



Innovation Telescope Philippines

2025

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GROUP

Index

INTRODUCTION	6
I. Main trends identified	7
1. AI VALUE SOLUTIONS	8
1.1. Machine customer	8
Introduction.....	8
1.1.1. Impact on business.....	8
1.1.2. Technical approach	9
1.1.2.1. Core technologies.....	9
1.1.2.2. Architecture	9
1.1.3. Use cases by market.....	9
1.1.4. Market considerations	9
1.1.5. Reference companies and startups	10
1.1.6. Recent Statistics.....	10
1.1.7. References	10
2. APP MODERNIZATION	11
2.1. Poyfunctional Robots.....	11
Introduction.....	11
2.1.1. Impact on business	11
2.1.2. Technical approach	12
2.1.2.1. Core technologies	12
2.1.2.2. System Architecture	12
2.1.3. Use cases by market.....	12
2.1.4. Market considerations	12
2.1.5. Reference companies and startups.....	13
2.1.6. Recent statistics	13
2.1.7. References	13
3.DATA MODERNIZATION	14
3.1. Quantum technologies.....	14
Introduction.....	14
3.1.1. Impact on business	14
3.1.2. Technical approach	15
3.1.2.1. Core Pillars of Quantum Technology	15
3.1.2.2. National Roadmap Highlights (DOST)	15
3.1.3. Use cases by market.....	15
3.1.4. Market considerations	15
3.1.5. Reference companies and startups.....	16
3.1.6. Recent statistics	16
3.1.7. References	16

3.2. Spatial computing	17
Introduction	17
3.2.1. Impact on business	17
3.2.2. Technical approach	18
3.2.2.1. Core technologies	18
3.2.2.2. Architecture	18
3.2.3. Use cases by market	18
3.2.4. Market considerations	18
3.2.5. Reference companies and startups	19
3.2.6. Recent statistics	19
3.2.7. References	19
4. CUSTOMER FIRST	20
4.1. Neurological enhancements	20
Introduction	20
4.1.1. Impact on business	20
4.1.2. Technical approach	21
4.1.2.1. Core technologies	21
4.1.2.2. Architecture	21
4.1.3. Use cases by market	21
4.1.4. Market considerations	21
4.1.5. Reference companies and startups	22
4.1.6. Recent statistics	22
4.1.7. References	22
5. DIGITAL IDENTITY ONBOARDING/SIGNATURE	23
5.1. Digital trust and cybersecurity	23
Introduction	23
5.1.1. Impact on business	23
5.1.2. Technical approach	24
5.1.2.1. Core technologies	24
5.1.2.2. Architecture integration	24
5.1.3. Use cases by market	24
5.1.4. Market considerations	24
5.1.5. Reference companies and startups	25
5.1.6. Recent statistics	25
5.1.7. References	25
5.2. Desinformation security	26
Introduction	26
5.2.1. Impact on business	26
5.2.2. Technical approach	27
5.2.2.1. Core technologies	27
5.2.2.2. Architecture integration	27

5.2.3. Use cases by market.....	27
5.2.4. Market considerations	27
5.2.5. Reference companies and startups	28
5.2.6. Recent statistics	28
5.2.7. References	28
5.3. Post-quantum cryptography	29
Introduction.....	29
5.3.1. Impact on business.....	29
5.3.2. Technical approach	30
5.3.2.1. Cryptographic Algorithms	30
5.3.2.2. Migration Strategy.....	30
5.3.2.3. Integration architecture.....	30
5.3.3. Use cases by market.....	30
5.3.4. Market considerations	30
5.3.5. Reference companies and startups	31
5.3.6. Recent statistics	31
5.3.7. References	31
6. ESG 360	32
6.1. Sustainable IT technology	32
Introduction.....	32
6.1.1. Impact on business	32
6.1.2. Technical approach	32
6.1.2.1. Core technologies	33
6.1.2.2. Architecture integration	33
6.1.3. Use cases by market.....	33
6.1.4. Market considerations	33
6.1.5. Reference companies and startups	34
6.1.6. Recent statistics	34
6.1.7. References	34
7. ITO TRANSFORMATION	35
7.1. Private cloud	35
Introduction.....	35
7.1.1. Impact on business.....	35
7.1.2. Technical approach.....	36
7.1.2.1. Core technologies	36
7.1.2.2. Architecture integration.....	36
7.1.3. Use cases by market	36
7.1.4. Market considerations.....	36
7.1.5. Reference companies and startups	37
7.1.6. Recent statistics	37
7.1.7. References	37

7.2. Hybrid computing.....	38
Introduction.....	38
7.2.1. Impact on business	38
7.2.2. Technical approach.....	39
7.2.2.1. Core Components	39
7.2.2.2. Architecture.....	39
7.2.3. Use cases by market	39
7.2.4. Market considerations.....	39
7.2.5. Reference companies and startups	40
7.2.6. Recent statistics	40
7.2.7. References.....	40
 8. DIGITAL WORKPLACE.....	 41
8.1. Augmented connected workforce.....	41
Introduction.....	41
8.1.1. Impact on business	41
8.1.2. Technical approach	42
8.1.2.1. Core technologies.....	42
8.1.2.2. Architecture	42
8.1.3. Use cases by market.....	42
8.1.4. Market considerations	42
8.1.5. Reference companies and startups.....	43
8.1.6. Recent statistics	43
8.1.7. References	43

Introduction

Digital transformation has given way to a new category of economic players: **machine customers**. These autonomous systems, powered by artificial intelligence (AI), IoT, and advanced algorithms, are beginning to make purchasing decisions, negotiate contracts, and execute transactions without human intervention. According to Gartner, by 2030, at least 25% of enterprise purchases will be made by machines.

I. Main trends identified

- **Quantum Computing in Early Expansion:** Although still in the exploratory phase, quantum computing is gaining ground in the Philippines, especially in sectors such as finance, healthcare, and logistics. Universities such as the University of the Philippines (UP) and entities such as DOST-PCIEERD are consolidating alliances with international research centers to explore applications in:
 - » Post-quantum cryptography
 - » Simulation of complex materials
 - » Industrial Process Optimization
- **Evolution of Artificial Intelligence (AI):** AI continues its rapid evolution in the Philippines, with sustained growth in its adoption by companies and public entities. The following stand out:
 - » Generative AI for Content and Automation
 - » Energy-efficient models
 - » Hyper-personalized solutions in health, education, and financial services

According to Deloitte, AI is becoming a structural part of business operations, comparable to electricity or digital connectivity.

- **Smart Cybersecurity and Digital Trust** Increasing digitalization has elevated the priority of cybersecurity in the Philippines. Organizations are adopting:
 - » **Zero Trust Architectures**
 - » **AI for proactive threat detection**
 - » **Cyber resilience in supply chains**

Although challenges persist in infrastructure and specialized talent, there are opportunities to strengthen the **country's digital sovereignty**, in line with the **National Cybersecurity Strategy and DICT policies**.

- **Advanced Connectivity and 5G:** The expansion of **5G** networks and the digitalization of infrastructures are enabling:
 - » **Smart cities**
 - » **Industrial Automation**
 - » **More efficient utilities**

This connectivity also enhances the interaction between autonomous devices, facilitating the growth of **machine customers** and autonomous decision systems, as highlighted by the **Gartner Hype Cycle 2024**.

AI Value Solutions

D1



1.1. | Machine customer

Customers Machines: Emergence of Autonomous Systems and Algorithms as Economic Actors in B2B Transactions.

The rise of **Machine Customers**—autonomous systems and algorithms capable of making purchasing decisions and executing transactions—is reshaping the B2B landscape. These entities, powered by AI, IoT, and blockchain, are increasingly acting as **economic agents**, interacting with suppliers, managing procurement, and optimizing operations without human intervention. In the Philippines, this trend is gaining traction across sectors, driven by digital transformation initiatives and the growing demand for operational efficiency¹.

1.1.1. Impact on business

Sector	Business Impact
Public Administration	Autonomous agents streamline procurement, compliance, and auditing.
Energy & Utilities	Smart grids use autonomous systems for real-time energy trading and load balancing.
Financial & Insurance	Robo-advisors managing portfolios and executing trades
Industry & Retail	AI agents manage inventory, logistics, and vendor negotiations.
Telecom & Media	Machine customers handle bandwidth allocation, SLA monitoring, and pricing.
Healthcare	Autonomous systems manage diagnostics, claims, and medical supply chains.

1.1.2. Technical approach

Machine customers are based on an architecture composed of:

1.1.2.1. Core technologies

- **Artificial Intelligence (AI):** Enables autonomous decision-making and predictive analytics.
- **Internet of Things (IoT):** Devices collect and transmit data to trigger autonomous actions.
- **Blockchain & Smart Contracts:** Ensure secure, verifiable, and automated transactions.
- **Digital Identity & Trust Architecture:** Authenticate machine entities and validate actions.

1.1.2.2. Architecture

- **Edge + Cloud Hybrid Models:** Real-time processing at the edge with centralized oversight.
- **API Ecosystems:** Facilitate integration with suppliers and service providers.
- **Data Lakes & AI Models:** Train systems to recognize patterns and optimize decisions.

Globe, for example, uses its 5G private network to enable low latency and high availability, essential for real-time autonomous decisions

1.1.3. Use cases by market

Sector	Company	Use Case
Public	EY Philippines	Autonomous procurement bots for local government
Energy	Globe Telecom	Smart grid optimization via machine agents
Financial	UnionBank	AI-driven robo-advisors executing B2B investment strategies
Retail	FMCG	AI-driven autonomous supply chain
Telecom	Globe Business	AI agents for B2B service orchestration
Healthcare	Bridgestone Health	GenAI for autonomous diagnostics and claims

1.1.4. Market considerations

Public Sector: Requires regulatory frameworks for machine identity and accountability.

Energy: Must ensure cybersecurity and operational safety in autonomous systems.

Finance: Needs compliance with BSP and AML regulations for machine-led transactions.

Retail: Integration with legacy ERP and supply chain systems is critical.

Telecom: Demands low-latency infrastructure and robust service-level agreements.

Healthcare: Requires medical-grade certification and ethical oversight.

1.1.5. Reference companies and startups

Globales:



Philippines: Globe Business (B2B automation), Bambú Mobile (AI & IoT), IRIUM (enterprise systems), Aiah (automation for customer service).

Startups: Fetch.ai, SingularityNET, and Ocean Protocol are pioneering decentralized machine economies.

1.1.6. Recent statistics

Globe Telecom's corporate data revenues rose **11% to ₱20.4 billion in 2024**, driven by ICT and automation services ².

Globe Business reported strong B2B growth in **finance, IT-BPM, supply chain, and retail**, sectors ripe for machine customer adoption ¹.

Gartner predicts that by **2030, 25% of B2B transactions** will be initiated by machine customers globally.

1.1.7. References

Gartner, "Top Trends in AI and B2B Ecosystems," 2024.

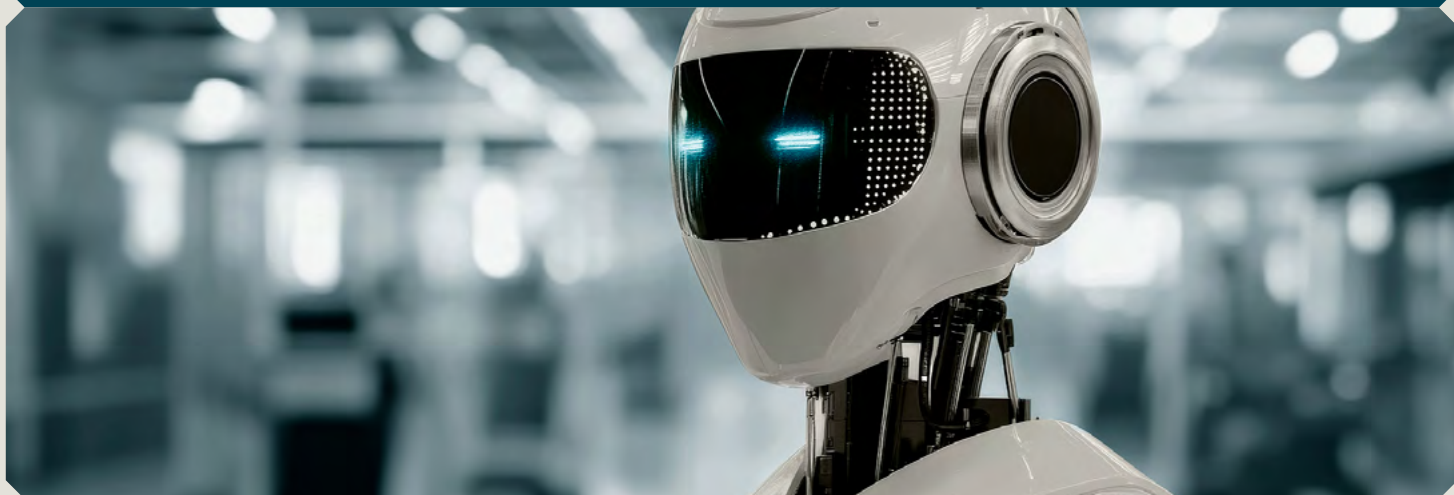
McKinsey & Company, "The Future of Autonomous Systems in Business," 2023.

Forrester, "Leveraging Machine Customers for Competitive Advantage," 2024.

IBM Research, "Blockchain and AI for Autonomous Commerce," 2023.

APP Modernization

02



2.1. | Polyfunctional robots

Multifunctional Robots: Robots Capable of Multitasking.

Polyfunctional robots are intelligent, modular machines capable of performing multiple tasks across diverse environments. Unlike traditional single-purpose robots, these systems leverage **AI, 5G, edge computing, and modular hardware** to adapt dynamically to changing operational needs. In the Philippines, the convergence of **smart infrastructure, digital transformation, and labor augmentation** is accelerating the deployment of such robots in both public and private sectors.

2.1.1. Impact on business

Sector	Main Impact
Public administration	Service robots for citizen service, cleaning and logistics in public buildings
Energy & Utilities	Robots for infrastructure inspection, predictive maintenance and safety
Financial & Insurance	Customer service bots, document processing, and branch automation
Industry & Retail	Robots for internal logistics, quality control and production line support
Telecommunications	5G-connected robots for guidance, cleaning, and delivery
Healthcare	Assistant robots in hospitals, disinfection, medicine delivery

2.1.2. Technical approach

Multifunctional robots integrate multiple technologies:

2.1.2.1. Core technologies

- **Artificial Intelligence (AI):** Enables task switching, learning, and decision-making.
- **5G Connectivity:** Provides low-latency, high-bandwidth communication for real-time control.
- **Edge Computing:** Allows local data processing for faster response and autonomy.
- **Modular Hardware Design:** Facilitates physical reconfiguration for different tasks.
- **Natural Language Interfaces:** Empowers non-technical users to interact and train robots.

2.1.2.2. System Architecture

- **Cloud-Robot Integration:** Centralized learning with decentralized execution.
- **Digital Twin Simulation:** Virtual testing of robot behavior and task optimization.
- **Cybersecurity Layer:** Ensures secure communication and data protection.

Globe Telecom, for example, has deployed robots connected to its 5G network that perform guidance, cleaning, and delivery tasks at corporate events, demonstrating their applicability across multiple industries

2.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Quezon City	Street inspection and document delivery robots
Energy	Meralco	Power Line Inspection Robots
Financial	BDO Unibank	Customer service robots for queue management and document scanning
Retail	SM Supermalls	Guidance, cleaning and safety robots
Telecom	Globe Telecom	Data Center Support Robots
Healthcare	Makati Medical Center	Robots for assistance and disinfection

2.1.4. Market considerations

Public Sector: Requires procurement frameworks and public trust in automation.

Energy: Must meet safety certifications and integrate with SCADA systems.

Finance: Needs compliance with BSP regulations and data privacy laws.

Retail: Demands seamless integration with POS and inventory systems.

Telecom: Requires robust 5G infrastructure and real-time analytics.

Healthcare: Must comply with medical device regulations and patient safety standards.

2.1.5. Reference companies and startups

Globales:



Philippines:

MySolutions (Pudu distributor), **Bambú Mobile** (AI/IoT), **Globe Business** (robotics)

Startups:

- a. **Agility Robotics** (multi-terrain robots),
- b. **Fetch Robotics** (warehouse automation),
- c. **PAL Robotics** (service robots for healthcare and public spaces).

2.1.6. Recent statistics

Globe Telecom showcased **5G-connected polyfunctional robots** in 2023, including concierge, delivery, and cleaning bots.

Gartner predicts that by **2027, 30% of frontline operations** will be supported by polyfunctional robots.

EY highlights that **natural language interfaces** will allow even non-technical users to train robots, accelerating adoption.

2.1.7. References

Gartner. [2023]. "Emerging Technologies Analysis: Polyfunctional Robotics."

Deloitte. [2023]. "Trends in Industrial Automation."

Fortune Business Insights. [2023]. "Robotics Market Forecast."

Statista. [2023]. "Robotics Industry Insights."

Data Modernization

03



3.1. | Quantum technologies

Quantum Technologies: Growing Awareness of Their Potential in AI, Business Scenario Simulation, and Scientific Breakthroughs, Even with Full Deployment Years Away.

Quantum technologies (QT) are rapidly transitioning from theoretical constructs to practical tools with transformative potential. While full-scale deployment remains years away, **quantum computing, quantum communication, and quantum sensing** are already influencing strategic planning in sectors such as finance, healthcare, and energy. In the Philippines, national initiatives led by the **Department of Science and Technology (DOST)** and increasing private-sector interest are laying the groundwork for a **quantum-enabled economy by 2030** ^{3 4}.

3.1.1. Impact on business

Sector	Potential Impact
Public administration	Government Data Security Using Post-Quantum Cryptography
Energy & Utilities	Quantum Simulation for Network Optimization and Demand Prediction
Financial & Insurance	Post-quantum cryptography and quantum-enhanced risk modeling
Industry & Retail	Materials Modeling and Advanced Logistics Using Quantum Algorithms
Telecommunications	Quantum Network Infrastructure and Quantum Key Distribution (QKD)
Healthcare	Simulation of molecules for drug development and clinical data protection

3.1.2. Technical approach

Quantum technologies applied in the business environment include:

3.1.2.1. Core Pillars of Quantum Technology

- **Quantum Computing:** Uses qubits to solve problems beyond classical capabilities (e.g., Shor’s and Grover’s algorithms).
- **Quantum Communication:** Enables ultra-secure data transfer using quantum key distribution (QKD).
- **Quantum Sensing:** Provides ultra-precise measurements of time, gravity, and electromagnetic fields.

3.1.2.2. National Roadmap Highlights (DOST)

- Establishment of a **Quantum Tech R&D Center**
- Development of **quantum memory, quantum repeaters, and quantum random number generators**
- Creation of a **local quantum computer prototype and quantum software/web infrastructure**
- Integration with **high-performance computing (HPC)** for quantum simulation ³

3.1.3. Use cases by market

Sector	Client Company	Use Case
Public	ENOUGH	Quantum cryptography for data security
Energy	Meralco	Simulation of power grids
Financial	UnionBank	Post-quantum cryptography readiness assessment and sandbox testing
Retail	Bamboo Mobile	Logistics optimization with quantum simulators
Telecom	Globe Telecom	Secure communication with quantum protocols
Healthcare	Makati Medical Center	Protein Simulation for Medical Research

3.1.4. Market considerations

Public Sector: Requires regulatory frameworks for quantum-safe encryption and data sovereignty.

Energy: Needs integration with existing SCADA and digital twin systems.

Finance: Must align with BSP and global standards for post-quantum cryptography.

Retail: Demands scalable quantum-inspired algorithms for real-time operations.

Telecom: Requires investment in QKD infrastructure and quantum-compatible hardware.

Healthcare: Must ensure ethical compliance and validation of quantum-assisted diagnostics.

3.1.5. Reference companies and startups

Globales:



Philippines:

DOST-PCIEERD [Quantum Roadmap], **Bambú Mobile** [AI/IoT], **Globe Business** [5G & secure networks], **QPI** [Quantum Philippines Initiative].

Quantumize, ID Quantique, PsiQuantum, Rigetti – Leading startups in cryptography and quantum computing.

3.1.6. Recent statistics

McKinsey estimates the global quantum market could reach **\$97 billion by 2035**, with **\$72 billion** from quantum computing alone ⁵.

The Philippines aims to establish a **local quantum computer prototype by 2028** and a **quantum-enabled economy by 2030** ³.

Gartner predicts that **20% of global organizations** will begin quantum-readiness assessments by 2026.

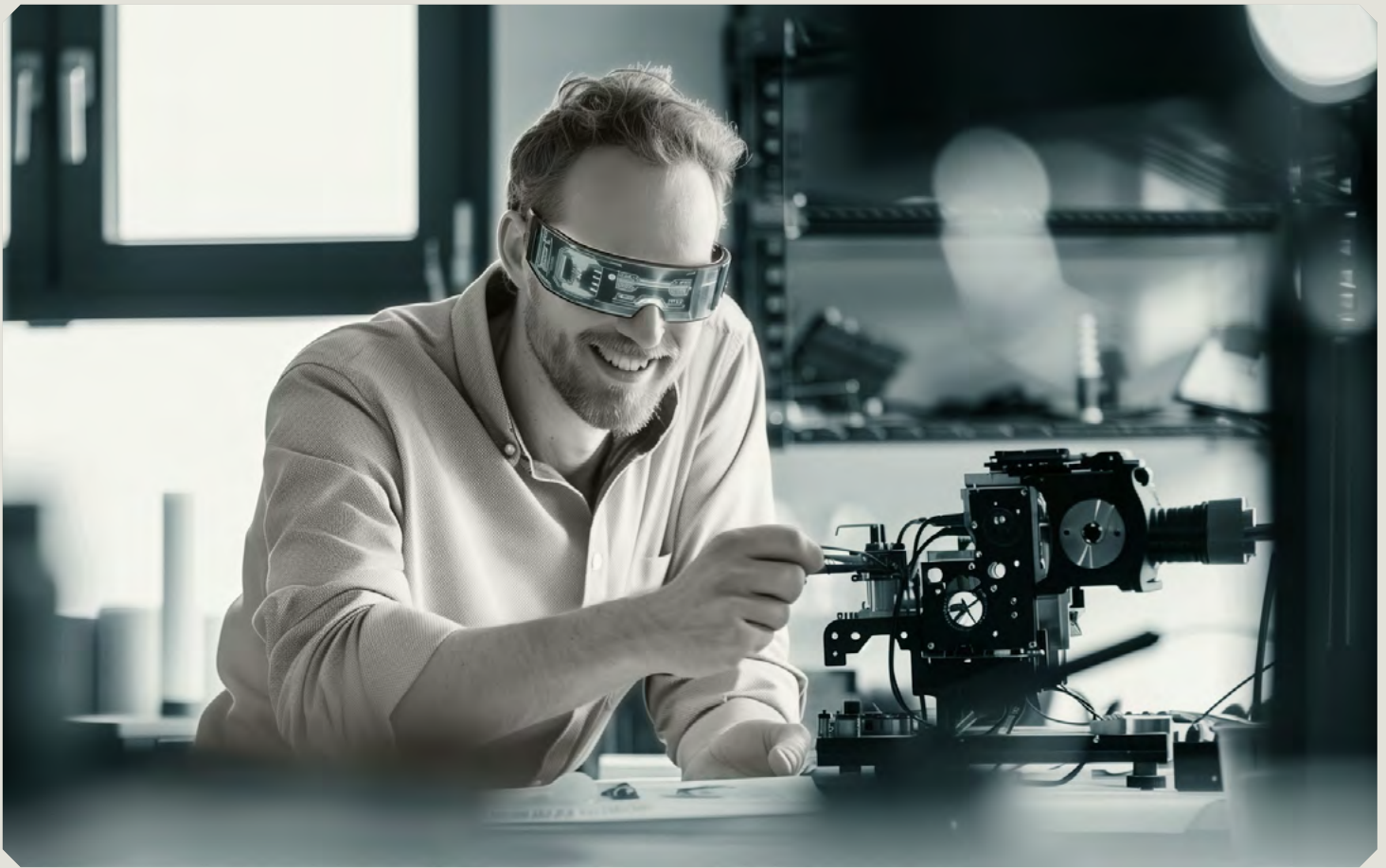
3.1.7. References

Gartner, “Quantum Computing Trends,” 2024.

McKinsey & Company, “Unlocking the Potential of Quantum Technologies,” 2023.

Forrester, “Quantum Disruption in Business,” 2024.

IBM Research, “The Future of Quantum Computing,” 2023.



3.2. | Spatial computing

Spatial Computing: The Merging of the Physical and Digital Worlds through Augmented and Virtual Reality.

Spatial computing refers to the integration of digital content into the physical world, enabling users to interact with data and environments in immersive, intuitive ways. It combines **augmented reality (AR), virtual reality (VR), AI, IoT, and edge computing** to enhance human cognition, decision-making, and behavioral understanding. In the Philippines, spatial computing is emerging as a key enabler of **digital transformation**, particularly in sectors where **remote interaction, real-time data visualization, and human-machine collaboration** are critical ⁶.

3.2.1. Impact on business

Sector	Main Impact
Public administration	Spatial visualization of urban data, territorial planning and citizen service
Energy & Utilities	Predictive maintenance with augmented reality and network simulation
Financial & Insurance	Cognitive analytics for customer behavior, immersive financial education, and branchless banking
Industry & Retail	Immersive customer experiences and employee training
Telecommunications	Infrastructure deployment optimization and immersive user experience
Healthcare	AR-assisted surgeries, clinical data visualization, and medical training

3.2.2. Technical approach

Spatial computing combines multiple technologies:

3.2.2.1. Core technologies

- **Augmented Reality (AR):** Overlays digital information on the physical world.
- **Virtual Reality (VR):** Creates fully immersive environments for simulation and training.
- **Spatial AI:** Interprets gestures, gaze, and movement to personalize experiences.
- **Edge Computing:** Enables real-time processing close to the user.
- **Digital Twins:** Virtual replicas of physical systems for monitoring and simulation.

3.2.2.2. Architecture

- **Sensor Fusion:** Combines data from cameras, LIDAR, and wearables.
- **Cloud-Edge Hybrid:** Balances latency-sensitive tasks at the edge with scalable cloud analytics.
- **Natural Interfaces:** Voice, gesture, and gaze-based interaction models.

Globe Telecom, for example, has used geospatial AI models to identify priority connectivity areas in the Philippines, optimizing infrastructure investment decisions.

3.2.3. Use cases by market

Sector	Client Company	Use Case
Public	Taguig City	Urban simulation for participatory planning
Energy	NGCP	Remote maintenance with AR
Financial	UnionBank	Immersive financial literacy programs using VR for rural communities
Retail	SM Supermalls	Interactive maps and immersive experiences
Telecom	Globe Telecom	Network visualization and technical support with AR
Healthcare	St. Luke’s Medical Center	Surgical simulation with mixed reality

3.2.4. Market considerations

Public Sector: Requires digital infrastructure and training for immersive tools.

Energy: Needs ruggedized AR devices and integration with SCADA systems.

Finance: Must ensure data privacy and accessibility for all demographics.

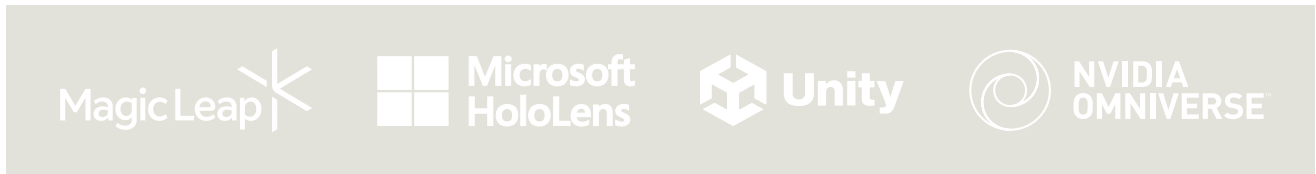
Retail: Demands real-time analytics and seamless integration with POS systems.

Telecom: Requires 5G infrastructure and low-latency edge computing.

Healthcare: Must comply with medical device regulations and clinical validation.

3.2.5. Reference companies and startups

Globales:



Philippines:

Bambú Mobile (AR/VR), **Globe Business** (5G + immersive tech), **Edukasyon.ph** (VR learning), **Aiah** (AI-driven automation)

Onirix, Niantic Lightship, Magic Leap, Varjo – Leading startups in spatial computing.

3.2.6. Recent statistics

Gartner lists **Spatial Computing** as a top strategic technology trend for 2025, citing its ability to **enhance cognitive functions and decision-making** ⁶.

Globe Telecom is expanding 5G and edge infrastructure to support immersive technologies in 100+ remote areas by 2025 ⁷.

IDC predicts that by 2027, **40% of customer-facing organizations** in Southeast Asia will adopt spatial computing for behavioral analytics and experience design.

3.2.7. References

Gartner. (2023). "Emerging Technologies Analysis: Spatial Computing."

IDC. (2023). "Market Forecast: AR and VR Adoption Trends."

Deloitte. (2023). "Digital Transformation in Manufacturing."

Statista. (2023). "Augmented Reality and Virtual Reality Market Insights."



4.1. | Neurological enhancements

Neurological Enhancements: Technologies to Enhance Cognitive Functions and Understanding of Consumer Thinking.

Neurological enhancements refer to the use of digital technologies—particularly **augmented reality (AR)**, **virtual reality (VR)**, and **brain-machine interfaces (BMIs)**—to improve cognitive function, emotional engagement, and human-machine interaction. These technologies are reshaping how Filipinos learn, heal, work, and interact with services. From **VR-based rehabilitation for neurological disorders** to **AR-driven customer engagement**, the Philippines is witnessing early adoption across sectors ^{8 9 10}.

4.1.1. Impact on business

Sector	Main Impact
Public administration	Immersive training for civil servants, urban data visualization
Energy & Utilities	Hazardous Environment Simulation and Predictive Maintenance with AR
Financial & Insurance	Emotion-aware customer service, immersive financial literacy programs
Industry & Retail	Cognitive training, product design, and immersive customer experience
Telecommunications	Immersive interfaces for customer service and network planning
Healthcare	Cognitive rehabilitation, AR-assisted surgery, and mental health treatment

4.1.2. Technical approach

4.1.2.1. Core technologies

- **AR/VR Headsets:** Immersive environments for training, therapy, and simulation.
- **Brain-Machine Interfaces (BMIs):** Devices that read and write brain signals to enhance cognition ⁹.
- **Spatial AI:** Interprets gestures, gaze, and neural signals for adaptive interaction.
- **Neurofeedback Systems:** Monitor brain activity to personalize experiences.
- **Edge Computing:** Enables real-time processing of neural and spatial data.

4.1.2.2. Architecture

- **Wearables & Sensors:** EEG headbands, eye trackers, haptic gloves.
- **Cloud-Neuro Integration:** Combines biometric data with AI models for real-time adaptation.
- **Digital Twins:** Simulate cognitive states and environments for training and diagnostics.

4.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Davao City	Immersive Emergency Management Training
Energy	Meralco	AR Cognitive Training for Operators
Financial	UnionBank	VR-based financial literacy for underserved communities
Retail	SM Retail	Shopping experiences with emotional analysis
Telecom	Globe Telecom	Training with non-invasive BBMIs
Healthcare	Makati Medical Center	Cognitive therapy with VR and neurofeedback

4.1.4. Market considerations

- Public Sector:** Requires investment in immersive infrastructure and digital literacy.
- Energy:** Needs ruggedized AR devices and safety-certified neurotech.
- Finance:** Must comply with data privacy laws and ethical use of emotional data.
- Retail:** Demands real-time analytics and seamless integration with CRM systems.
- Telecom:** Requires 5G and edge computing for low-latency neuro-AR experiences.
- Healthcare:** Must meet clinical validation and regulatory standards for neurotherapies.

4.1.5. Reference companies and startups

Globales:



Philippines:

Bambú Mobile (AR/VR), **Edukasyon.ph** (VR learning), **Aiah** (AI automation), **Globe Business** (5G + immersive tech)

Neurable, Emotiv, MindMaze, Varjo – Leading Startups in Neurotechnology and Cognitive VR

4.1.6. Recent statistics

Gartner predicts that by **2034, neurological enhancement will be mainstream in workforce training and customer engagement** ⁹.

Filipino developers have launched **VR games for dementia and cerebral palsy rehabilitation**, showing local innovation in neuro-AR ¹⁰.

Immersive VR has shown **significant improvement in upper-extremity rehabilitation** for neurological patients in clinical trials ⁸.

4.1.7. References

Gartner. (2023). "Emerging Technologies Analysis: Cognitive and Neurological Enhancements."

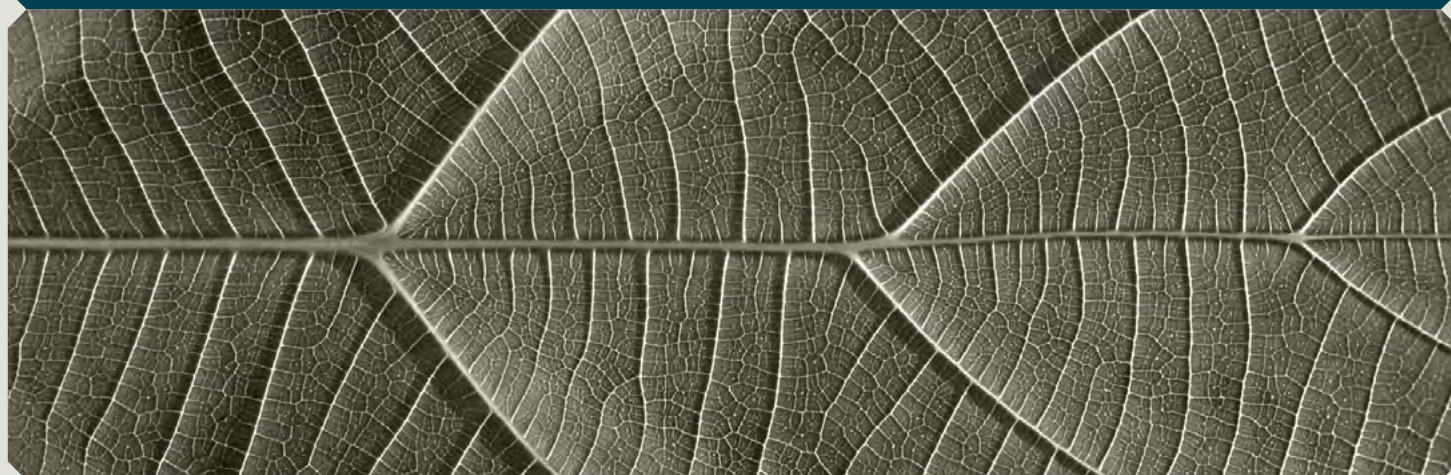
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Fortune Business Insights. (2023). "Neurological Enhancements Market Overview."

Statista. (2023). "Cognitive Technology Market Insights."

Digital Identity Onboarding/Signature

D5



5.1. | Digital trust and cybersecurity

Digital Trust and Cybersecurity Integration of Web3 technologies and trusted architectures to improve digital security and reduce the risks of cyberattacks.

In an era of rising digital manipulation, **disinformation security** has become a strategic imperative. The Philippines, with its high social media penetration and active digital citizenry, faces increasing threats from **fake news, impersonation, and coordinated misinformation campaigns** ^{12 13}. To counter this, organizations are turning to **Web3 technologies**—including **blockchain, decentralized identity (DID), and smart contracts**—combined with **Zero Trust architectures** to ensure **data authenticity, source verification, and secure digital interactions** ¹⁴.

5.1.1. Impact on business

Sector	Main Impact
Public administration	Process traceability, identity verification and institutional transparency
Energy & Utilities	Protection of operational data and energy contracts via blockchain
Financial & Insurance	Defense against phishing, fake investment schemes, and impersonation of banks
Industry & Retail	Product traceability and brand authenticity against counterfeiting
Telecommunications	Fraud prevention, data protection and user validation
Healthcare	Protecting Medical Records and Verifying Clinical Information Sources

5.1.2. Technical approach

5.1.2.1. Core technologies

- **Blockchain:** Immutable ledger for verifying content origin and transaction integrity.
- **Decentralized Identity (DID):** Enables secure, verifiable digital identities without central authority.
- **Smart Contracts:** Automate trust-based interactions and content validation.
- **Zero Trust Architecture:** Continuous verification of users, devices, and data flows.
- **AI for Content Analysis:** Detects anomalies, fake content, and coordinated disinformation patterns.

5.1.2.2. Architecture Integration

- **Web3 Gateways:** Connect legacy systems to decentralized networks.
- **Content Provenance Engines:** Track and verify digital content history.
- **Trust Registries:** Maintain verified identities and reputations across platforms.

5.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Election Commission of the Philippines	Digital Identity Verification System for Electoral Processes
Energy	Meralco	Blockchain for Regulatory Data Traceability
Financial	UnionBank	DID-based customer onboarding and fraud prevention in mobile banking
Retail	Lazada Philippines	Product authenticity verification with Web3
Telecom	Globe Telecom	AI disinformation campaign detection
Healthcare	Makati Medical Center	Blockchain for Medical Records Integrity

5.1.4. Market considerations

Public Sector: Requires regulatory frameworks for decentralized identity and blockchain use.

Energy: Must ensure interoperability with SCADA and real-time systems.

Finance: Needs compliance with BSP and AML regulations for identity and transaction verification.

Retail: Demands integration with supply chain and CRM platforms.

Telecom: Requires scalable infrastructure for real-time content validation.

Healthcare: Must comply with data privacy laws and ethical standards for medical information.

5.1.5. Reference companies and startups

Globales:



Philippines:

Bambú Mobile (Web3 & AI), **Globe Business** (blockchain integration), **Aiah** (automation), **UnionBank** (digital identity innovation)

Polygon, Civic, Chainlink, Ocean Protocol – Leading Web3 and Data Security Startups

5.1.6. Recent statistics

The Philippines saw a **67% increase in public anxiety over online disinformation** in early 2025 ¹³.

Cyberint reports a surge in **phishing and impersonation attacks** targeting government and financial sectors ¹².

Gartner identifies **Disinformation Security** as a top strategic technology trend for 2025, urging IT leaders to integrate **trust architectures and Web3 tools** ¹⁴.

5.1.7. References

Gartner, "Trends in Digital Trust and Web3," 2024.

McKinsey & Company, "Blockchain and Cybersecurity Innovations," 2023.

Forrester, "Enhancing Security Through Decentralization," 2024.

IBM Research, "Integrating Blockchain in Security Architectures," 2023.



5.2. | Desinformation security

Security Against Disinformation: AI-Based Technologies to Mitigate Disinformation Risks.

As the Philippines accelerates its digital transformation, the need for **robust cybersecurity and digital trust frameworks** has become paramount. The rise of **AI-driven threats, misinformation, and identity fraud** has exposed vulnerabilities in legacy systems. To address this, organizations are adopting **Web3 technologies—including blockchain, decentralized identity (DID), and smart contracts—**alongside **Zero Trust architectures to build secure, transparent, and resilient digital ecosystems** ^{15 16}.

5.2.1. Impact on business

Sector	Main Impact
Public administration	Secure digital identity, process traceability and institutional transparency
Energy & Utilities	Protection of operational data and energy contracts via blockchain
Financial & Insurance	Enables secure digital identity, fraud prevention, and regulatory compliance
Industry & Retail	Product traceability, brand authenticity and fraud prevention
Telecommunications	Fraud prevention, data protection and user validation
Healthcare	Protecting Medical Records and Verifying Clinical Information Sources

5.2.2. Technical approach

5.2.2.1. Core technologies

- **Blockchain:** Immutable ledger for transaction and data integrity.
- **Decentralized Identity (DID):** User-controlled identity verification without centralized databases.
- **Smart Contracts:** Automate trust-based interactions and compliance.
- **Zero Trust Architecture:** Continuous verification of users, devices, and data flows.
- **AI-Powered Threat Detection:** Identifies anomalies and potential breaches in real time.

5.2.2.2. Architecture Integration

- **Web3 Gateways:** Connect legacy systems to decentralized networks.
- **Trust Registries:** Maintain verified identities and reputations.
- **Federated APIs:** Enable secure cross-platform data exchange (e.g., Globe’s CAMARA APIs initiative ¹⁵).

5.2.3. Use cases by market

Sector	Client Company	Use Case
Public	Election Commission of the Philippines	Digital Identity System for Electoral Processes
Energy	Meralco	Blockchain for Regulatory Data Traceability
Financial & Insurance	UnionBank	DID-based customer onboarding and fraud prevention in mobile banking
Retail	Lazada Philippines	Product authenticity verification with Web3
Telecom	Globe Telecom	Network security and disinformation detection with AI
Healthcare	Makati Medical Center	Blockchain for Medical Records Integrity

5.2.4. Market considerations

Public Sector: Requires legal frameworks for decentralized identity and data sovereignty.

Energy: Must ensure integration with SCADA and OT systems.

Finance: Needs compliance with BSP, AML, and data privacy regulations.

Retail: Demands real-time verification and integration with supply chain systems.

Telecom: Requires scalable infrastructure for real-time identity and content validation.

Healthcare: Must comply with HIPAA-like standards and ethical data governance.

5.2.5. Reference companies and startups

Globales:



Philippines:

Bambú Mobile (Web3 & AI), **Globe Business** (blockchain integration), **Aiah** (automation), **UnionBank** (digital identity innovation)

Polygon, Civic, Chainlink, Ocean Protocol – Leading Web3 and Data Security Startups

5.2.6. Recent statistics

Globe Telecom signed a **MoU with Philippine telcos** to deploy **federated CAMARA APIs** for fraud prevention and identity verification ¹⁵.

The 2025 Cyber Revolution Summit emphasized the convergence of **cybersecurity, data privacy, and digital trust** as a national priority ¹⁶.

PwC's 2025 Global Digital Trust Insights found that **only 36% of organizations** in Southeast Asia have fully implemented Zero Trust models ¹⁷.

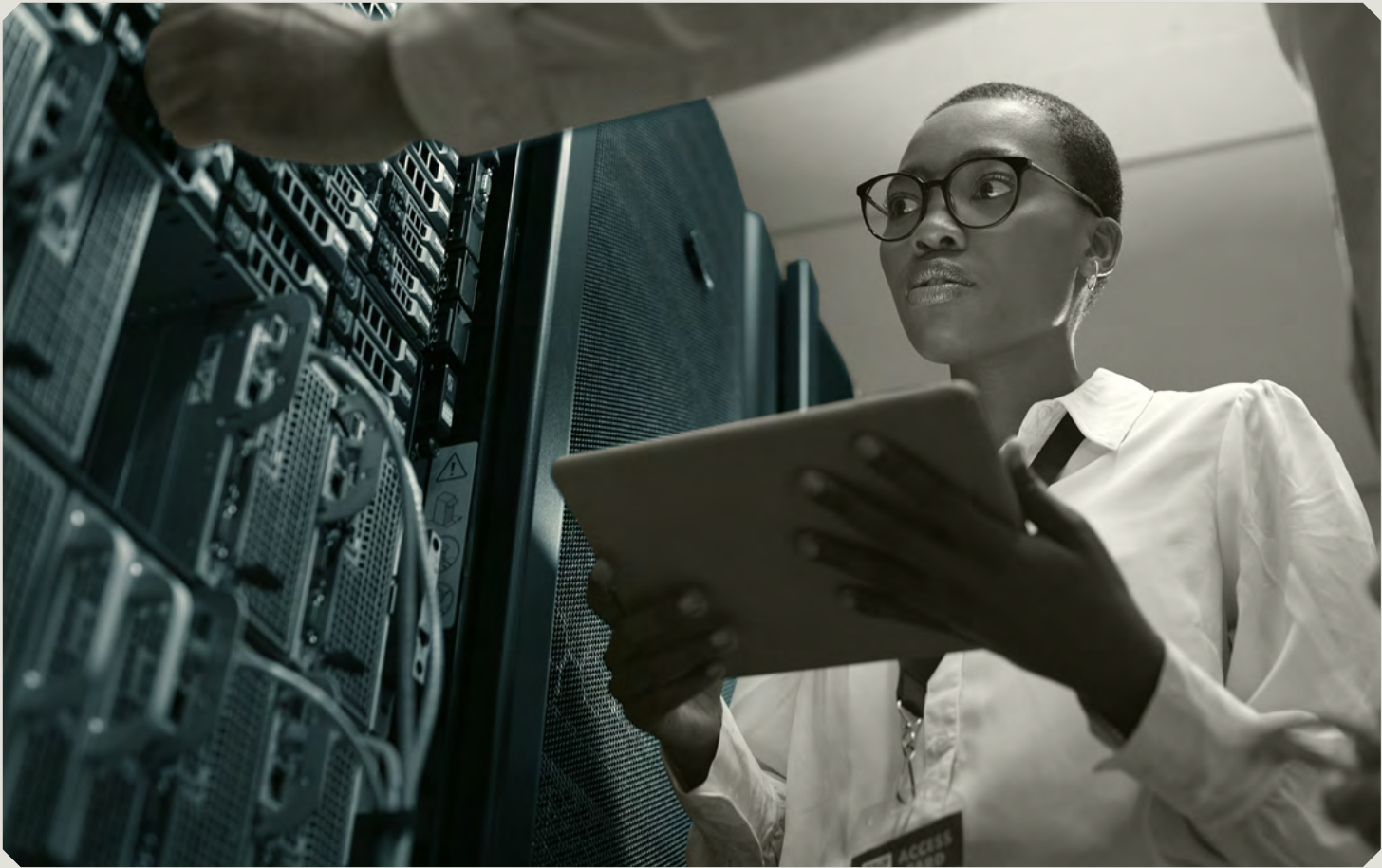
5.2.7. References

Gartner, "Combatting Disinformation with AI," 2024.

McKinsey & Company, "Securing Trust in the Digital Age," 2023.

Forrester, "Blockchain and AI for Trust," 2023.

IBM Watson, "AI for Information Integrity," 2023.



5.3. | Post-quantum cryptography

Post-Quantum Cryptography: Quantum-Computing Threat-Resistant Cryptographic Methods.

Quantum computing promises breakthroughs in science, finance, and logistics—but it also threatens to render today’s cryptographic systems obsolete. By 2029, **asymmetric encryption** (e.g., RSA, ECC) will no longer be secure against quantum attacks ¹⁸. In the Philippines, where digital banking, e-governance, and cloud adoption are accelerating, **Post-Quantum Cryptography (PQC)** is becoming a national cybersecurity priority. Organizations must begin transitioning now to **quantum-resistant algorithms** to protect sensitive data and maintain regulatory compliance ^{18 19}.

5.3.1. Impact on business

Sector	Main Impact
Public administration	Citizen Data Protection and Government Communications
Energy & Utilities	Security of SCADA networks and energy contracts against quantum attacks
Financial & Insurance	Ensures long-term confidentiality of transactions and compliance with BSP regulations
Industry & Retail	Intellectual property protection and product traceability
Telecommunications	Mobile Network Security, User Authentication, and End-to-End Encryption
Healthcare	Long-term protection of medical records and clinical data

5.3.2. Technical approach

5.3.2.1. Cryptographic Algorithms

- **Lattice-Based:** Kyber, Dilithium (NIST finalists).
- **Hash-Based:** SPHINCS+.
- **Multivariate Polynomial:** Rainbow (less favored due to vulnerabilities).
- **Code-Based:** Classic McEliece

5.3.2.2. Estrategia de Migración

- **Cryptographic Inventory:** Identify where current cryptography is used.
- **Hybrid Certificates:** Combine classical and quantum-safe algorithms.
- **Performance Testing:** Evaluate impact on latency, key sizes, and throughput.
- **Vendor Readiness:** Ensure third-party systems support PQC standards.

5.3.2.2. Integration Architecture

- **Quantum-Resistant Key Management Systems (KMS).**
- **Zero Trust + PQC:** Continuous verification with quantum-safe encryption.
- **Secure APIs:** PQC-enabled interfaces for cloud and mobile apps.

5.3.3. Use cases by market

Sector	Client Company	Use Case
Public	Election Commission of the Philippines	Evaluation of PQC algorithms for digital identity
Energy	Meralco	Migration to post-quantum encryption in SCADA networks
Financial	UnionBank	PQC sandbox for secure digital banking and customer onboarding
Retail	Lazada Philippines	Mobile Payment Protection with PQC
Telecom	Globe Telecom	PQC encryption pilots on 5G networks
Healthcare	Makati Medical Center	Post-quantum encryption for medical records

5.3.4. Market considerations

Public Sector: Requires national standards and regulatory alignment with DICT and NTC.

Energy: Must ensure compatibility with legacy OT systems and real-time performance.

Finance: Needs BSP guidance on PQC compliance and risk modeling.

Retail: Demands scalable encryption for high-volume transactions.

Telecom: Requires low-latency PQC for real-time communications.

Healthcare: Must comply with data privacy laws and medical device certification.

5.3.5. Reference companies and startups

Globales:



Philippines:

Bambú Mobile (Web3 & AI), **Globe Business** (blockchain integration), **UnionBank** (digital identity innovation), **Aiah** (automation)

Post-Quantum, ISARA, PQShield, QuintessenceLabs – Startups líderes en PQC y QKD

5.3.6. Recent statistics

The Asia-Pacific PQC market is projected to grow from **\$111.1M in 2024 to \$4.08B by 2034**, at a CAGR of 43.41% ²⁰.

Gartner warns that **“harvest-now, decrypt-later” attacks may already be occurring**, urging organizations to begin PQC transitions immediately ¹⁸.

McKinsey estimates that **fully error-corrected quantum computers** could emerge by 2030, making current encryption obsolete ¹⁹.

5.3.7. References

Gartner, “The Future of Post-Quantum Cryptography,” 2024.

McKinsey & Company, “Quantum Security Trends,” 2023.

Forrester, “Building Resilience with PQC,” 2023.

IBM Research, “Quantum-Safe Cryptographic Solutions,” 2023.



6.1. | Sustainable IT technology

Sustainable Technology: Leveraging Technology to Achieve Environmental, Social, and Governance (ESG) Goals.

As climate change, social equity, and ethical governance become central to business strategy, **sustainable technology** is emerging as a critical enabler of ESG transformation. In the Philippines, where digital infrastructure is rapidly expanding, organizations are integrating **green IT, AI-driven efficiency, and ESG analytics** into their operations. Leading consultancies and tech firms are helping enterprises embed sustainability into their **IT strategies**, ensuring long-term resilience, regulatory compliance, and stakeholder trust ^{21 22}.

6.1.1. Impact on business

Sector	Main ESG Impact
Public administration	Sustainable digitalisation of services, paper reduction and energy efficiency
Energy & Utilities	Optimisation of energy consumption and monitoring of emissions
Financial & Insurance	ESG risk modeling, green finance platforms, and sustainable investment analytics
Industry & Retail	Green logistics, product traceability and circular economy
Telecommunications	Emission reduction, energy efficiency and inclusive digitalisation
Healthcare	Clinical waste reduction, operational efficiency, and equitable access to services

6.1.2. Technical approach

6.1.2.1. Core technologies

- **AI for Energy Optimization:** Predictive analytics to reduce energy consumption.
- **Cloud Sustainability Platforms:** Track emissions, water usage, and waste.
- **IoT Sensors:** Monitor environmental impact in real time.
- **Blockchain:** Ensure transparency in ESG reporting and supply chain traceability.
- **Green Software Engineering:** Optimize code and infrastructure for energy efficiency.

6.1.2.2. Arquitectura ESG Integrada

- **Sustainable Cloud Migration:** Shift workloads to renewable-powered data centers.
- **Digital Twin Modeling:** Simulate environmental impact of operations.
- **ESG Dashboards:** Real-time reporting for compliance and stakeholder engagement.

6.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Quezon City	Digital government platform with sustainable architecture
Energy	Meralco	Digital twins for energy efficiency
Financial	UnionBank	ESG scoring engine for sustainable lending and investment portfolios
Retail	SM Retail	Blockchain for sustainable product traceability
Telecom	Globe Telecom	Circular economy strategy and ESG metrics
Healthcare	Makati Medical Center	Digital medical record in sustainable cloud

6.1.4. Market considerations

Public Sector: Requires policy alignment with national climate goals and digital equity.

Energy: Needs integration with legacy infrastructure and regulatory compliance.

Finance: Must align with BSP’s sustainable finance framework and global ESG standards.

Retail: Demands supplier engagement and consumer transparency.

Telecom: Requires investment in low-power networks and sustainable hardware.

Healthcare: Must balance sustainability with clinical safety and patient care standards.

6.1.5. Reference companies and startups

Globales:



Philippines:

Globe Business (ESG platforms), **Bambú Mobile** (IoT & AI), **Aiah** (automation for ESG), **First Gen** (renewable energy tech)

IBM Sustainability Accelerator, Climeworks, Plan A, Circularise – Leading digital sustainability startups and platforms.

6.1.6. Recent statistics

Globe Telecom reduced its emissions by **4.42%** in 2023 through AI-driven energy management and renewable energy adoption ²¹.

The company was awarded **ESG Initiative of the Year** at the Asian Telecom Awards 2024 and named the **Most Sustainable Brand** in the Philippines ²².

IDC forecasts that by 2026, **60% of enterprises in Southeast Asia** will embed ESG metrics into their digital transformation KPIs.

6.1.7. References

Gartner, “Trends in Sustainable Technology,” 2024.

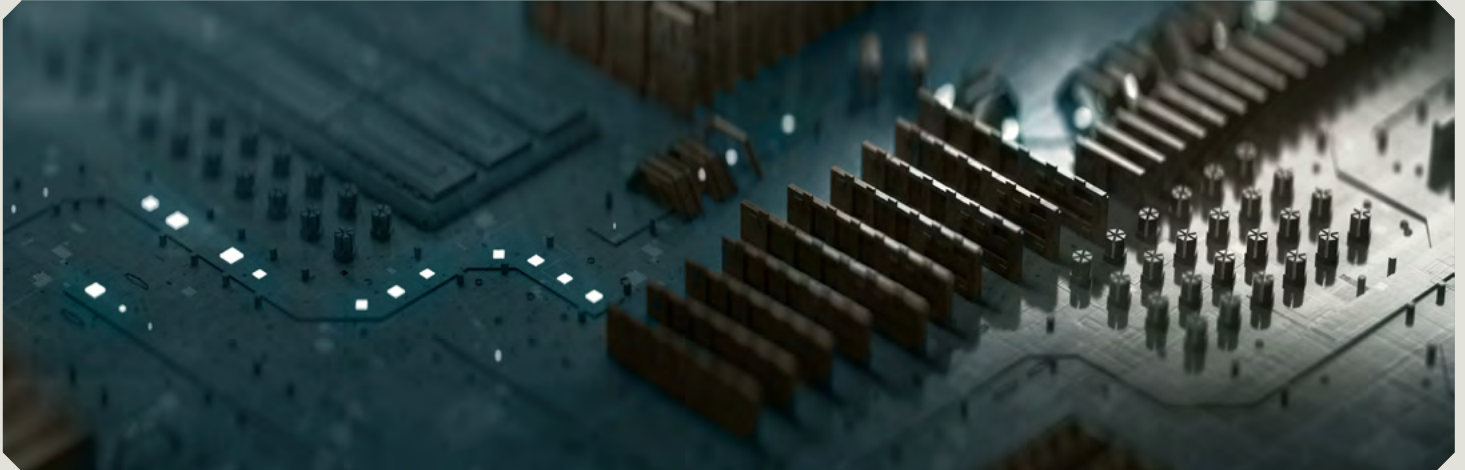
McKinsey & Company, “ESG and Digital Transformation,” 2023.

Forrester, “Technology for a Greener Future,” 2024.

Microsoft Sustainability Report, 2023.

ITO Transformation

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7.1. | Private cloud

Private Cloud: Investment Growth Driven by Changes in Public Cloud Pricing and Key Vendor Dominance.

As enterprises in the Philippines scale their digital operations, many are reassessing their cloud strategies. The **rising cost of public cloud services**, especially data egress fees, and the **dominance of hyperscalers** are prompting a shift toward **private and hybrid cloud alternatives**. According to IDC, **50% of enterprises in Asia-Pacific will form strategic alliances with cloud providers by 2025**, with a growing emphasis on **cost governance and data sovereignty** ²³. In this context, private cloud is emerging as a **cost-effective, secure, and customizable** infrastructure model.

7.1.1. Impact on business

Sector	Main Impact
Public administration	Data sovereignty, regulatory compliance, and operational efficiency
Energy & Utilities	Critical data control, operational continuity and resource optimization
Financial & Insurance	Supports regulatory compliance, secure data processing, and fraud detection
Industry & Retail	Latency reduction, intellectual property protection, and personalization
Telecommunications	Resilient infrastructure, 5G service deployment, and network security
Healthcare	Clinical Data Protection, Interoperability, and Privacy Compliance

7.1.2. Technical approach

7.1.2.1. Core Technologies

- **Virtualization Platforms:** VMware, OpenStack, Nutanix
- **Container Orchestration:** Kubernetes on-premises
- **Software-Defined Infrastructure:** SDN and SDS for scalability and automation
- **Zero Trust Security:** Microsegmentation and identity-based access
- **Hybrid Cloud Connectors:** Azure Arc, Anthos, Red Hat OpenShift

7.1.2.2. Architecture Integration

- **On-Premise Private Cloud:** For mission-critical workloads and data residency
- **Hosted Private Cloud:** Managed by third-party providers in local data centers
- **Hybrid Cloud:** Combines private cloud with public cloud for elasticity and cost optimization

7.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Davao City	Private cloud for citizen data management
Energy	Meralco	Migrating from SCADA to software-defined private cloud
Financial	UnionBank	Core banking modernization using a secure private cloud infrastructure
Retail	SM Retail	Hybrid infrastructure for local processing and scalability
Telecom	Globe Telecom	Private cloud for critical services and innovation testing
Healthcare	Makati Medical Center	Digital Health Record in Secure Private Cloud

7.1.4. Market considerations

Public Sector: Requires alignment with data localization laws and procurement frameworks.

Energy: Must ensure real-time performance and integration with legacy OT systems.

Finance: Needs BSP compliance and robust encryption for sensitive data.

Retail: Demands scalability and integration with POS and CRM systems.

Telecom: Requires low-latency infrastructure and support for edge computing.

Healthcare: Must comply with health data privacy laws and support clinical workloads.

7.1.5. Reference companies and startups

Globales:



Philippines:

Globe Business (private cloud services), **IRIUM** (infrastructure consulting), **Bambú Mobile** (cloud-native solutions), **ePLDT** (data center hosting).

Nutanix, OpenStack, VMware, Red Hat OpenShift – Leading private cloud platforms.

7.1.6. Recent statistics

Globe Telecom is reducing its capital expenditure by **23% in 2024**, focusing on **cost-optimized infrastructure**, including private cloud deployments ²⁴.

IDC reports that **65% of A2000 firms in Asia-Pacific** will adopt **multicloud and private cloud strategies** by 2025 to manage GenAI and data governance ²³.

The Philippines' public cloud market is growing at **29.3% CAGR**, but concerns over cost and control are accelerating private cloud adoption ²³.

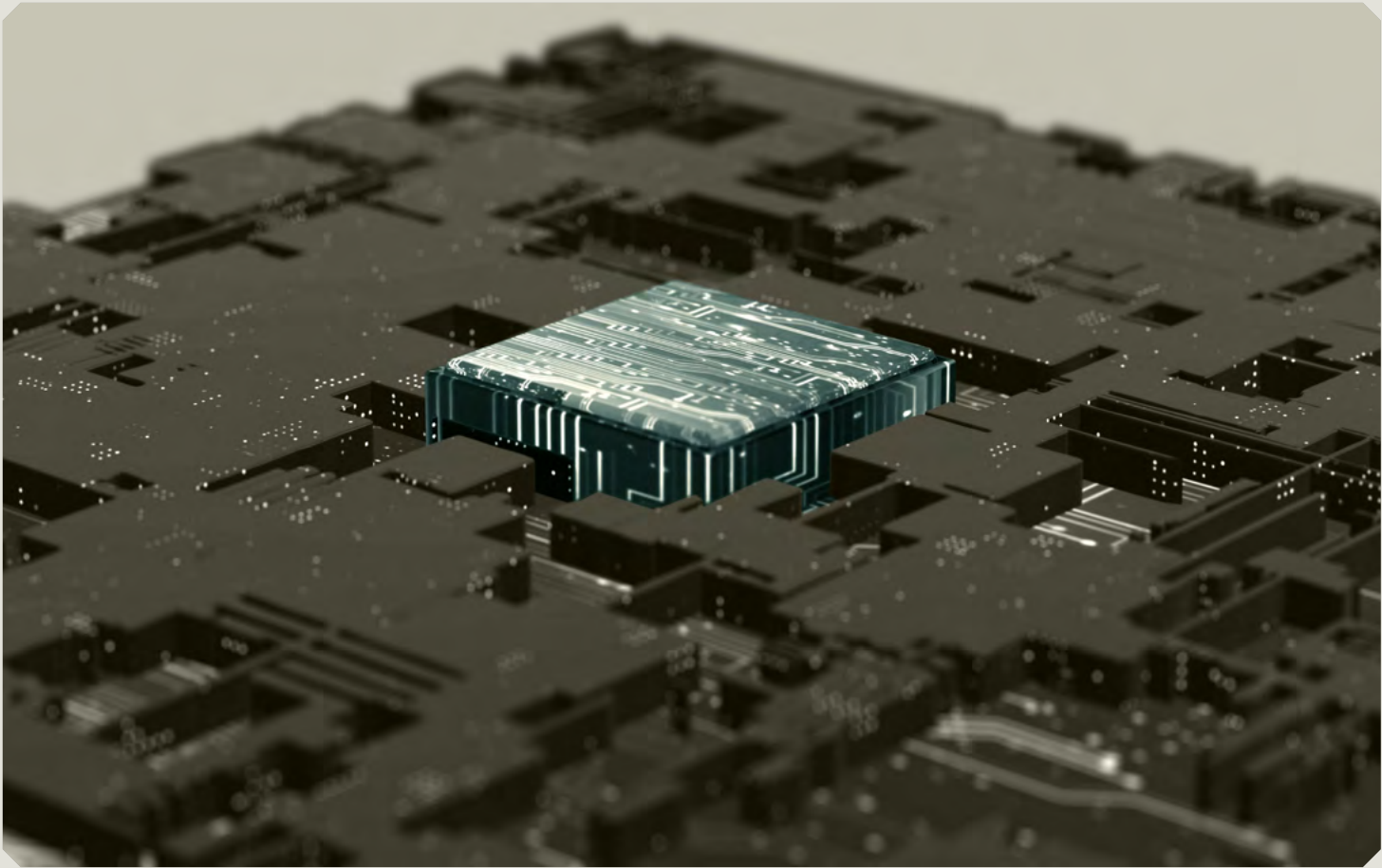
7.1.7. References

Gartner, "Top Trends in Cloud Computing," 2024.

McKinsey & Company, "Hybrid and Private Cloud Solutions," 2023.

Forrester, "Navigating the Private Cloud Landscape," 2024.

Red Hat Research, "Open Source Solutions for Private Clouds," 2023.



7.2. | Hybrid computing

Integrating Different Computational Models for Efficiency in Solving Complex Problems.

Hybrid computing refers to the orchestration of multiple computing paradigms—cloud, edge, high-performance computing (HPC), and even quantum computing—to solve complex, data-intensive problems efficiently. According to Gartner, hybrid computing is a top strategic technology trend for 2025, enabling organizations to **maximize performance, scalability, and cost-efficiency** by combining the strengths of different computing models ²⁵.

In the Philippines, where digital transformation is accelerating across industries, hybrid computing is becoming essential for **AI workloads, real-time analytics, and secure data processing**—especially in sectors like finance, healthcare, and energy.

7.2.1. Impact on business

Sector	Main Impact
Public administration	Digital Service Optimization and Data Sovereignty
Energy & Utilities	Predictive analytics and real-time monitoring of energy networks
Financial & Insurance	Powers fraud detection, risk modeling, and real-time transaction processing
Industry & Retail	Distributed data traceability, automation, and analytics
Telecommunications	Service scalability, 5G deployment, and operational resilience
Healthcare	Secure clinical data processing and medical decision support

7.2.2. Technical approach

7.2.2.1. Core Components

- **Cloud Computing:** Elastic compute and storage for scalable workloads.
- **Edge Computing:** Real-time processing near data sources (e.g., IoT, sensors).
- **High-Performance Computing (HPC):** For simulations, modeling, and AI training.
- **Quantum Readiness:** Preparing for future integration of quantum algorithms.
- **AI & ML Integration:** Distributed model training and inference across environments.

7.2.2.2. Architecture

- **Hybrid Orchestration Platforms:** Kubernetes, OpenShift, Azure Arc, Anthos.
- **Data Fabric:** Unified data access across cloud, edge, and on-prem systems.
- **Security Layer:** Zero Trust architecture with encryption and identity management.

7.2.3. Use cases by market

Sector	Client Company	Use Case
Public	Taguig City	Hybrid platform for citizen services
Energy	Meralco	Hybrid SCADA with edge computing
Financial	UnionBank	Hybrid AI platform for fraud detection and customer behavior modeling
Retail	SM Retail	Smart Retail with Hybrid AI
Telecom	Globe Telecom	Hybrid infrastructure for 5G and digital services
Healthcare	Makati Medical Center	Hybrid platform for medical AI and clinical data

7.2.4. Market considerations

Public Sector: Requires data sovereignty, interoperability, and budget alignment.

Energy: Must ensure low-latency, high-availability infrastructure for OT systems.

Finance: Needs compliance with BSP regulations and secure data governance.

Retail: Demands real-time analytics and integration with POS and ERP systems.

Telecom: Requires scalable edge infrastructure and AI-driven orchestration.

Healthcare: Must comply with health data privacy laws and clinical validation.

7.2.5. Reference companies and startups

Globales:



Philippines:

Globe Business (hybrid cloud), **Bambú Mobile** (AI/IoT), **IRIUM** (infrastructure consulting), **ePLDT** (data centers).

Red Hat OpenShift, VMware Tanzu, IBM Cloud Satellite, Oracle Cloud@Customer – Leading Hybrid Computing Platforms

7.2.6. Recent statistics

Gartner reports that **by 2026, 60% of enterprises will use hybrid computing** to support AI, analytics, and edge workloads ²⁵.

Globe Telecom is investing in **AI and edge computing** to enhance customer experience and operational efficiency ²⁶.

IDC forecasts that **hybrid cloud adoption in Southeast Asia** will grow at a CAGR of 28% through 2027.

7.2.7. References

Gartner, “The Rise of Hybrid Computing,” 2024.

Forrester, “Edge and Cloud: A Hybrid Future,” 2023.

McKinsey & Company, “Strategies for Hybrid IT Adoption,” 2023.

IBM Research, “Hybrid Cloud and Quantum Synergies,” 2023.



8.1. | Augmented connected workforce

Augmented and Connected Workforce: Adopting Digital Tools for Remote and Hybrid Work Models and Increasing Productivity.

The **Augmented-Connected Workforce (ACWF)** is a strategic approach that integrates **AI, automation, collaboration platforms, and real-time analytics** to enhance employee productivity, engagement, and decision-making. According to Gartner, by 2026, **50% of office workers in global enterprises will be AI-augmented** in one form or another²⁸. In the Philippines, where hybrid work models are becoming the norm, ACWF is transforming how organizations operate across both public and private sectors.

8.1.1. Impact on business

Sector	Main Impact
Public administration	Digitalization of processes, remote collaboration and virtual citizen service
Energy & Utilities	Remote asset monitoring, predictive maintenance, and virtual technical support
Financial & Insurance	Enhances customer service, fraud detection, and compliance through AI copilots
Industry & Retail	Remote training, operations monitoring, and real-time support
Telecommunications	Distributed team management, remote technical support, and process automation
Healthcare	Telemedicine, clinical collaboration and remote patient management

8.1.2. Technical approach

8.1.2.1. Core technologies

- **AI Copilots:** Assist employees with real-time insights, task automation, and decision support.
- **Collaboration Platforms:** Microsoft Teams, Zoom, Google Workspace for hybrid work.
- **AR/VR Interfaces:** Used for immersive training and remote assistance.
- **IoT & Wearables:** Monitor worker safety, productivity, and health.
- **Digital Experience Monitoring (DEM):** Tracks user experience across devices and apps.

8.1.2.2. Architecture

- **Cloud-Native Infrastructure:** Ensures scalability and accessibility.
- **Zero Trust Security:** Protects distributed workforces and endpoints.
- **Unified Endpoint Management (UEM):** Manages devices and enforces policies remotely.

8.1.3. Use cases by market

Sector	Client Company	Use Case
Public	Quezon City	Remote Work Platform for Officials
Energy	Meralco	Technical training with augmented reality
Financial	UnionBank	AI copilots for customer service agents and compliance monitoring
Retail	SM Retail	Virtual assistance for store associates
Telecom	Globe Telecom	Help desk automation and hybrid collaboration
Healthcare	Makati Medical Center	Telemedicine and digital medical training

8.1.4. Market considerations

Public Sector: Requires digital literacy programs and secure cloud infrastructure.

Energy: Must ensure ruggedized devices and real-time connectivity in the field.

Finance: Needs compliance with BSP regulations and secure data handling.

Retail: Demands integration with POS and HR systems for workforce optimization.

Telecom: Requires scalable AI infrastructure and low-latency networks.

Healthcare: Must comply with health data privacy laws and clinical validation.

8.1.5. Reference companies and startups

Globales:



Philippines:

Globe Business (AI copilots, 5G), **Bambú Mobile** (AI/IoT), **Aiah** (automation), **Edukasyon.ph** (digital learning).

TeamViewer Frontline, **RealWear**, **Zoom AI Companion**, **WorkJam** – Startups and leading augmented workforce platforms.

8.1.6. Recent statistics

Globe Telecom deployed **329 AI copilots** internally, significantly boosting productivity and innovation ²⁶.

Gartner predicts that **AI-augmented workforces will drive 30% higher productivity** in digitally mature organizations by 2026 ²⁸.

IDC reports that **70% of Southeast Asian enterprises** are investing in hybrid work technologies as part of their digital transformation strategies.

8.1.7. References

Gartner, “Trends in Augmented Workforce,” 2024.

McKinsey & Company, “Digital Transformation in the Workplace,” 2023.

Forrester, “Workforce Tools and Productivity Insights,” 2024.

Microsoft Research, “The Role of Collaboration Platforms in Hybrid Work,” 2023.

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