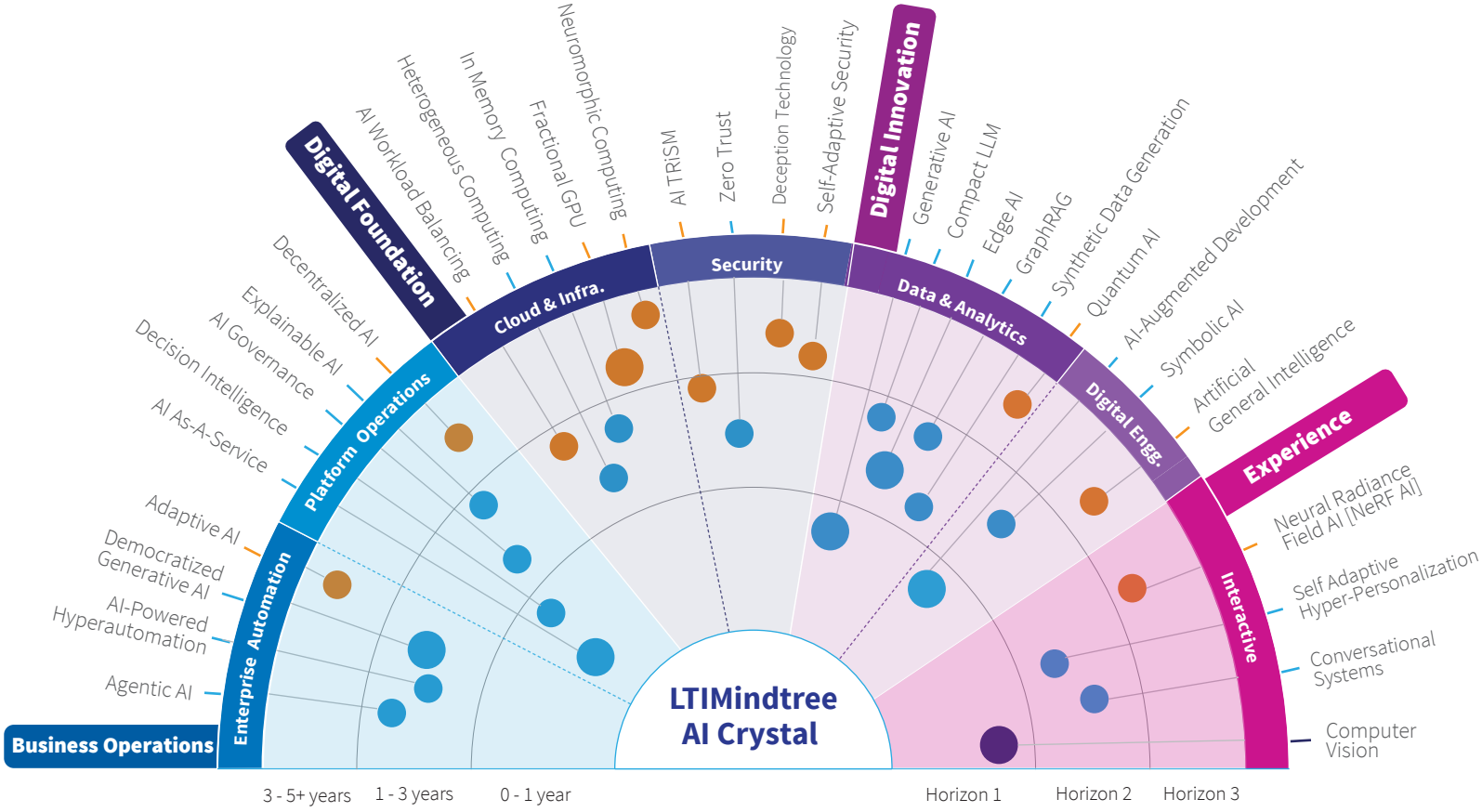
The pace of innovation in AI is truly profound. Beyond just foundational models, the innovation now spans domain LLMs, agentic AI, industrial AI and new techniques in responsible AI, computing infrastructure, AI security and more. LTIMindtree AI technology trends radar **emphasizes the symbiotic relationship between AI advancements and customer-centric growth.** It reinforces the need for a deep understanding of the potential of AI to transform industries and individual experiences alike. At LTIMindtree, we leverage AI to deeply understand our customers, predict their needs, and provide personalized experiences. Our foresight into AI trends is a testament to our dedication to being at the forefront of technology. Together, let's navigate the complexities of the digital landscape and leverage AI to create customer value and growth.

Krishnan Iyer
Chief Growth Officer
Business Services
LTIMindtree

LTIMindtree is keen on building an **enterprise-grade data and digital foundation**, which has proved essential for embedding automation and AI in the client's platform solutions. This helps the clients to get better internal and external stakeholder experiences and insights from their business processes at the same time minimizing risk and optimizing costs.

Table of Contents

AI Technology Trends Radar



Horizon	Adoption Phase	Market Potential
Horizon 1 *(0 - 1 year)* Trend will be industrialized in less than 1 year.	**Emerging** Trend is at its initial stages of adoption, with innovators and early adopters exploring its potential.	**Low**
Horizon 2 *(1 - 3 years)* Trend will be industrialized within 1 to 3 years.	**Improving** Trend adoption is increasing with proven potential to improve efficiency and effectiveness.	**High**
Horizon 3 *(3 - 5+ years)* Trend will take more than 5 years to reach industrialization state.	**Mature** Trend has achieved widespread acceptance	**Very High**

Navigating the Radar

The AI technology trends listed below are arranged according to their corresponding horizon and grouped by their segments.

	Business Operations		Digital Foundation		Digital Innovation		Experience
	Platform Operations	Enterprise Automations	Cloud & Infrastructure	Security	Data & Analytics	Digital Engineering	Interactive
Horizon 1	• AI As-A-Service • Decision Intelligence				• Generative AI • AI-Augmented Development		• Computer Vision
Horizon 2	• Agentic AI • AI-Powered Hyperautomation • Democratized Generative AI • AI Governance • Explainable AI		• AI Workload Balancing • Heterogeneous Computing • In Memory Computing • AI TRiSM • Zero Trust		• Compact LLM • Edge AI • GraphRAG • Synthetic Data Generation • Symbolic AI		• Conversational Systems • Self Adaptive Hyper-Personalization
Horizon 3	• Adaptive AI • Decentralized AI		• Fractional GPU • Neuromorphic Computing • Deception Technology • Self-Adaptive Security		• Quantum AI • Artificial General Intelligence		• Neural RadianceField AI [NeRF AI]

SEGMENT

Business Operations

Business Operations aim to boost efficiency and productivity by focusing on digitalization and automation while also meeting specific operational goals. Emerging technology trends empower organizations to manage their resources and workloads with agility while positioning them for scalability. The primary goal is to harness the full potential of these trends through effective adoption and use in operational practices.

SUB-SEGMENT

Enterprise Automation

This sub-segment explores how AI transforms business operations by automating complex workflows and boosting productivity contextualized to enterprise needs. It highlights the use of AI technologies to optimize processes, minimize manual efforts, and facilitate real-time decision-making. Such innovations underscore the transformative role of AI-driven automation in improving operational efficiency and driving growth in modern businesses.

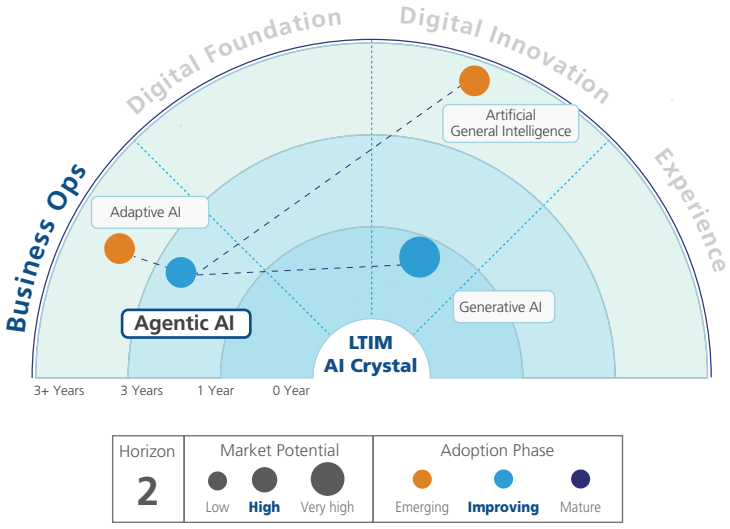
Agentic AI

AI agents are adaptive AI systems that learn to achieve complex and repetitive tasks using natural language inputs with minimal human interventions. These intelligent agents interact with their surroundings to achieve goals through decision-making. They can be AI systems, collaborative robots, or any computational entities capable of sensing and acting on their surroundings.

Highlights

Agentic AI can streamline workflows by reducing the reliance on multiple applications and products, allowing actors to achieve tasks seamlessly through multimodal interfaces. Agents can facilitate legacy system integration and provide a natural framework for representing task allocation, planning, and actor preferences. They efficiently retrieve and coordinate information from dispersed sources, offering solutions where expertise is spatial and temporally distributed. Consequently, agents improve the overall system performance, making them a crucial paradigm in modern AI research and applications.

Radar View & Related Technologies



Industry Use Cases

BFS

- Automated trading systems
- Fraud detection & management

Healthcare

- Distributed patient monitoring
- Personalized treatment planning

Manufacturing

- Multi-robot factories
- Automated assembly lines

Energy & Utilities

- Demand-response energy systems
- Analyze consumption patterns for energy optimization

Key Takeaway

Agentic AI represents the next frontier in autonomous framework for efficient, robust problem-solving, reducing the need for a multi-vendor landscape.

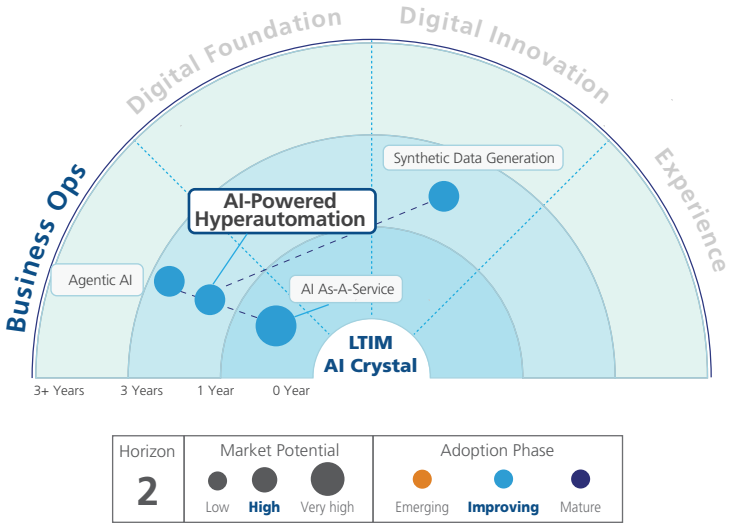
AI-Powered Hyperautomation

AI-powered hyperautomation goes beyond conventional automation. It intelligently automates complex workflows while automating the automation process itself. It seamlessly integrates automation across all organizational layers without needing technical expertise, dynamically discovering business processes and creating bots to automate them.

Highlights

AI-powered hyperautomation is reshaping how organizations operate. It emphasizes collaboration between AI and human intelligence, transforming how organizations extract insights from enterprise data. With their advanced Natural Language Processing (NLP) capabilities, Large Language Model's (LLMs) excel in analyzing unstructured data across text, images, and videos. It enables businesses to identify consumer behavior patterns, automate actions based on them, optimize marketing strategies, and streamline processes, enhancing efficiency and profitability.

Radar View & Related Technologies



Industry Use Cases

BFS

- End-to-end loan processing
- Regulatory compliance and reporting

Insurance

- Automated risk assessment
- Customer service automation

Communication Media Entertainment

- Subscription and billing management
- Automated network troubleshooting

Hi-Tech

- Cybersecurity operations
- R&D automation

Key Takeaway

AI-powered hyperautomation is the future of work, driving the automation of complex tasks and boosting efficiency and productivity.

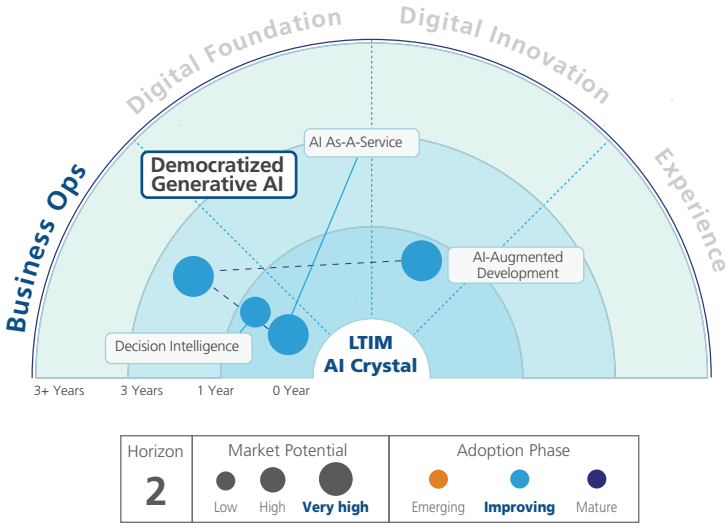
Democratized Generative AI

Democratized generative AI empowers all users with AI technology. It transforms AI from an exclusive tool to a widely available resource, fostering creativity and problem-solving. This technology will disrupt many industries. It will help small businesses promote, help educators personalize learning, help scientists analyze data, and help individuals complete daily tasks without technological barriers.

Highlights

Democratized generative AI helps people with tasks and hobbies in marketing, education, art, science, and non-technology. According to Gartner[1], by 2026, almost 80% of enterprises will adopt generative AI Application Programming Interface (APIs), a sharp rise from 5% in 2023. Generative AI can execute complex tasks in minutes, enhance productivity, automate coding, saving time and money. Though democratized generative AI has numerous benefits, it has concerns like data privacy, misinformation, talent dilution, and governance. Overusing AI could hamper critical thinking.

Radar View & Related Technologies



Industry Use Cases

Insurance

- Self-service insurance customization
- Claims assistance

Communication Media Entertainment

- DIY content creation
- Contextual content filtering

Energy & Utilities

- Home energy management solutions
- Personalized utility usage insights

Manufacturing

- Customizable product features
- Rapid prototyping

Key Takeaway

Harnessing democratized generative AI will enable IT leaders to ensure productivity, reduce costs, and drive operational transformation for a competitive edge.

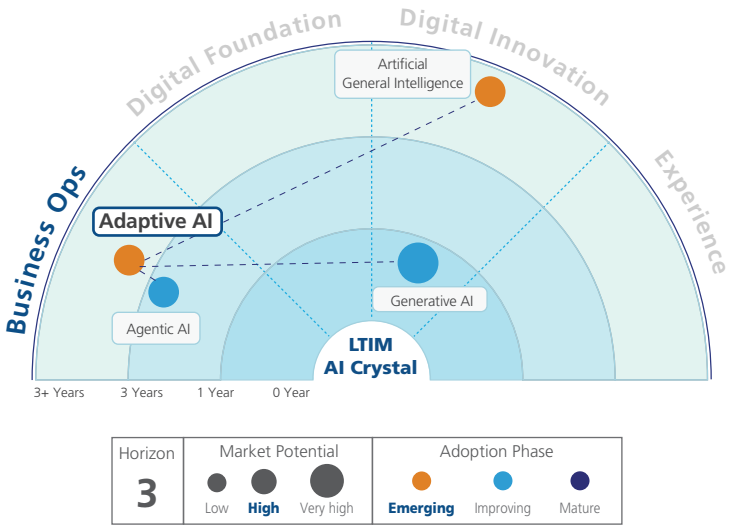
Adaptive AI

Adaptive AI operates on the principle of continuous learning and enhances performance as time progresses. It is the right mix of machine learning (ML), agent-based modeling, evolutionary algorithms, neural networks, and reinforcement learning. Adaptive AI is continuously fed new data to provide more accurate insights as output.

Highlights

Adaptive AI can independently learn and significantly alter its programming. It synthesizes processes to provide personalized experiences and user engagement. It is best to implement adaptive AI in a complex situation since it is not trained on historical or static data. Instead, it uses techniques like neural architecture search, transfer learning, etc. Traditional AI systems were designed with fixed inputs, such as responses and instructions, while adaptive AI can respond and accommodate an endless stream of data.

Radar View & Related Technologies



Industry Use Cases

Healthcare

- Predicting disease progression
- Improved diagnostic accuracy using medical images

Retail & Consumer Packaged Goods

- Optimized market pricing
- Adaptive customer engagements

Manufacturing

- Production line optimization
- Real-time data adaptation to minimize downtime

Energy & Utilities

- Demand fluctuation prediction
- Distributed energy resources management

Key Takeaway

Traditional AI relies on fixed inputs, but adaptive AI dynamically adjusts its parameters, delivering superior results.

SUB-SEGMENT

Platform Operations

This sub-segment discusses how AI modernizes the management and optimization of digital platforms for efficient and reliable operations. It emphasizes the role of AI in automating infrastructure, improving scalability, ensuring seamless service delivery, and fostering innovation in platform management.

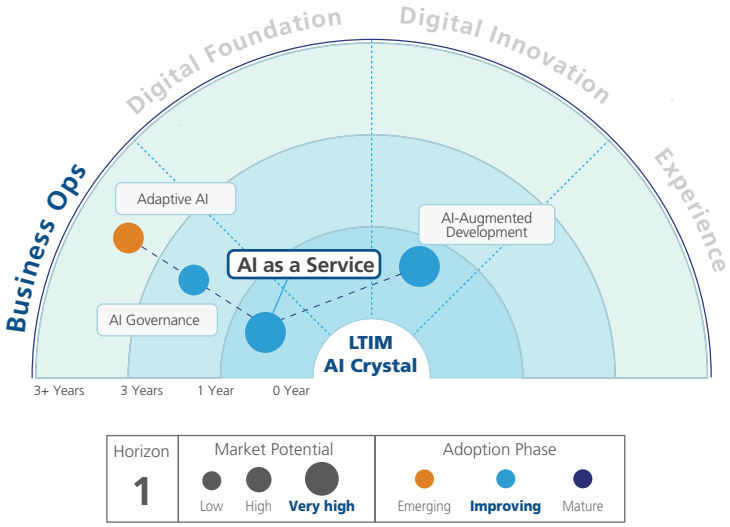
AI as a Service

Artificial Intelligence as a Service (AIaaS) uses external providers to outsource AI capabilities. It allows businesses to leverage low-cost AI services to incorporate AI-powered solutions, tools, etc., in their enterprises. It enables them to validate AI for various goals without making significant investments and mitigating risks.

Highlights

AI as a Service (AIaaS) allows enterprises to use AI technology without requiring upfront expenditures, assuring affordability and accessibility. The service is becoming popular in various industries, with merchants using chatbots in several operations. They utilize it to forecast demand, tailor shopping experiences, manage inventories, provide customer service, improve operations, and increase consumer happiness.

Radar View & Related Technologies



Industry Use Cases

Communication Media Entertainment

- Audience analytics
- More efficient content creation

Retail & Consumer Packaged Goods

- Real-time recommendations based on customer behavior
- Optimized inventory levels

Manufacturing

- Zero defect quality control
- Design prototyping for reduced time-to-market

Insurance

- Faster claim settlement process
- Underwriting for the best possible premium calculation

Key Takeaway

Addressing privacy and security issues head-on will enable AI as a service to advance the next stage of accessible and innovative AI solutions.

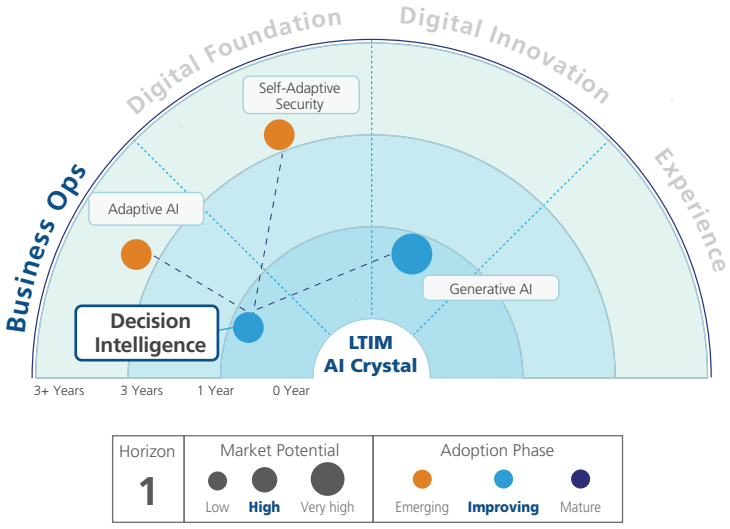
Decision Intelligence

Decision intelligence enables businesses to make informed and effective choices by analyzing data and available information. It identifies patterns by leveraging analytical techniques such as predictive analytics and collaborative tools. Increased Large Language Model's (LLM) integration with AI has transformed Natural Language Processing (NLP) significantly. It leads to a streamlined process and a more efficient strategic decision-making approach.

Highlights

Organizations today have a lot of staggered data; however, they struggle to turn it into insights. By leveraging decision intelligence, organizations can comprehensively view all the data, automate time-consuming processes, and ensure collaborative and seamless information sharing. Technological advancement in Large Language Model's (LLMs) has significantly improved decision-making capabilities, user experience, and language generation across domains. The technology is poised to address the intricate "last mile of analytics challenge."

Radar View & Related Technologies



Industry Use Cases

BFS

- Autonomous investment portfolios
- Personalized wealth management

Retail & Consumer Packaged Goods

- Optimized market pricing
- Adaptive customer engagements

Life Sciences

- Genetic risk profiling
- Intelligent drug repurposing

Energy & Utilities

- Grid resiliency optimization
- Advanced gas leak detection

Key Takeaway

AI-assisted decision intelligence can accelerate quality decision-making, with sophisticated AI, ML, and LLMs solidifying their influence across industries.

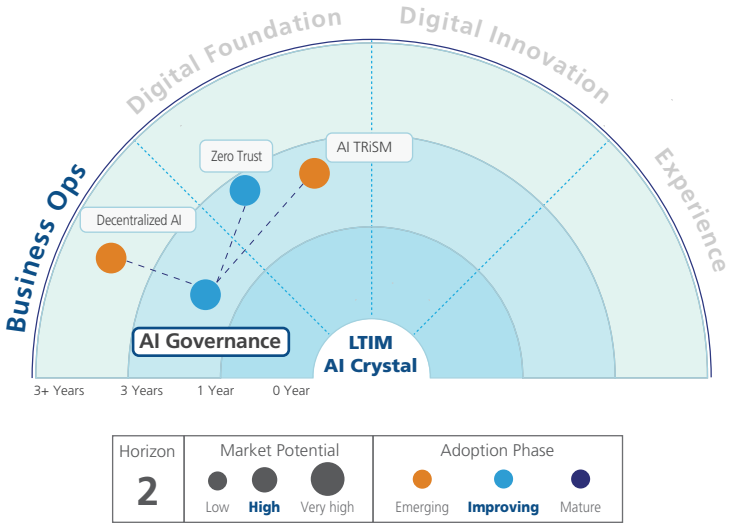
AI Governance

Artificial Intelligence (AI) governance refers to creating guidelines, policies, laws, and regulations to ensure the safety, ethics, and fairness of AI tools and systems. It directs research, development, and applications to uphold human rights. Once optimally implemented, it becomes desirable and essential for effective and responsible AI.

Highlights

Presently, AI is being integrated across industries and government organizations. With increased integration comes the heightened risks of negative high-profile impacts. AI governance is closely linked to responsible AI principles and helps manage an organization's risk tolerance. Implementing AI governance brings many benefits, such as fostering trust and social acceptance of systems and effective use of the technology. Some of the most widely used AI governance frameworks are the European Commission's Ethics Guidelines for Trustworthy AI and the National Institute of Standards and Technology (NIST) AI Risk Management Framework.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Automated assessment, identification, and remediation of governance risks
- Proactive compliance management to AI laws and regulations
- Large Language Model (LLM) vulnerabilities scanning and auto fixing/healing

Key Takeaway

AI's potential is limitless, but only with human-centric governance. Organizations must clearly define AI outcomes to harness its power responsibly.

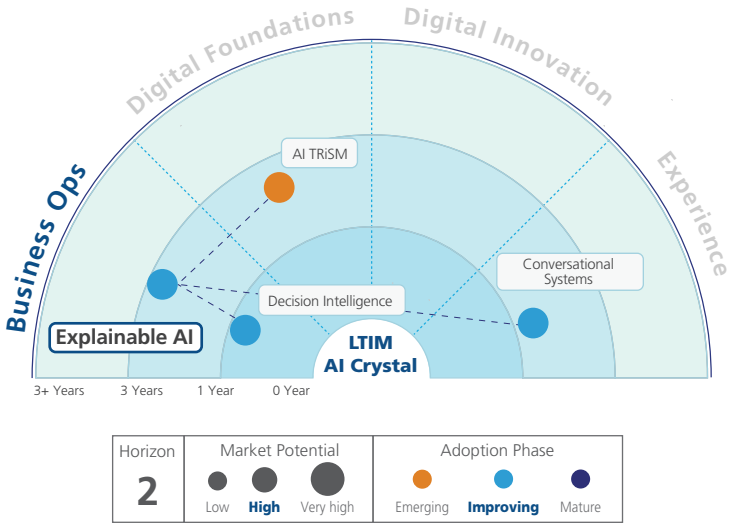
Explainable AI

Explainable AI (XAI) is an approach to developing AI systems designed to be transparent and understandable to humans. XAI aims to create AI systems that can clarify their decision-making processes and provide transparent, easily understandable rationales for the decisions they generate.

Highlights

XAI helps users comprehensively understand the decision taken and the reasoning behind it. It can explain Machine learning (ML) algorithms, deep learning, and neural networks. It primarily focuses on prediction accuracy, traceability, and decision understanding to arrive at decisions and build trust in AI mechanisms. XAI enhances the precision and efficiency of AI systems and contributes to their improvement. Through explaining decisions, AI systems can undergo more accessible audits and testing, facilitating the identification and correction of errors and biases within the system.

Radar View & Related Technologies



Industry Use Cases

BFS

- Automated credit score explanation
- Regulations and compliance explanation

Retail & Consumer Packaged Goods

- Customer support chatbots
- Demand pattern analysis

Manufacturing

- Root cause analysis of equipment failure
- Sustainable design assessment

Life Sciences

- Clinical trial analysis
- Genomic research insights

Key Takeaway

XAI enhances trust and confidence in AI systems by improving transparency and interpretability, leading to broader adoption across industries.

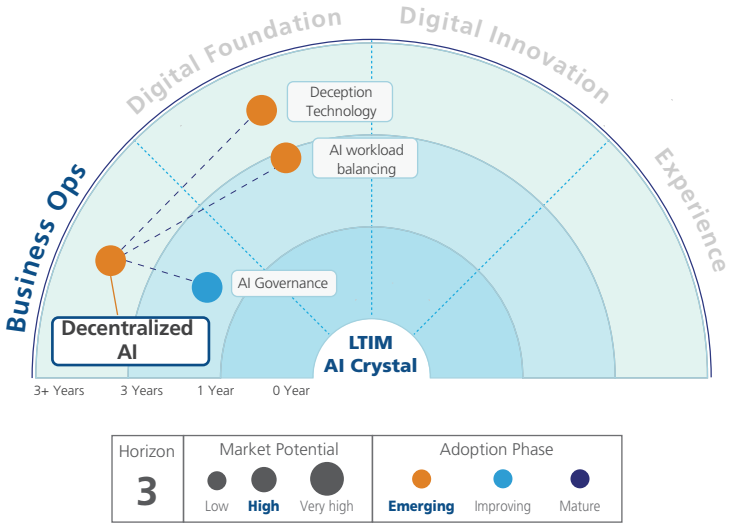
Decentralized AI

Decentralized Artificial Intelligence (DAI) focuses on distributing intelligence across a network of nodes. In DAI systems, decision-making is decentralized, relying on consensus from multiple nodes instead of a central authority. Leveraging decentralized networks, DAI aims to create robust, scalable, and collaborative AI solutions for diverse applications.

Highlights

Decentralized AI promotes resilience, privacy, and transparency in AI systems. The blockchain-based DAI ensures secure transactions and data integrity. It provides transparent and auditable records of AI decisions, thus fostering trust. Alignment in decentralized AI is an ongoing process, requiring vigilance, collaboration, and adaptability to ensure AI systems serve human values effectively. Developers can collaborate on shared code bases, coordinate among decentralized teams to build Machine Learning (ML) models that learn from each other over time, contribute to model training, and collectively improve AI systems.

Radar View & Related Technologies



Industry Use Cases

BFS

- Distributed ledger for transactions
- Decentralized credit scoring

Communication Media Entertainment

- Content verification
- Copyrights management

Manufacturing

- Distributed production systems
- Smart contracts for supply chains

Energy & Utilities

- Demand fluctuation prediction
- Distributed energy resources management

Key Takeaway

Web 3.0 and AI are converging to create a fairer-decentralized AI ecosystem with robust mechanisms to track and incentivize data contributors.

SEGMENT

Digital Foundation

Cloud, infrastructure, and security are the pillars of a successful digital foundation. Extreme digitalization rates have transformed enterprises' expectations of delivering more service-focused, secure, and agile transformative services. AI technology trends for digital foundations will augment the provision of reliable, secure, and efficient digital infrastructure, leading to safe and efficient digital systems.

SUB-SEGMENT

Cloud & Infrastructure

This sub-segment explores the key technological trends that form the backbone of today's IT environments. It emphasizes how cloud and cutting-edge infrastructure solutions create a foundation for scalable, adaptable, and secure businesses. It also investigates the cloud and infrastructure technologies enabled by AI, which are crucial for fostering innovation and ensuring robust, efficient systems in the current digital era.

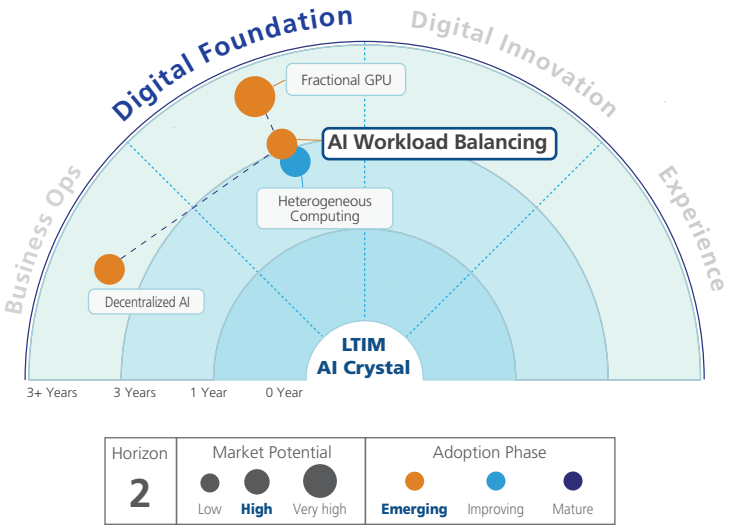
AI Workload Balancing

AI workload balancing optimizes tasks and processes in AI systems, from data processing and model training to real-time inference and decision-making. It supports all stages of the AI lifecycle across enterprises and different technology stacks, ensuring efficient and effective AI operations.

Highlights

According to an OpenAI paper, the computing required for major AI training projects has increased over 300,000 times in recent years. Digital transformation, application development, edge computing, and emerging AI capabilities necessitate balancing computations between private data centers and rented infrastructure. It pressures Chief Information Officers (CIOs) to manage IT operations cost-effectively. AI workload balancing enables organizations to optimize training infrastructure, avoiding data throttles that could slow model development.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Micro data centers for remote places
- On-premises AI computation
- Real-time processing of sensor data
- Optimization of computational workloads in Research and Development (R&D)

Key Takeaway

Balancing AI workload optimizes performance and scalability, ensuring efficient allocation of the available computational resources.

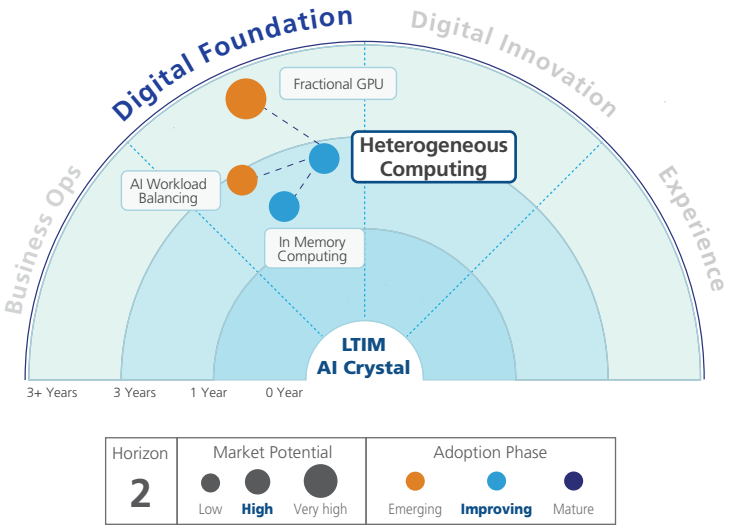
Heterogeneous Computing

Heterogeneous computing refers to a system that uses various computing cores, like Central Processing Units (CPUs), Graphics Processing Unit (GPUs), Application-Specific Integrated Circuits (ASICs), Field-Programmable Gate Arrays (FPGAs), and Neural Processing Units (NPUs), and processors based on diverse computer architectures.

Highlights

Heterogeneous computing enhances performance by parallel processing diverse tasks, such as advanced calculation and image processing. Parallel processing is done using specialized equipment rather than increasing sheer processing capabilities. Heterogeneous computing is crucial in developing AI and Machine Learning (ML) workloads, where large volumes of data must be processed and converted for a seamless user experience. Heterogeneous systems have a long way to go, as the current computing systems are still transitioning from sequential processing to parallel processing of tasks.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Enhanced system performance
- Reduced energy consumption
- Low-latency delivery of live events and interactive content
- Efficient virtualized network function orchestration

Key Takeaway

To maximize the computational power of AI systems and overcome device management challenges, advancements in heterogenous computing are crucial.

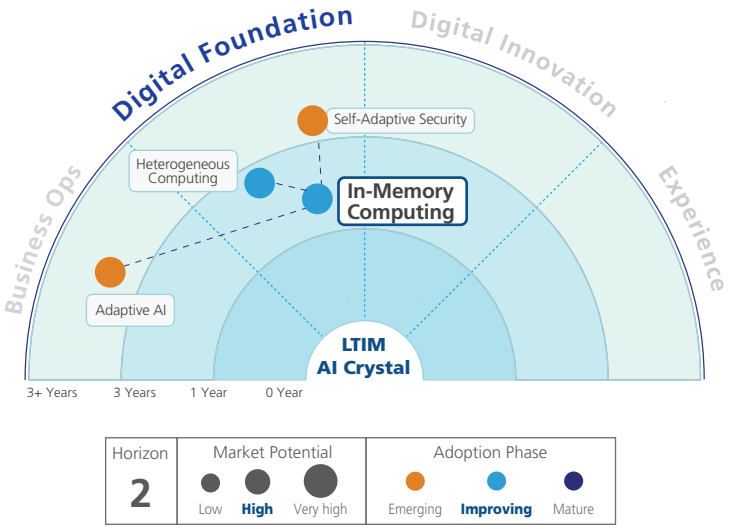
In-Memory Computing

In-Memory Computing (IMC) is a computational paradigm where data is processed directly in memory, optimizing performance per watt for AI algorithms. It is gaining traction in semiconductor startups and industry leaders for System-on-Chip (SoC) designs, aiming to disrupt the industry with enhanced efficiency and speed.

Highlights

IMC involves directly processing data in the memory rather than transferring data back and forth between the memory and the Central Processing Unit (CPU). The data is stored in the server Random Access memory (RAM), enabling faster processing and real-time analytics. However, optimization challenges remain due to data volume, query complexity, resource management, and cost. AI can address these challenges with IMC as its key enabler by providing predictive analytics, automated resource management, query optimization, anomaly detection, and adaptive systems. For AI, it offers high-speed data access and processing capabilities.

Radar View & Related Technologies



Domain Agnostic Use Cases

Modelling of weather data

Securities trade reporting for regulatory compliance

Traceability for anti-money laundering

Key Takeaway

The IMC market is growing at a significant rate, driven by applications in financial trading, personalized treatment, and real-time analytics.

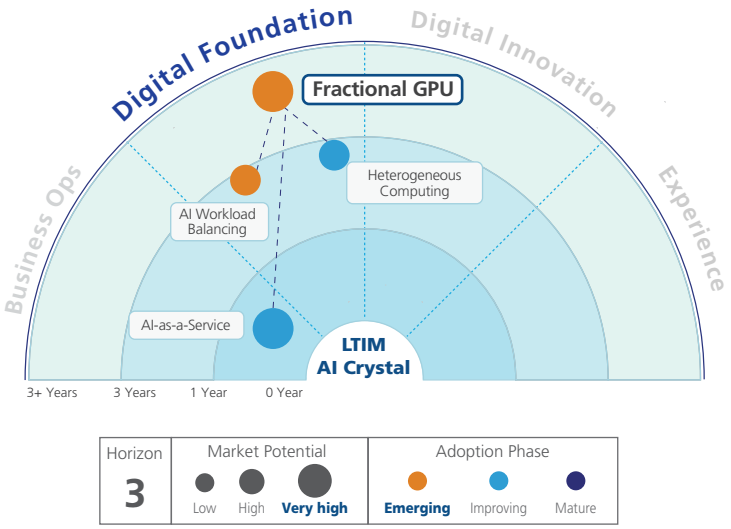
Fractional GPU

Fractional Graphics Processing Unit (FGPU) is a software-driven mechanism for partitioning a GPU's computing and memory resources. It allows multiple applications to run in parallel with solid performance isolation from each other. Advancements in AI can enable GPUs to split a single processing unit into smaller parts, ensuring that each partition operates independently.

Highlights

Effective resource management becomes crucial as the demand for GPU resources grows in today's AI era. It ensures optimal performance and efficient allocation of valuable resources. FGPUs are essential for optimizing GPU utilization, allowing users to right-size their GPU workloads. FGPUs provide more robust isolation than traditional multi-process service (MPS) mechanisms and static memory allocation. It is vital for running multiple AI tasks concurrently without interference. This approach enables better utilization of GPU resources, reducing costs and increasing GPU utilization.

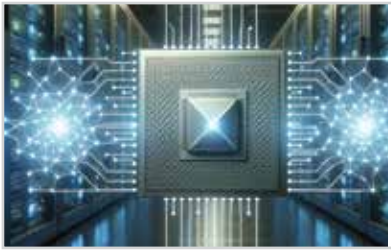
Radar View & Related Technologies



Domain Agnostic Use Cases

- Dynamic GPU partitioning for scalable access
- Workload isolation
- Usage-based billing models
- Resource scheduling

Key Takeaway



Fractional GPU capabilities offers granular control over the allocation of compute resources, enabling enterprises to enhance the efficiency of their GPU clusters.

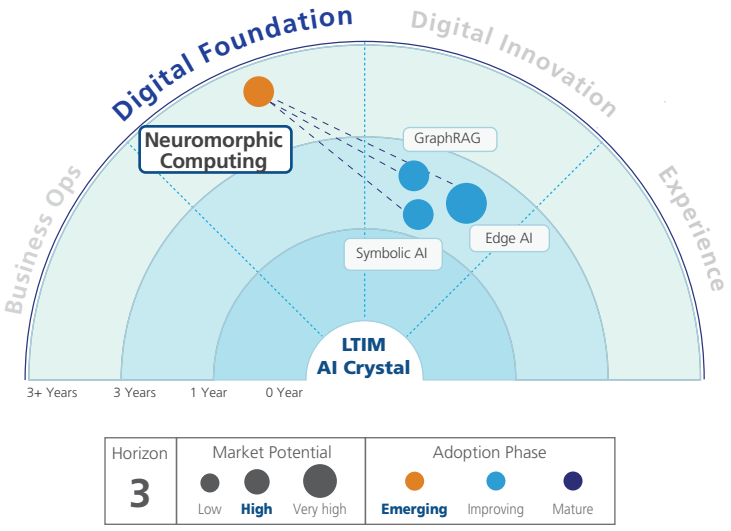
Neuromorphic Computing

Neuromorphic computing aims to improve AI by emulating neural connections and cognitive processes. It offers faster computations, energy efficiency, and applications in robotics, image processing, and natural language understanding.

Highlights

Neuromorphic computing transforms AI, enhancing its adaptive intelligence. Although commercial adoption is gaining traction slowly, there is high anticipation for progress with neuromorphic chips. These chips bridge lab experiments and real-world applications, optimizing edge devices across industries. Gartner[2] predicts a significant market impact as AI's global contribution approaches USD 15.7 trillion by 2030. From generative AI to advanced graph algorithms, neuromorphic chips shape the next wave of intelligent applications, especially in the healthcare, finance, and automotive sectors.

Radar View & Related Technologies



Industry Use Cases

BFS

- Touchless banking kiosks
- High-frequency trading

Healthcare

- Pattern recognition in diagnostics
- Real-time monitoring of patient vitals

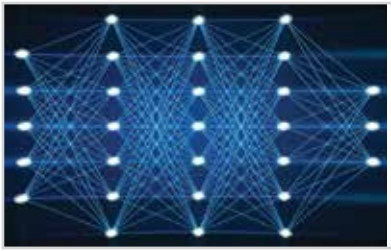
Manufacturing

- Real-time decisions for autonomous vehicles
- Efficient robotics control

Insurance

- Parametric insurance claims processing
- Video-based claims processing

Key Takeaway



With brain-inspired designs that enhance real-time processing and adaptability, neuromorphic computing will drive advancements in robotics and IoT.

SUB-SEGMENT

Security

In today's highly interconnected environment, security is paramount to protecting digital assets. This sub-segment delves into the latest developments in cybersecurity, such as AI-enhanced threat detection, advanced encryption methods, and proactive defense mechanisms. These technologies are essential for securing data, systems, and networks and guarding them against adaptive cyber threats. They also maintain the reliability and trustworthiness of AI-based solutions.

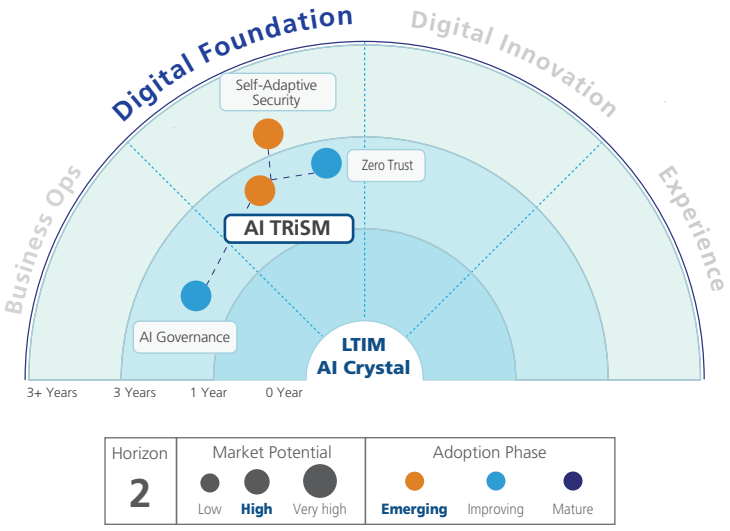
AI TRiSM

AI Trust, Risk, and Security Management (AI TRiSM) by Gartner[3] governs AI models, addressing security, privacy, and risk concerns. It ensures compliance, fairness, reliability, and security through integrated governance, tackling challenges like model understanding, data confidentiality, constant monitoring, and regulatory compliance.

Highlights

AI TRiSM is a robust framework that steers responsible AI development and implementation. It prioritizes trust through model governance, employing decision trees and techniques like Local Interpretable Model-agnostic Explanations (LIME) & SHapley Additive exPlanations (SHAP) for transparency in AI decision-making. It promotes compliance with evolving AI regulations, benefiting organizations under General Data Protection Regulations (GDPR). AI TRiSM underscores the importance of legal expertise in navigating the changing legal landscape surrounding AI, interpreting complex regulations. Gartner[3] forecasts that by 2026, enterprises using AI TRiSM will boost decision accuracy by eliminating 80% of flawed data.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Mitigate risks of algorithmic bias
- Ensure data privacy compliance
- Maintain transparency in AI operations
- Personalize with responsibility

Key Takeaway

Trust, risk, and security management forms the foundation for the AI system adoption ensuring they are used responsibly and effectively.

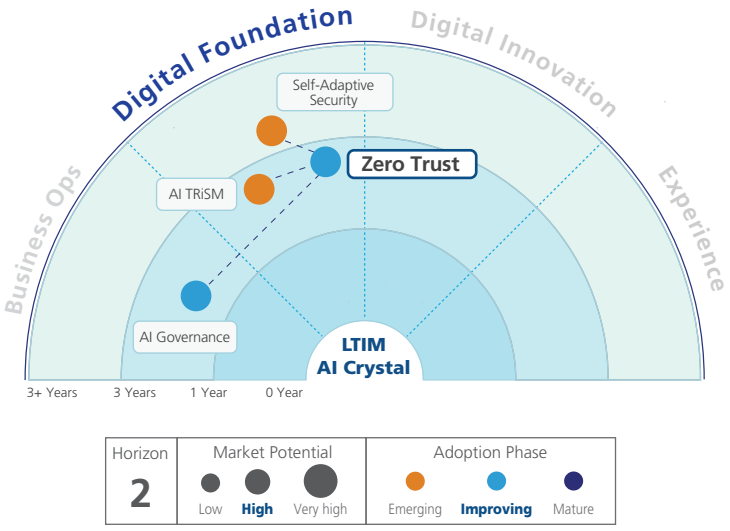
Zero Trust

Zero trust is a security framework for AI systems that scrutinizes all entities inside and outside the network. It verifies identities and enforces rigorous access controls to ensure data and system security, enhancing defense mechanisms against external and internal threats.

Highlights

Zero trust is crucial for enhancing security in AI systems by assuming no entity is inherently trustworthy. Large Language Model (LLMs) face cyber threats like adversarial attacks, data poisoning, privacy leaks, and impersonation, contributing to a 72% growth in cyberattacks. Zero trust mitigates these risks through continuous authentication, data integrity, segmentation, behavior monitoring, anomaly detection, and response mechanisms. Its integration into LLM management effective use, with critical infrastructure, banking, and healthcare applications facing challenges around data privacy and implementation complexity.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Hybrid and remote work enablement
- Phishing and credential protection
- Access controls to protect operational technology and data
- Continuous access monitoring to prevent data breaches

Key Takeaway

Zero trust bolsters AI security by mandating strict access controls and constant verification for a proactive defense mechanism against threats.

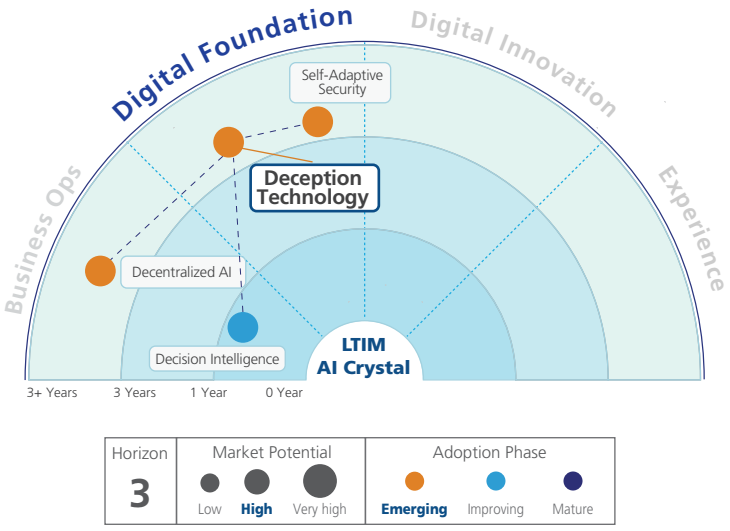
Deception Technology

Deception technology is a toolset designed to deceive and prevent hackers from inflicting significant damage once they have infiltrated a network. Deception technologies improve on traditional "honeypots" by being more dynamic and acting as more intelligent alert systems.

Highlights

Deception technology collaborates seamlessly with detection engineering. Generative AI might craft both deception components and corresponding detection protocols concurrently. The Massachusetts Institute of Technology Research and Engineering (MITRE) Adversarial Tactics, Techniques (ATT) framework is a globally accessible knowledge base based on real-world observations, adversary tactics, and techniques. Deception technology refers to this framework to align with MITRE Engage - a cyber-deception framework and community. The increasing threat of Advanced Persistent Threats (APTs) and zero-day attacks necessitate early detection solutions.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Synthetic scenario generation
- Interactive decoy systems
- Deceptive network nodes
- Monitor data integrity with deceptive data

Key Takeaway

The surge in customized-AI powered defences is catalyzing the adoption of ethical deception for System-on-Chip (SOCs).

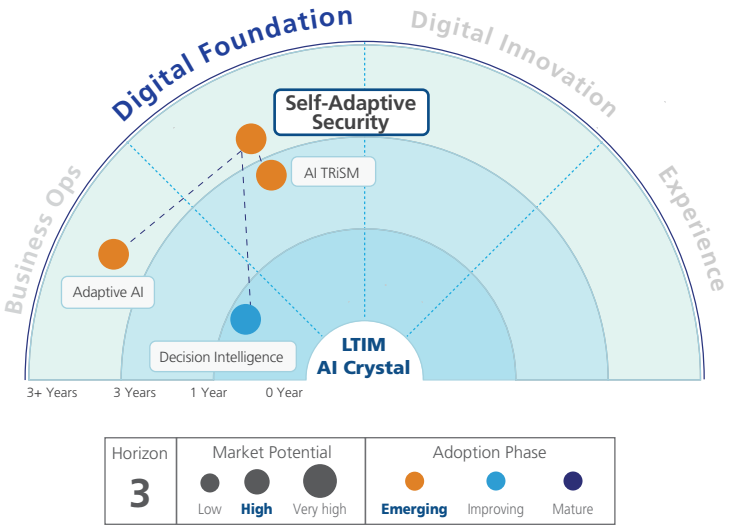
Self-Adaptive Security

Self-adaptive security is a dynamic framework that continuously adjusts itself in real time to protect an organization's infrastructure against advanced cyber threats. Integrating Machine Learning (ML), multi-factor authentication, biometrics, mobile security, and risk analytics establishes a feedback loop for threat identification, prevention, and response.

Highlights

The self-adaptive security market is witnessing increased demand due to persistent attacks from advanced threats like Advanced Persitent Threat (APTs) and zero-day malware. Self-adaptive security solutions leverage adaptation through self-learning. They enhance threat detection, incident response, and access controls, and integrating them with existing IT infrastructure is crucial for seamless implementation.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Advanced threat detection and response
- Secure customer service chatbots
- User behavior analytics
- Feedback loops for threat visibility, detection, and prevention

Key Takeaway

AI empowers businesses to create highly adaptive and personalized experiences that drive engagement, revenue, and long-lasting customer relationships.

SEGMENT

Digital Innovation

This segment explores how AI merges with modern engineering to design and enhance digital products and services. It shows how AI tools are revolutionizing traditional engineering through rapid prototyping, smart automation, and improved user experiences.

SUB-SEGMENT

Data & Analytics

This sub-segment delves into the core of AI technologies, showing how data is captured, processed, and analyzed to support informed decisions. It stresses the importance of big data, advanced analytics, and AI-driven insights in turning raw information into practical intelligence. By looking at the newest tools and methods, we highlight the crucial role of data in driving AI advancements and shaping future business strategies.

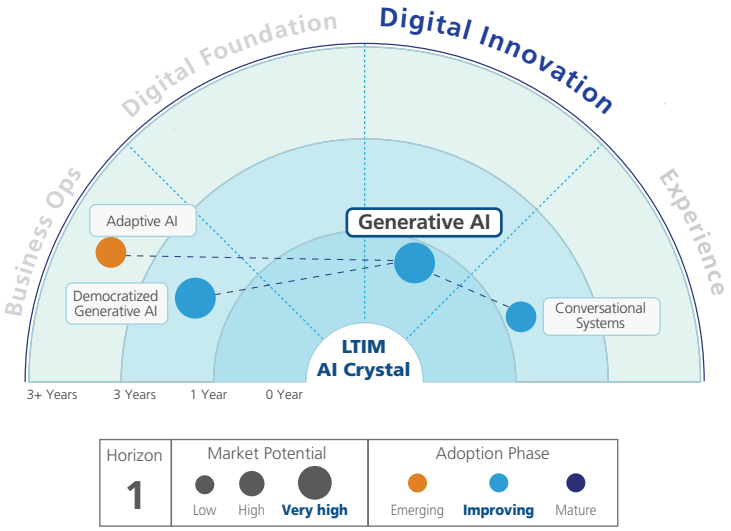
Generative AI

Generative AI, a subset of AI, creates digital images, videos, audio, text, or code using Large Language Model (LLMs). While training traditional AI for specific outputs, generative AI takes prompts as inputs. It independently learns digital representations from sample data to generate unique, realistic artifacts. This distinctive approach positions generative AI as a catalyst for rapid innovation in enterprises.

Highlights

Generative AI aims to amplify product development and content creation, enhance team productivity, and elevate customer experience. It is highly compatible with existing technologies such as big data, Internet Of things (IoT), cloud computing, etc., making its integration more effortless and extensively applied across many business areas. Once personalized, it can quickly provide strategic information for a competitive edge. Automation capabilities enable organizations to focus their resources and time on important strategic goals, resulting in lower costs and greater efficiency.

Radar View & Related Technologies



Industry Use Cases

BFS

- Personalized investment decisions generation
- Automated invoice generation

Communication Media Entertainment

- Content generation and transcription
- Multi-lingual translation

Life Sciences

- Detailed drug discovery documentation
- Complex image interpretation

Retail & Consumer Packaged Goods

- Personalized advertisement delivery
- Dynamic product pricing

Key Takeaway

Generative AI is acting as a catalyst for innovative content generation using data patterns, boosting revenue growth across various sectors.

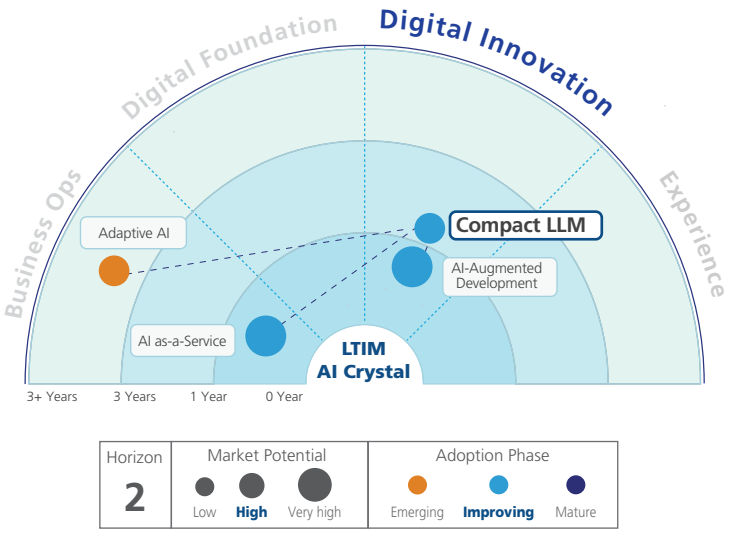
Compact LLM

Large Language Models (LLMs) are AI systems trained on extensive text datasets. This equips them to perform tasks such as generating text, summarizing documents, translating languages, and responding to queries effectively. Large Language Model (LLMs) with parameters under 100 million are considered compact LLMs.

Highlights

Compact LLMs offer inherent advantages such as improved efficiency, cost savings, and customizable options relative to larger models. Moreover, their reduced memory and storage needs make them ideal for integration with sensors and Internet of Things (IoT) devices. Due to their modest resource requirements, these models find application in edge computing, enabling them to operate offline on lower-power devices. Compact LLMs offer quicker iteration cycles, making them more practical for architecture modification and finetuning for end-task data.

Radar View & Related Technologies



Industry Use Cases

BFS

- Prevent leakage of sensitive individual information
- Customer service bots

Communication Media Entertainment

- Natural language generation for animations
- Dialogue models for gaming

Hi-Tech

- Collaboration without sharing sensitive data
- Data localization for enhanced data security

Retail & Consumer Packaged Goods

- Personalized advertisement delivery
- Dynamic product pricing

Key Takeaway

Compact LLMs make advanced capabilities accessible to organizations that are digitalizing and prioritizing narrow AI applications.

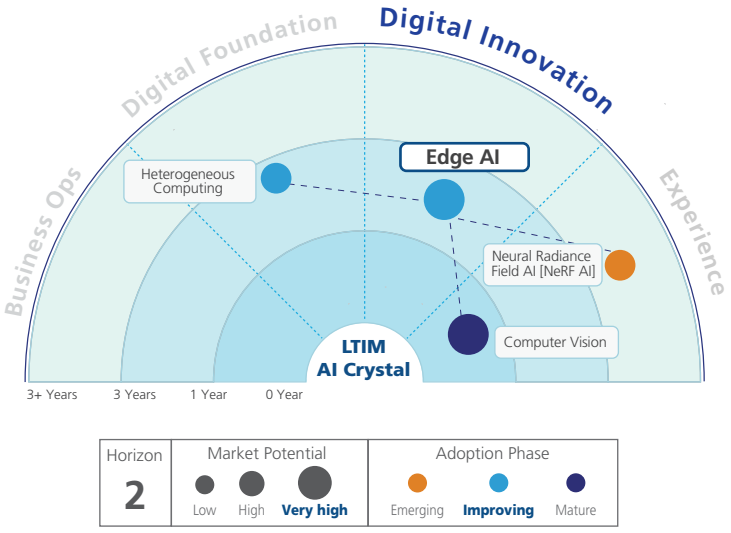
Edge AI

Edge AI uses edge computing to execute AI algorithms on local computing devices. Unlike cloud-based AI, Edge AI operates without constant connectivity, which enables real-time data processing on devices. AI algorithms in edge devices prevent network difficulties, speed up data aggregation, and serve consumers without external locations.

Highlights

Edge AI enables robots to monitor stores for stock-outs and spills, enhancing operational efficiency and safety. Leveraging 5G, it excels in autonomous driving and healthcare, utilizing high bandwidth and low latency for rapid data processing. Advanced Edge AI chips support complex models, driving video analytics and natural language processing applications. While enhancing productivity, widespread adoption requires stringent security measures. Companies must grasp edge AI's capabilities to effectively integrate multiple AI models commercially.

Radar View & Related Technologies



Industry Use Cases

BFS

- Real-time fraud detection
- Smart KYC and compliance

Public Sector

- Smart city sensor data for traffic management
- Integrated urban safety system

Manufacturing

- Worker health and safety monitoring
- Self-optimizing manufacturing systems

Energy and Utilities

- Intelligent water reservoir management system
- Mitigation of power plant carbon emissions locally

Key Takeaway

With the rise of Internet of Things (IoT), Edge AI's local data processing will reduce latency and bandwidth use, making it indispensable

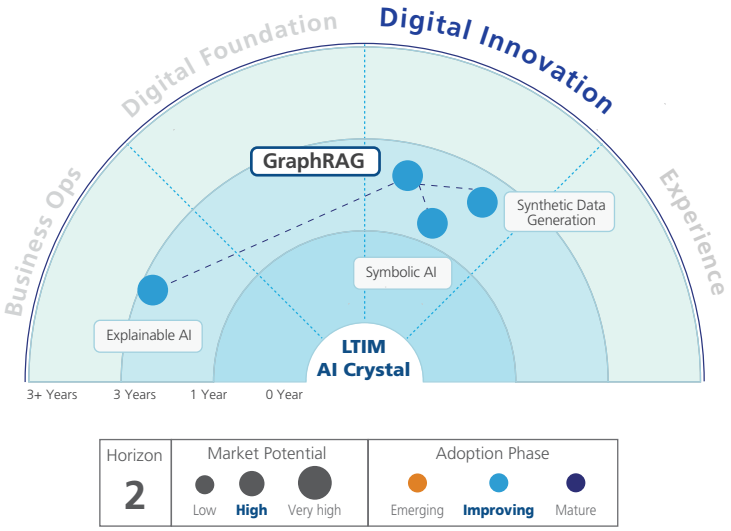
GraphRAG

GraphRAG or Graphs + Retrieval Augmented Generation utilizes large language models (LLMs) to automate the creation of detailed knowledge graphs from text documents. These graphs serve as semantic data indexes, capturing the structure and relationships within the data without requiring extensive manual intervention.

Highlights

GraphRAG plays a crucial role in enterprise AI adoption by automating the creation of knowledge graphs from text data. Semantic analysis ensures accurate representation and context, highlighting relationships and connections within the data. It offers hierarchical summaries by identifying interconnected nodes, providing insights into themes and topics without requiring predefined questions. This improves the understanding and accessibility of complex datasets. GraphRAGs will be pivotal in enhancing data observability and understanding within Large Language Model (LLMs).

Radar View & Related Technologies



Industry Use Cases

Healthcare

- Management of complex healthcare data
- Universal patient record system

Retail & Consumer Packaged Goods

- Analyze customer feedback and ratings
- Continuous tuning of data for business operations

Communication Media Entertainment

- Identify emerging social media trends
- Provide personalized recommendations

Hi-Tech

- Enterprise data fabric creation
- Search Engine Optimization

Key Takeaway

GraphRAG empowers data-driven foundation for enterprises by automating knowledge graph creation, summarizing data, and improving information retrieval.

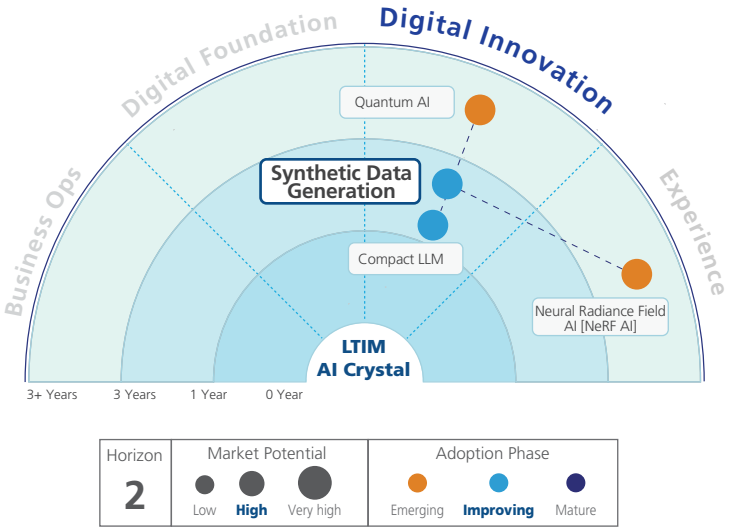
Synthetic Data Generation

Synthetic data generation is artificial data generation that mimics real-world data to train Machine learning (ML) models. It allows companies to test and enhance algorithms while protecting sensitive data.

Highlights

The demand for scalable and diverse datasets for ML model training and privacy and security in data management drives the growth of synthetic data generation using AI. Synthetic data production requires reliable real-world data to match. The biggest challenge with synthetic data is its production from real-world data. It requires ensuring that synthetic data matches genuine data patterns and properties while protecting privacy and security.

Radar View & Related Technologies



Industry Use Cases

Healthcare

- Privacy-preserving research using synthetic patient data
- Patient response modeling

BFS

- Anti-money laundering testing using synthetic customer records
- Stress-testing of financial models

Manufacturing

- Identify emerging social media trends
- Provide personalized recommendations

Public Sector

- Impact analysis of new policy and regulations
- Climate change modelling

Key Takeaway

Generating synthetic data using AI will unlock critical AI solutions dependent on delivery of diverse and privacy-compliant data

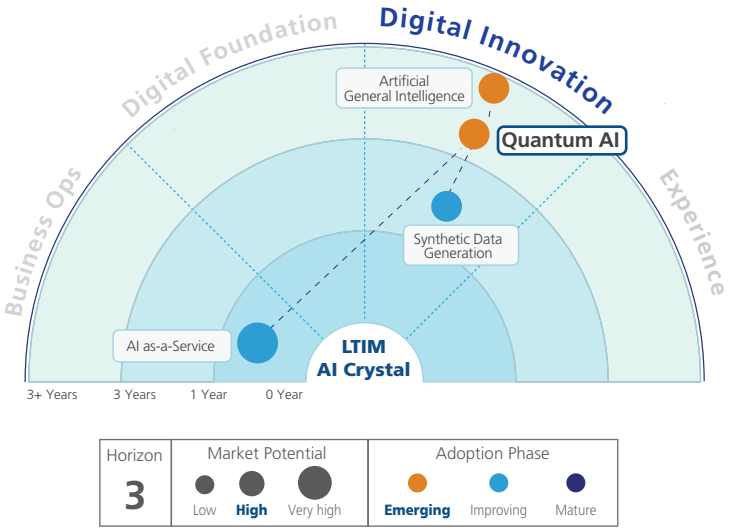
Quantum AI

Quantum AI utilizes quantum mechanics properties, such as superposition and entanglement, for parallel processing. It significantly enhances AI capabilities and offers exponential speed for tasks like data tuning, database searching, and large number factoring, which is crucial for advancing AI applications.

Highlights

Quantum AI algorithms offer faster training and lower energy consumption compared to classical computers, addressing the rising energy demands of Artificial Intelligence and Machine Learning (AI and ML) training. Quantum AI can accelerate the training of large language models, which is crucial for solving complex business problems. The field's growth is evidenced by a recent 14% Compound Annual Growth rate (CAGR) increase in patent filings, indicating its broad impact across industries. Quantum AI also advances material science, enhancing medicine discovery and infrastructure development through accurate material property identification.

Radar View & Related Technologies



Industry Use Cases

Healthcare

- Whole genome sequencing and analytics
- High-precision molecular interaction simulation

BFS

- Real-time derivatives pricing
- Portfolio optimization

Manufacturing

- New material development
- Manufacturing process optimization

Public Sector

- Weather forecasting
- Environmental planning

Key Takeaway

Harnessing quantum parallelism to unlock unprecedented computational power, allows AI algorithms to tackle complex problems with incredible speed and accuracy.

SUB-SEGMENT

Digital Engineering

This sub-segment explores how AI merges with modern engineering to design and enhance digital products and services. It shows how AI tools revolutionize traditional engineering through rapid prototyping, intelligent automation, and improved user experiences.

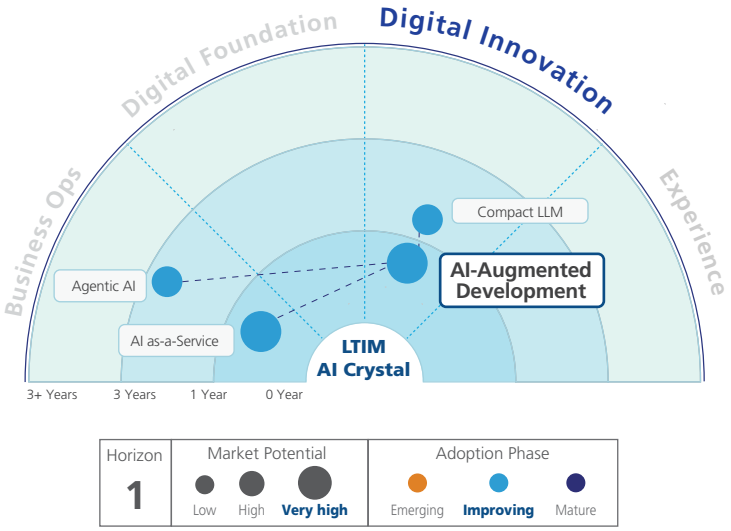
AI-Augmented Development

AI-augmented development enhances end-to-end software development by performing repetitive tasks, improving code quality, and providing real-time feedback. It leads to faster and more efficient software creation, maintenance, and sustenance, which benefits various projects.

Highlights

AI-augmented development has the potential to transform software development. By 2028, Gartner[4] predicts, 75% of enterprise software engineers will use AI coding assistants. AI tools drive this trend to help engineers focus on high-level tasks like application design while streamlining code production and legacy code translation. Some examples include AI-powered agile platforms, bot-assisted development, and auto-healing systems to enhance productivity. However, risks include copyright violations and over-reliance on AI, potentially stifling human innovation.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Natural language interfaces for development
- Tuning Large Language Model (LLMs) for prompt-assisted development
- Pair programming, automated code review
- Integration of no-code tools with development tools
- Comprehensive documentation creation

Key Takeaway

Adopting AI powered coding assistants, no-code development tools, prompt-based algorithms, and intensive code snippet generation improves the productivity of citizen developers.

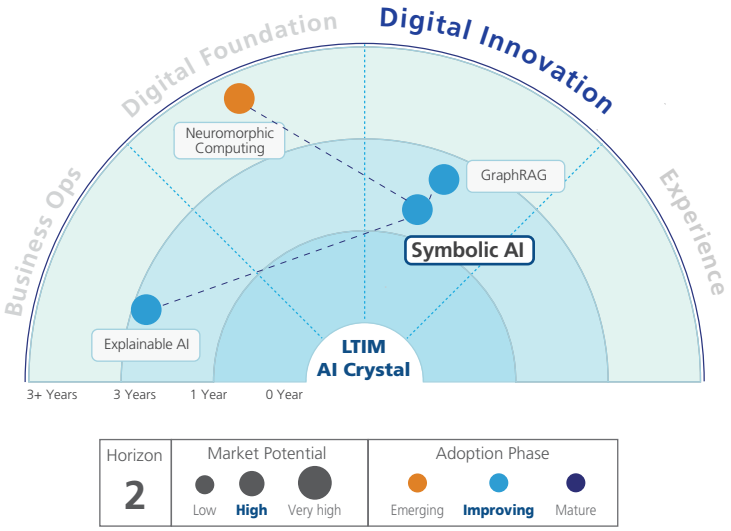
Symbolic AI

Symbolic AI is an AI subfield that manipulates symbols and concepts, emphasizing symbolic reasoning, knowledge representation, and rule-based problem-solving. Natural language processing uses symbolic AI for expert systems and robotics applications.

Highlights

Symbolic AI has played a pivotal role in developing expert systems and significantly contributed to knowledge engineering, natural language understanding, and cognitive science. Its primary features include symbolic representation and rule-based inference, which enhances transparency and interpretability. Symbolic AI facilitates straightforward reasoning and manipulation by translating complex data into structured, formal representations. Moreover, symbolic AI often integrates with evolutionary algorithms and neural networks to enhance efficiency and capabilities.

Radar View & Related Technologies



Industry Use Cases

BFS

- Decode investment strategies
- Risk assessments for loan sanctioning

Healthcare

- Recommendations based on patient symptoms
- Create virtual biopharmaceutical models

Manufacturing

- Quality inspection
- Streamline workflows & resource allocation

Insurance

- Assess policy risk and make informed decisions
- Regulatory framework management

Key Takeaway

Integrating symbolic AI with neural networks is a new concept, paving the way for advanced neuro-symbolic AI.

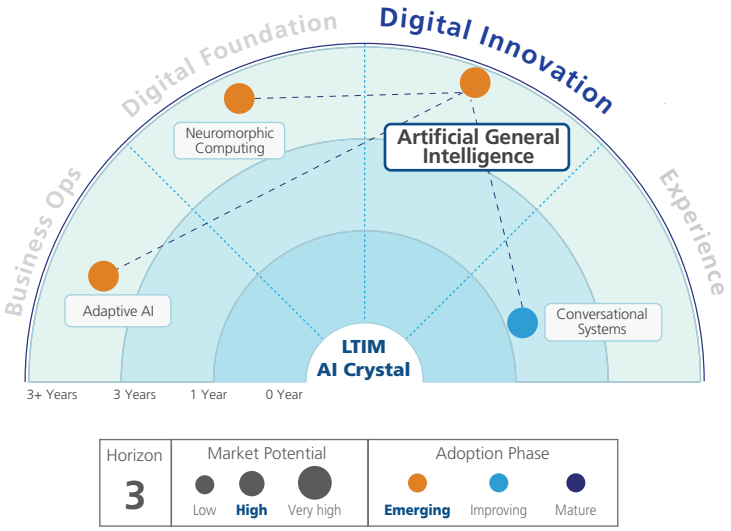
Artificial General Intelligence

Artificial General Intelligence (AGI) is a conceptual AI system with capabilities that match those of humans. Artificial General Intelligence (AGI), also known as strong AI, is purely theoretical at this stage. The system's ability to access and process massive data sets at incredible speeds makes its broad intellectual capacities exceed human capacities.

Highlights

Artificial Intelligence has grown into a formidable technology in recent years. AGI will possess additional cognitive and emotional abilities like empathy that are indistinguishable from humans. The pursuit of AGI involves interdisciplinary collaboration among fields such as computer science, neuroscience, and cognitive psychology. Advancements in these areas are continuously shaping the understanding and development of AGI.

Radar View & Related Technologies



Domain Agnostic Use Cases

BFS

- Real-time regulatory compliance
- Advanced fraud detection

Communication Media Entertainment

- Interactive storytelling
- Fully autonomous content creation

Healthcare

- Diagnosis of life-threatening diseases
- Personalized health care assistant

Energy and Utilities

- Disaster response and recovery
- Smart infrastructure management

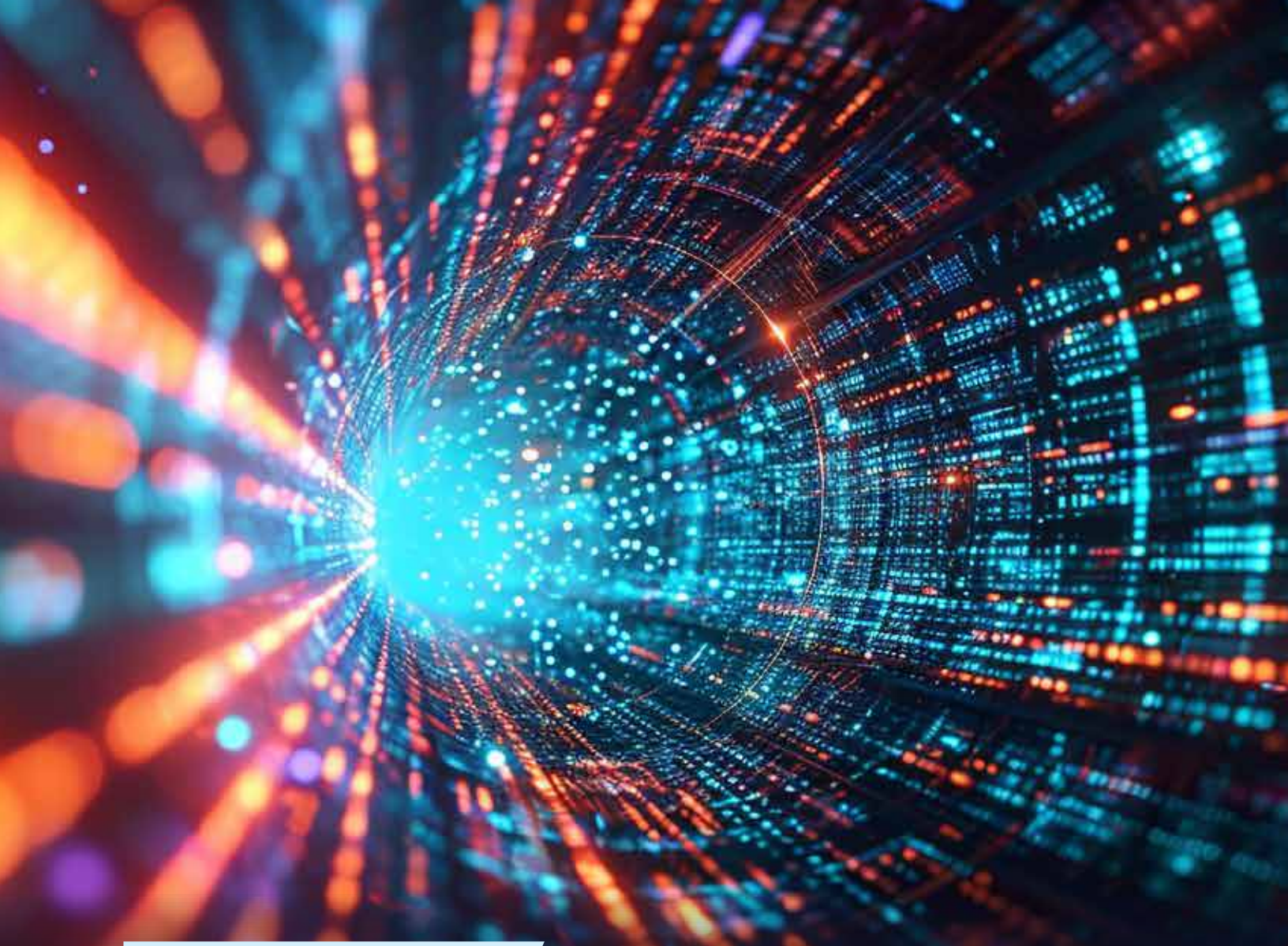
Key Takeaway

AGI is still a theory, but grasping its implications prepares us for a future with machines exceeding human-level intelligence.

SEGMENT

Experience

Customer experience is at the core of any relationship with end users, clients, partners, employees, or prospects. In this segment, we explore how leveraging new-age AI technologies such as computer vision and conversational and generative AI will allow us to transform and adapt to the ever-changing needs of the primary stakeholders.



SUB-SEGMENT

Interactive

This sub-segment delves into the progression of human-computer interaction through AI-powered advancements. This area explores how emerging technologies such as virtual and augmented reality, natural language processing, and conversational AI transform user interactions with digital platforms. Our examination of these developments underscores the increasing significance of crafting immersive, intuitive, and responsive experiences that boost user engagement and satisfaction in a digitally evolving landscape.

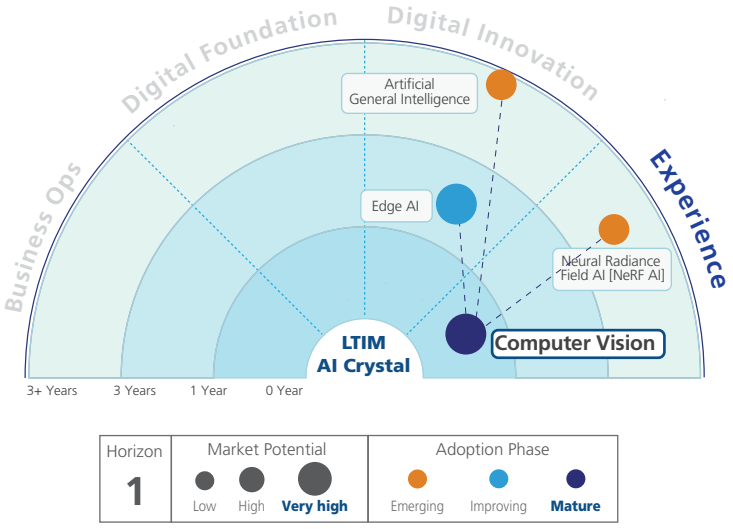
Computer Vision

Computer vision is a branch of AI that enables computers to extract information from videos, digital images, and other visual inputs akin to human perception. It encompasses object identification, image processing, tracking, and understanding visual content.

Highlights

Computer vision's shift to deep learning, notably with Convolutional Neural Networks (CNNs), is transformative. Residual Network with 50 layers (ResNet-50,) using innovative residual blocks, enhances accuracy in image classification. You Only Look Once (YOLO) sets a benchmark for real-time object detection and stable diffusion. V2 advances image generation with text-to-image models and super-resolution upscaling. Vision transformers redefine image processing, offering enhanced accuracy, adaptability, and scalability. The increasing adoption of computer vision algorithms in big tech firms highlights its growing significance, fostering immersive experiences.

Radar View & Related Technologies



Industry Use Cases

BFS

- Data extraction from trade documents
- Identity management via biometrics

Manufacturing

- Identifying macro and micro defects
- Monitoring equipment health

Life Sciences

- Analysis of Computed Tomography (CT) scans and MRI
- Analysis of pathological conditions

Public Sector

- Traffic management and surveillance
- Environmental impact analysis

Key Takeaway

To excel in real-time computer vision, enterprises must cultivate an integrated approach that harmonizes cloud and edge computing resources.

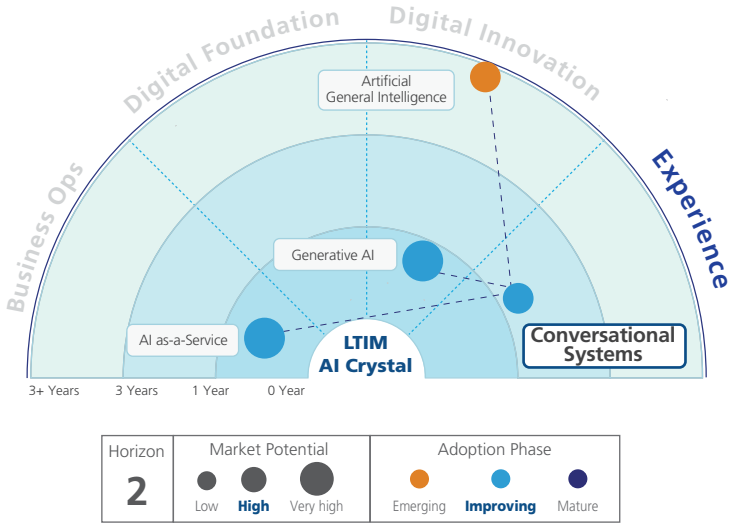
Conversational Systems

Conversational systems are smart technologies that can communicate with humans through text and speech. They automate consumer interactions in multiple languages through text and voice queries. Company conversational systems improve consumer interactions and personalize products using consumer segmentation data. However, this technology can only understand limited emotions and tone.

Highlights

Incorporating conversational system technology is crucial for enhancing user engagement on digital platforms. It improves interaction between humans and machines, benefiting sectors like customer service, healthcare, and education. As technology evolves, conversational systems become pivotal in enhancing user satisfaction, accessibility, and efficiency in task performance. Advanced language models such as GPT-4 enable the creation of natural and compelling conversational systems that can manage multiple languages, facilitating the development of international systems.

Radar View & Related Technologies



Domain Agnostic Use Cases

- Intelligent customer support
- Universal personal assistant
- Multi-lingual communication bridge
- Collaborative project manager

Key Takeaway

Conversational systems will redefine human interactions, improving language comprehension and integrating seamlessly into business operations.

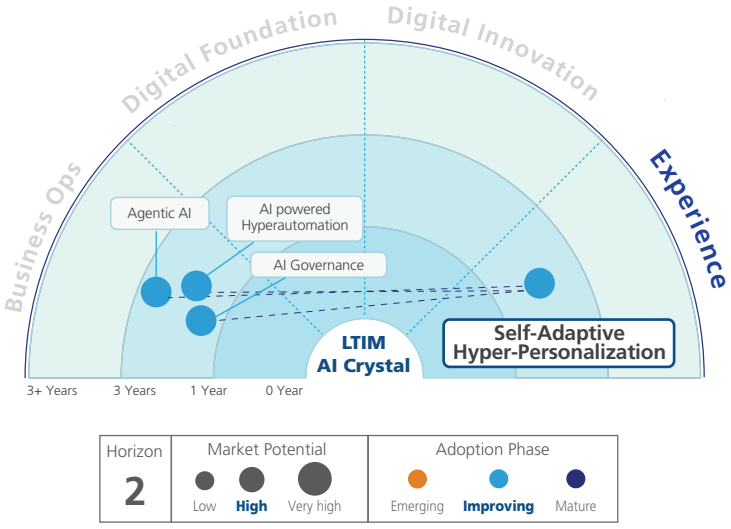
Self-Adaptive Hyper-Personalization

Self-adaptive hyper-personalization is an advanced approach that tailors experiences to individual users by dynamically adjusting content, functionality, and interactions. The approach is based on real-time data and evolving behaviors. Unlike traditional personalization, which relies on predefined options, self-adaptive hyper-personalization continuously adapts to each user's unique context and preferences.

Highlights

Self-adaptive hyper-personalization drives engagement, loyalty, and business success by putting the user at the center of the experience. It relies on real-time data to learn about user behaviors and trends businesses can use to refine strategies, optimize offerings, and innovate. Proactively addressing user preferences and pain points can reduce customer churn. Self-adaptive hyper-personalization is achievable through AI-driven automation, which dynamically tailors content and offers to each user. Customer expectations, real-time data, AI automation, and practical frameworks fuel its adoption.

Radar View & Related Technologies



Industry Use Cases

BFS

- Personalized product recommendations
- Customized marketing campaigns

Retail & Consumer Packaged Goods

- Personalized cross-channel marketing
- Increased supply chain agility and resilience
- Predictive inventory management
- Dynamic pricing

Healthcare

- Proactive risk identification
- AI-driven personalized health coach

Key Takeaway

AI empowers businesses to create highly adaptive and personalized experiences that drive engagement, revenue, and long-lasting customer relationships.

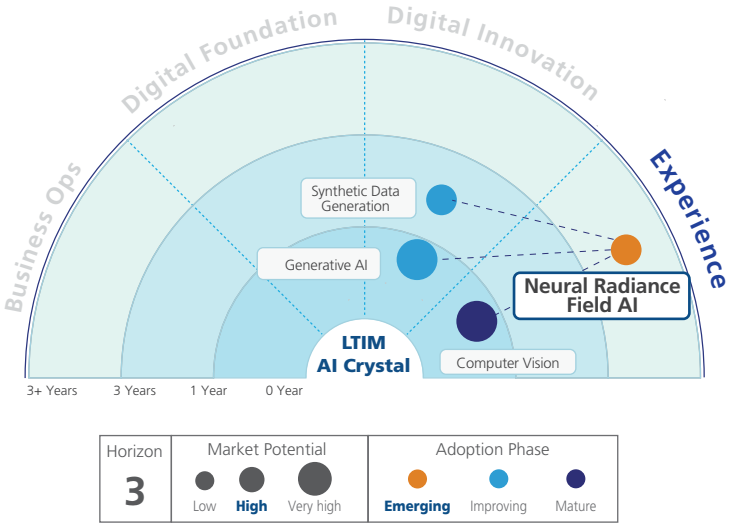
Neural Radiance Field AI

A Neural Radiance Field (NeRF) neural network can rebuild complicated three-dimensional scenes from two-dimensional photographs. Including generative AI in Neural Radiance Field (NeRF) enables those lacking modeling expertise to modify 3D configurations.

Highlights

AI adoption in NeRF enhances its ability to generate high-quality, photorealistic images from sparse input data. Its potential applications are in virtual reality, augmented reality, gaming, and visual effects industries. Additionally, the scalability and efficiency of NeRF AI models are crucial considerations for organizations looking to implement this technology. Furthermore, the medical field is beginning to utilize NeRF AI to generate detailed 3D reconstructions of organs and tissues, diagnostic imaging, and surgical planning.

Radar View & Related Technologies



Industry Use Cases

Healthcare

- Reconstruct high-quality 3D images
- Surgery training simulation

Manufacturing

- Create realistic product design models
- Factory layout optimization

Energy & Utilities

- Real-time decision-making in drilling operations
- Enhance infrastructure visualization

Communication Media Entertainment

- Immersive content creation
- Virtual film-set design

Key Takeaway

Driving breakthroughs in visual content, NeRF AI is prompting companies to secure patents for synthetic data in simulation, mapping, and perception.

About LTIMindtree Crystal

LTIMindtree Crystal brings "Beyond-The-Horizon" technologies to cross-industry enterprises. It presents exciting opportunities in terms of foresight to future-ready businesses keen to make faster and smarter decisions on existing and emerging technology trends. The LTIMindtree Crystal is an output of rigorous research by our team of next-gen technology experts and meticulously rated by our Technology Council across a set of parameters.

We want to thank our Technology Council members for their passion and support in sharing their ratings and feedback. We hope you enjoyed reading the **AI Technology Trends Radar Report.**

Please reach out to **crystal@ltimindtree.com** for any queries.

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Technology Council

Technology Council is a formal body composed of experts and leaders, from various units.

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Glossary

AGI	Artificial General Intelligence
AI	Artificial Intelligence
AIaaS	Artificial Intelligence As-A-Service
AML	Anti-Money Laundering
API	Application Programming Interface
APT	Advanced Persitent Threat
ASICs	Application-Specific Integrated Circuits
BFS	Banking, Financial Services
BYOD	Bring Your Own Device
CAGR	Compound Annual Growth rate
CIOs	Chief Information Officers
CME	Communications, Media and Entertainment
CNN	Convolutional Neural Networks
CPG	Consumer and Packaged Goods
CPUs	Central Processing Units
CT	Computed Tomography
DAI	Decentralized Artificial Intelligence
FGPU	Fractional Graphics Processing Unit
FPGAs	Field-Programmable Gate Arrays
GDPR	General Data Protection Regulations
GPU	Graphics Processing Unit
GraphRAG	Graphs + Retrieval Augmented Generation
IMC	In-Memory Computing
IOT	Internet of Things
IT	Information Technology
KYC	Know Your Customer
LIME	Local Interpretable Model-agnostic Explanations
LLM	Large Language Model
ML	Machin Learning
MPS	Multi Process Service
MRI	Magnetic Resonance Imaging
NeRF	Neural Radiance Field
NIST	National Instutute of Standards and Technology
NLP	Natural Language Processing
NPUs	Neural Processing Units
R&D	Research and Development
RAM	Random Access memory
ResNet-50	Residual Network with 50 layers
SEO	Search Engine Optimization
SHAP	SHapley Additive exPlanations
SLMs	Small Language Models
SOC	Security Operations Center
SoC	System-on-Chip
TRiSM	Trust, Risk, and Security Management
USD	United States Dollar
XAI	Explainable AI

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