Australian College of Intelligent Technology

Platforms, Hybrid Models and Scalability

Week 4

Business Digital Transformation & Innovation | MBAI5001

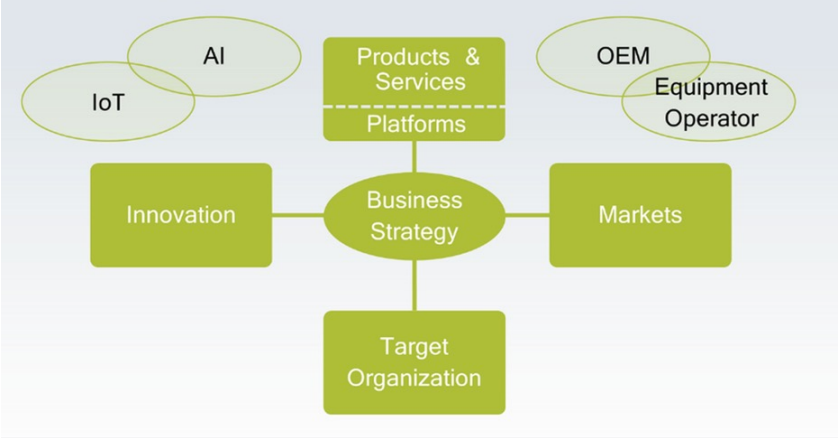
Today's Agenda
Platforms, Hybrid Models and Scalability

- Platforms
- Hybrid Models
- Scalability

Platforms, Hybrid Models and Scalability

Fundamentals of AIoT Business Strategy

Platform-based Strategies utilize AIoT connectivity to link physical products and create integrated, value-added service offerings.



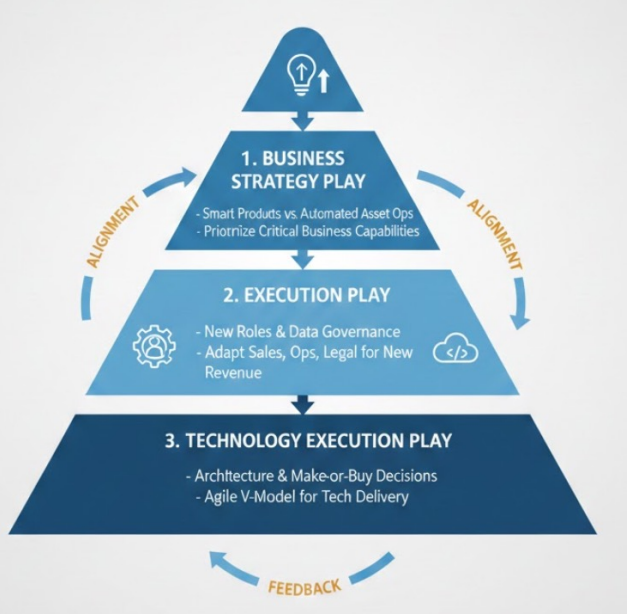
The AIoT paradigm shifts traditional industry roles into two primary digital categories:

- **Digital OEMs** transform traditional manufacturing by incorporating digital enhancements and fundamental business model changes.
- **Digital Equipment Operators** focus on digitalizing operations models to optimize asset management and service delivery.

Part II

The Three Plays of AIoT Transformation

Strategic Synchronization requires aligning three distinct levels to ensure a cohesive and successful AIoT transformation.



Business Strategy Play

- Prioritize between developing smart products or focusing on the automation of asset operations.
- Define critical business capabilities that will benefit most from AIoT-based decision-making processes.

Execution Play

- Establish new organizational roles and data governance structures to manage digital services effectively.
- Adapt classical corporate functions including sales, operations, and legal to support new revenue structures.

Technology Execution Play

- Manage complex architectural questions and make-or-buy decisions for the technology stack.
- Implement modern development approaches such as the agile V-model for technical delivery.

Case Study: Smart Metering

The Dialectic of Business and Technology

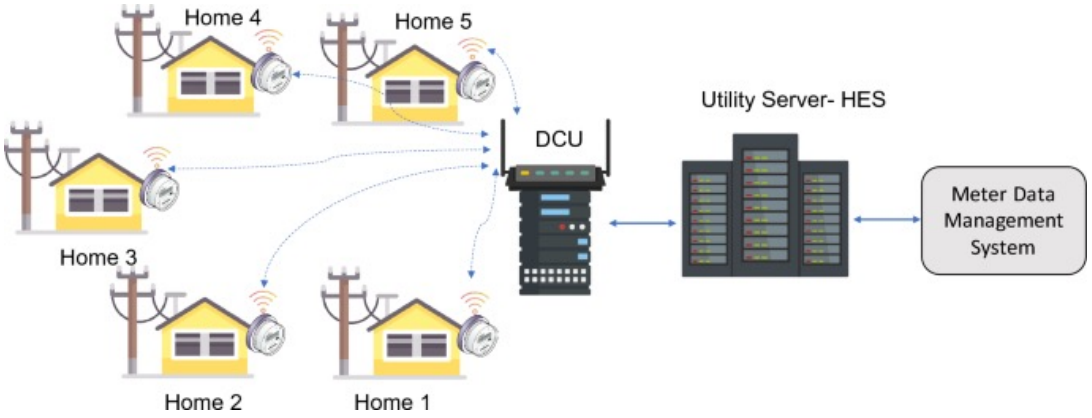
Business and Technology Dialectic: These forces must interact like **Yin and Yang** to achieve success.

Technology Push Trap: Avoid IT-driven developments that fail to anchor within a clear business perspective.

Strategic Alignment: Innovation requires syncing technical execution with business model priorities and organizational capabilities.

Case Study: Smart Metering

- **Technical Requirements**: Engineers must identify the right wireless technology for challenging environments like concrete basements.
- **Business Requirements**: Managers must define the offering structure and identify which service components generate revenue.



Part II

Platforms

Introduction to AIoT Platforms and Strategic Motives

AIoT Platforms: These digital platforms connect directly to physical assets and products to create value.

Platform operators function independently from the specific roles of **Digital OEM** or **Equipment Operator**.

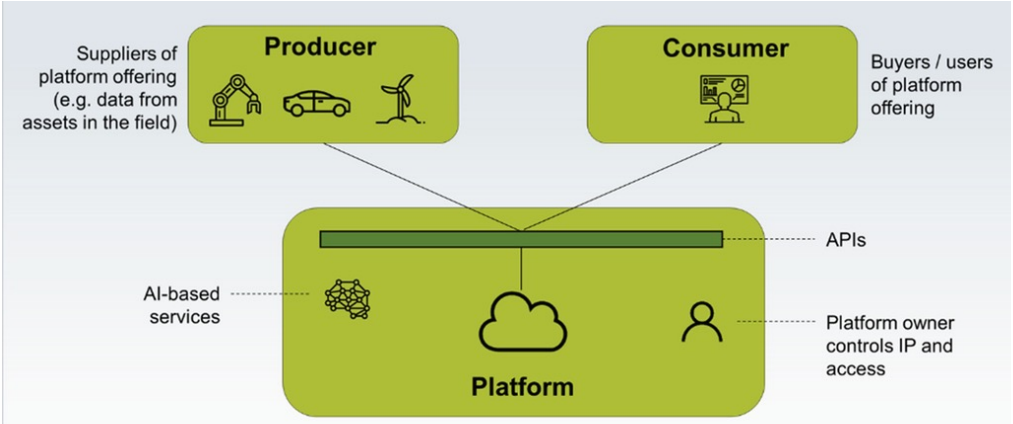
Network Effects: These enable global scaling and revenue generation without requiring heavy physical infrastructure investments.

Strategic Motives for Platform Involvement:

- **Winner Takes All**: Achieving market dominance and extreme profitability within a specific industrial or consumer domain.
- **Underdogs Team Up**: Aligning with other players to collectively compete against established market leaders.

Platforms

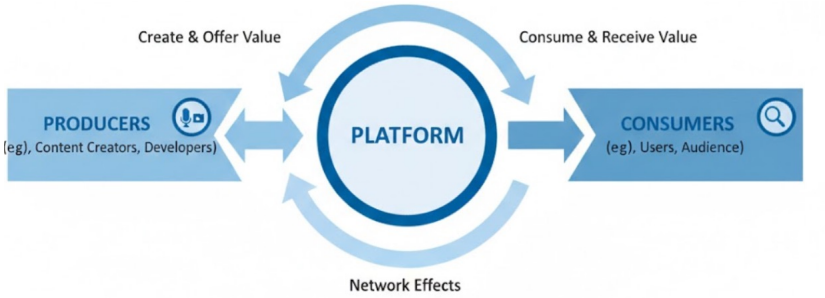
B2C Platform Success	Industrial AIoT Challenges
Simplicity and **focus** allow B2C platforms to scale rapidly across global markets.	**Industrial complexity** requires broader strategies to manage diverse stakeholders and technical requirements.
Standardized data models facilitate **easy connections** between independent producers and consumers.	**Data diversity** involves managing high variety in sensors across different equipment and vehicle models.
Success is driven by neutral brokerage and network effects **without physical infrastructure** investment.	The **AIoT opportunity** involves solving industrial-specific hurdles to achieve B2B platform dominance.



WHAT

Multi-Sided Platforms and the Three Paradigm Shifts

Multi-Sided Platforms provide the infrastructure that brings together content-creating producers and content-using consumers.



Paradigm Shift	Traditional Business	Platform Business
Resource Management	Control of tangible assets like real estate and factories.	Orchestration of external ecosystems and community-based assets.
Value Creation	Internal optimization of activities to create and sell products.	Building external ecosystems to facilitate value-creating interactions.
Strategic Value	Focusing on the individual lifetime value of customers.	Prioritizing network effects between customers within the ecosystem.

WHAT

Integration and Strategic Recommendations

AIoT Integration: Physical products serve as data producers or consumers within the platform's connected ecosystem.

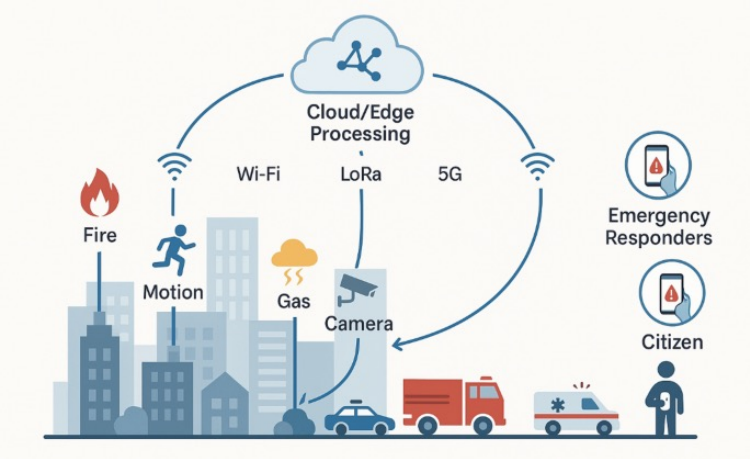
The Role of AI: Artificial intelligence optimizes interactions for producers, consumers, and platform operators.

- AI supports producers by helping them create meaningful offerings for the platform ecosystem.
- Consumers use AI to process platform data in ways that meet their specific needs.
- Operators apply AI to generate swarm intelligence from data provided by multiple producers.

Magnetism: Platforms must match consumers and providers based on specific physical assets and use cases.

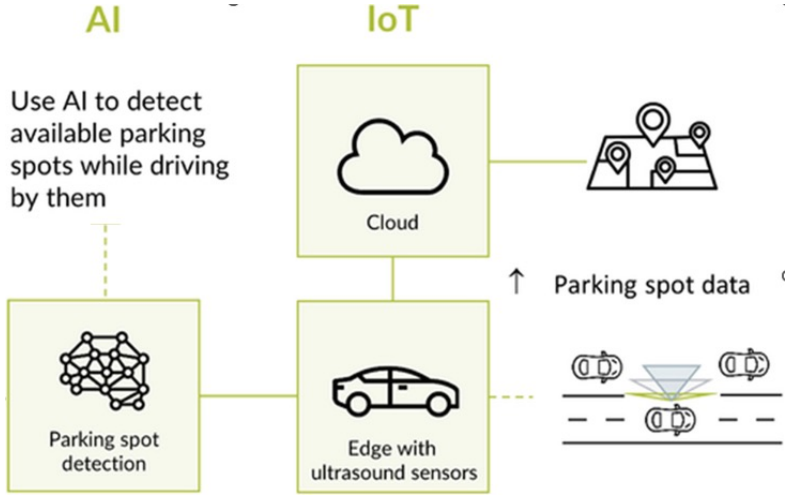
User-Generated Content: Sensor data from assets in the field acts as the primary platform content.

Implicit Value: Combining data from multiple sensors creates new value, such as real-time road maps.



Example: Parking Spot- Multi-Sided Business Platform Model

Multi-Sided Business Platform: A digital ecosystem connecting data providers with consumers to create shared value.



Data Acquisition Strategy

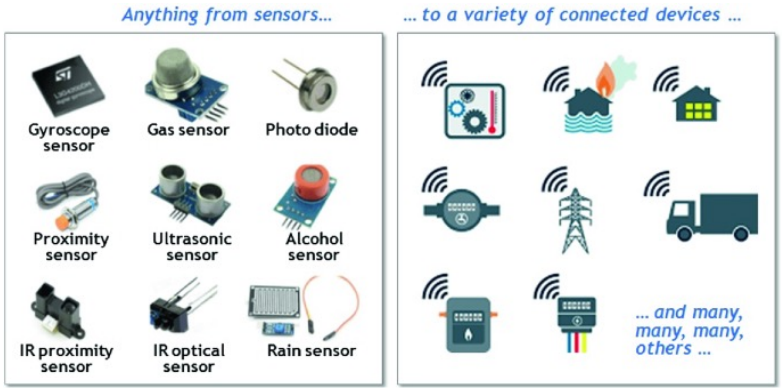
- Vehicles equipped with **ultrasound sensors** detect vacant parking spots automatically while passing through streets.
- Various **Original Equipment Manufacturers (OEMs)** supply raw sensor data to a centralized cloud-based platform.

Value Creation and Delivery

- The platform operator **integrates and consolidates** disparate data sources into a unified, high-quality stream.
- **Monetization** is achieved by selling access to data via specialized find-a-free-parking-spot mobile applications.

Challenges - Complexity in Industrial Platform Environments

Industrial Platform Models face significant hurdles when applied to complex products like automobiles or machinery.



Asset Heterogeneity arises from long product lifetimes, leading to a fragmented landscape of field equipment.

Triple Complexity Factors create a challenging environment for building successful and sustainable platform businesses.

- **Technical Complexity** involves the intricate integration of software with high-precision physical engineering systems.
- **Stakeholder Complexity** requires managing diverse interests across OEMs, suppliers, service providers, and customers.
- **Legacy Systems** represent the difficulty of integrating older physical assets and equipment into modern networks.

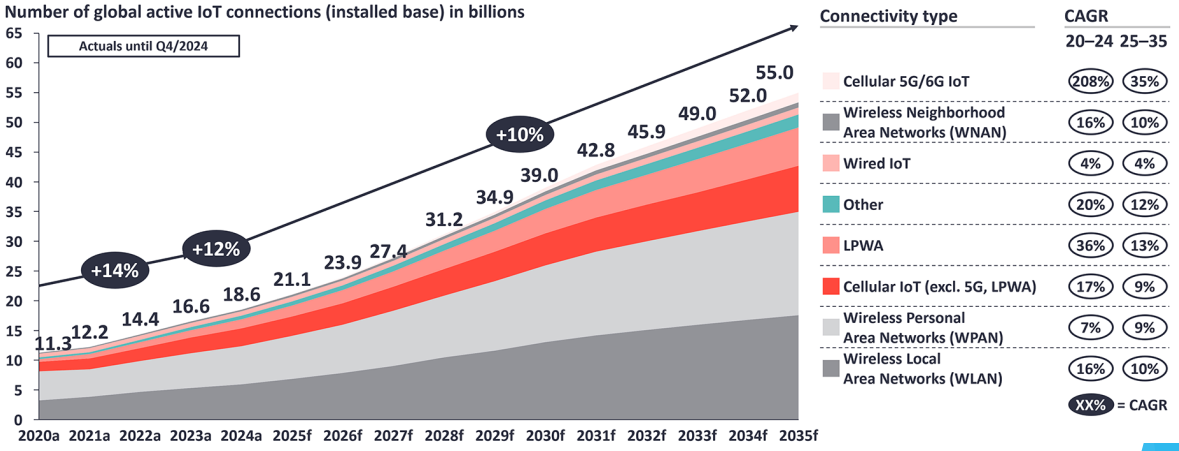
Challenges in Data Marketplaces

OEM Reluctance persists as manufacturers often refuse to share proprietary data, even for direct financial compensation.

Integration Trade-offs require balancing technical depth against the total cost of deployment for data access.

- Basic APIs provide easy internet access but offer limited depth for complex industrial data needs.
- Custom hardware enables better vehicle integration but significantly increases the overall cost of the solution.

Global IoT market forecast (in billions of connected IoT devices)



Challenges - Industrial AppStores and Future Outlook

Profitability Barriers: Smaller consumer bases in industrial environments make building profitable apps harder than in smartphone ecosystems.

Security and Safety: Breaches in OEM app sandboxes can lead to catastrophic consequences in industrial or automotive environments.

Evolutionary Roadmap: The industry is moving toward open ecosystems through a phased, risk-managed approach.

- **Trusted Partner Stores**: Initial steps involve restricted access for verified partners to ensure security and co-creation.
- **Smartphone AIoT Model**: Industrial players will eventually follow the proven success of smartphone ecosystems within their domains.

Knowledge Check

Select all that apply: Platforms

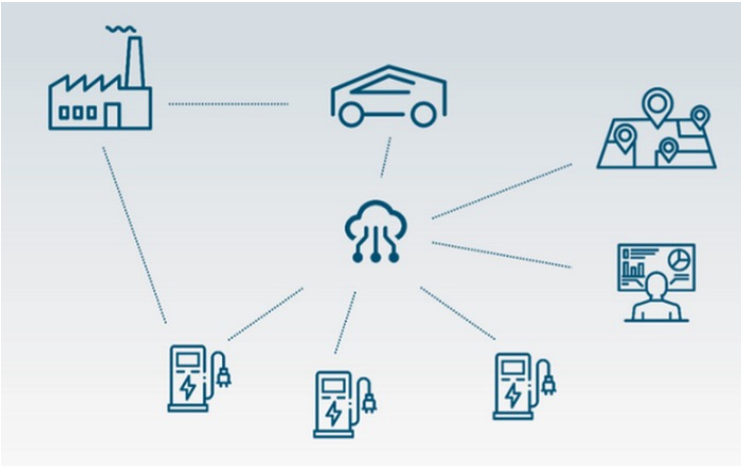
Which of the following are true regarding digital and AIoT platforms?

- A) They rely on an ecosystem of external producers and consumers to scale.
- B) Platform operators must manufacture the physical assets involved in the network.
- C) Successful platforms can create global network effects without owning physical infrastructure.
- D) Industrial AIoT platforms are typically simpler to implement than B2C platforms like Airbnb.
- E) Companies may use platforms to align with others to catch up to a dominant market leader.

Hybrid Models

Integrating Digital OEM and Equipment Operator Roles

Hybrid Models integrate the roles of the Digital OEM and the Digital Equipment Operator. Differentiating these roles clarifies the distinct concepts and responsibilities within a complex business ecosystem.



Integrated Business Models combine manufacturing and operations to capture value across the entire lifecycle.

- **Asset-as-a-Service** models require OEMs to manage equipment performance using revenue and **OEE** metrics.
- **Productized Retrofit Solutions** focus on predictive maintenance while balancing revenue against specific modification costs.

E.g., Tesla manufactures electric vehicles while simultaneously operating a global network of fast-charging stations.

Hybrid Models

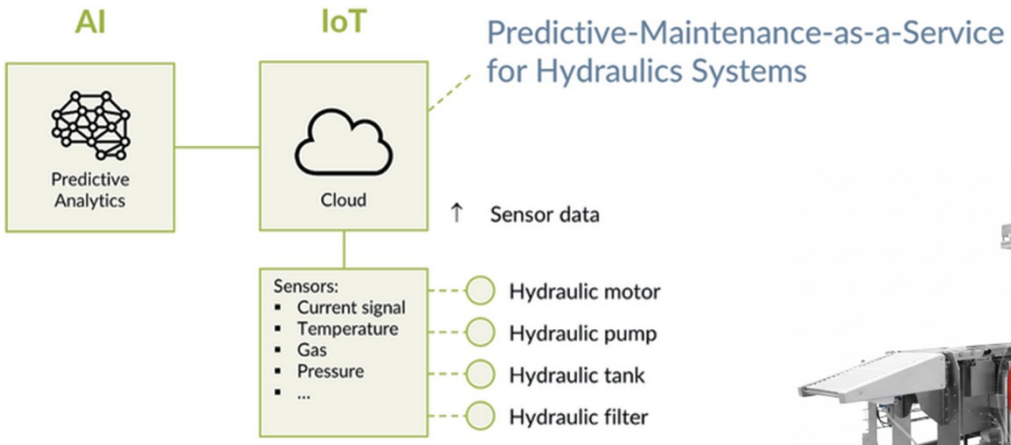
Integrating Digital OEM and Equipment Operator Roles

Hybrid Model	Examples	OEM/Operator KPIs
Integrated Business Model (OEM & Operator)	▪ EV manufacturer with own network of fast charging stations ▪ OEM with Asset-as-a-Service business model	▪ ↑ Revenue, ↑ usability ▪ ↑ Revenue, ↑ OEE
Productized Retrofit Solution	▪ Predictive maintenance solution with own sensor packages ▪ Track & Trace solution with productized tracking sensors	▪ ↑ Revenue, ↓ costs for customizations ▪ ↑ Revenue
Other kinds of digital/physical offerings	▪ Drone-based natural disaster area inspection for insurance companies	▪ ↑ Revenue

Example: Bosch Rexroth Hydraulic Components

Predictive-Maintenance-as-a-Service is a hybrid model providing advanced maintenance for diverse hydraulic components.

Bosch Rexroth provides **hydraulic components** including motors and pumps for manufacturing, mining, and vehicles.



Anomaly detection algorithms differ across applications, requiring unique configurations for every specific customer environment.

- Rexroth implemented a **standardized setup** to deliver customer-specific customizations with high operational efficiency.
- This model serves as a **productized retrofit solution**, upgrading existing hardware with digital service capabilities.

Hybrid Models

	Digital OEM	Digital Equipment Operator	Platforms	Hybrid Models
Customer:	B2C or B2B	Usually B2B	Providers / Consumers	
Offering:	**Smart, connected products**	**Smart, connected solutions**	**Data or services**	
Organization:	Product organization	Project/program organization	Digital product org.	
Balance sheet:	Sold physical products **not** included in own balance sheet	Physical assets/equipment recorded under PP&E (property, plant, and equipment)	Not assets	
KPIs:	Useability / ease-of-use, EBIT, revenue (one-time sales, subscriptions)	Efficiency, cost reduction, quality improvement	Platform-usage related	
Physical Product / Equipment:	Specifically designed and manufactured to support AIoT product offering (**line-fit**)	**Retro-fit** to existing, often heterogeneous assets	Integration via **APIs**	
Standardization:	Productization (packaging, installation, documentation, training, support)	Industrialization (project documentation / operating procedures, operational support)	Highly standardized APIs	
Delimitation:	Multiple, fully isolated users (multi-tenancy)	Single installation with holistic fleet perspective (single tenant)	Multi-tenancy, data-space concepts	

aiotplaybook.org

Example: Drone-based Building

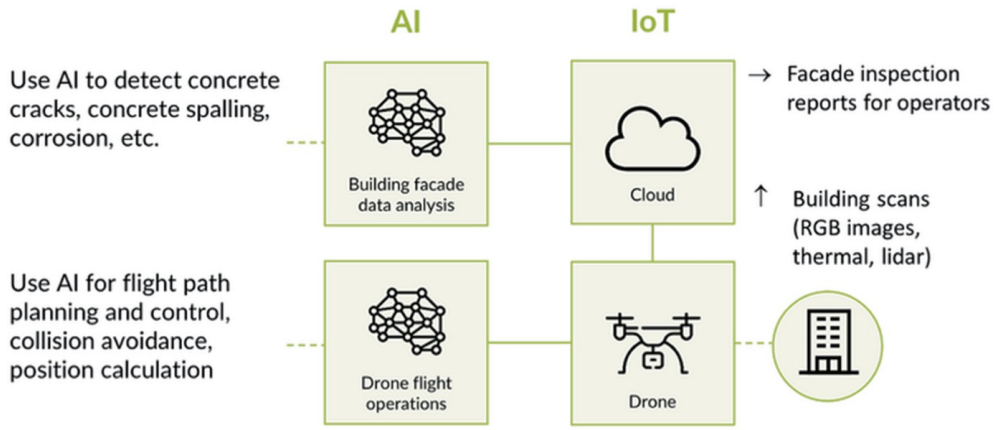
Case Study: TUEV SÜD Drone-based Facade Inspection

Drone-based Inspection utilizes cameras, thermal scanners, and LIDAR to create detailed building facade scans.

Edge AI on the drone manages flight path control, collision avoidance, and precise position calculation.

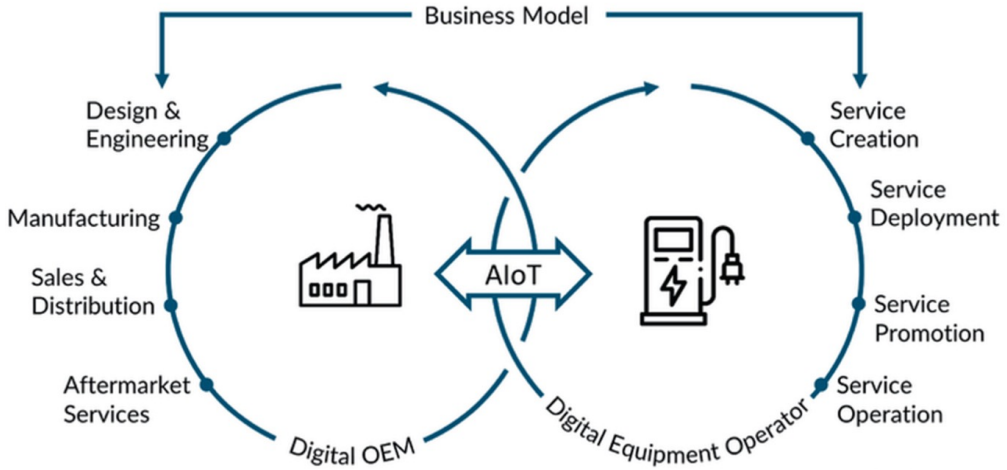
Cloud AI in the TÜV Cloud detects structural anomalies like concrete cracks, spalling, and corrosion.

Customer Reports provide detailed maintenance insights to address identified facade problems effectively.



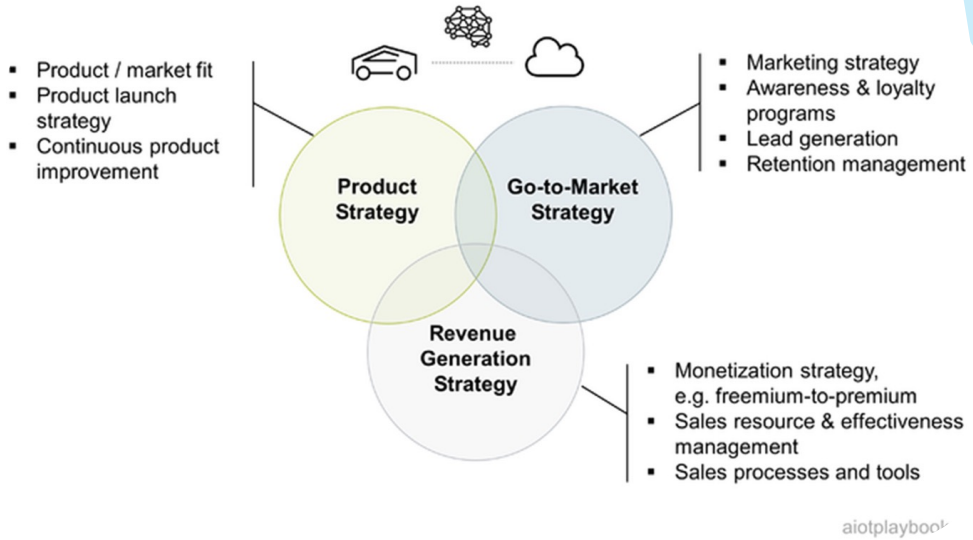
Example: Drone-based Building

- **Hybrid AIoT Models** require the integration of Digital OEM processes with Digital Equipment Operator processes.
  - There is currently **no common blueprint** for implementing these complex and evolving hybrid business models.
- **Strategic Alignment** involves a single entity managing both the production and the operation of technology.
- **TUEV SÜD** exemplifies this by acting as both the manufacturer and the operator of solutions.



Digital OEM: Strategy for Smart, Connected Products

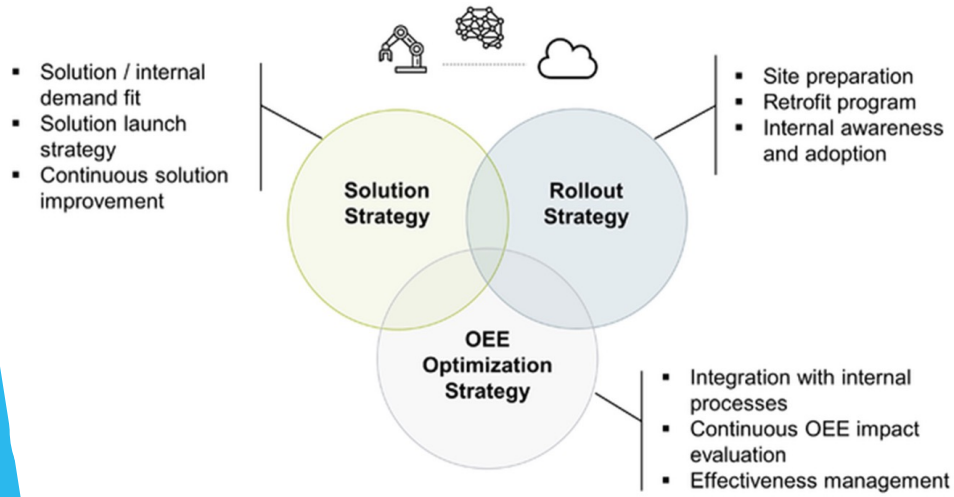
Strategy Element	Primary Focus	Key Components
Product Strategy	Ensures **Product/Market Fit** and continuous digital/physical improvement through AIoT-enabled updates.	Launch strategy, market needs alignment, and ongoing digital side enhancements.
Go-to-Market Strategy	Identifies and persuades customers most likely to benefit from the **Smart, Connected** solution.	Marketing, awareness programs, loyalty initiatives, lead generation, and retention management.
Revenue Generation Strategy	Establishes sustainable income streams and manages **Sales Effectiveness** for digital subscription models.	Monetization models, freemium-to-premium conversion, sales processes, and digital tools.



Scalability

Digital Equipment Operator:
Optimizing Internal Processes through Smart, Connected Solutions

The **Digital Equipment Operator** focuses on optimizing internal processes through smart, connected solutions.



Solution Strategy: Aligns technology with internal needs and continuous improvement.

- Matches the specific solution to internal demand and organizational requirements.
- Establishes a structured launch plan and a framework for ongoing solution enhancement.

Rollout Strategy: Manages the physical and cultural implementation of new digital tools.

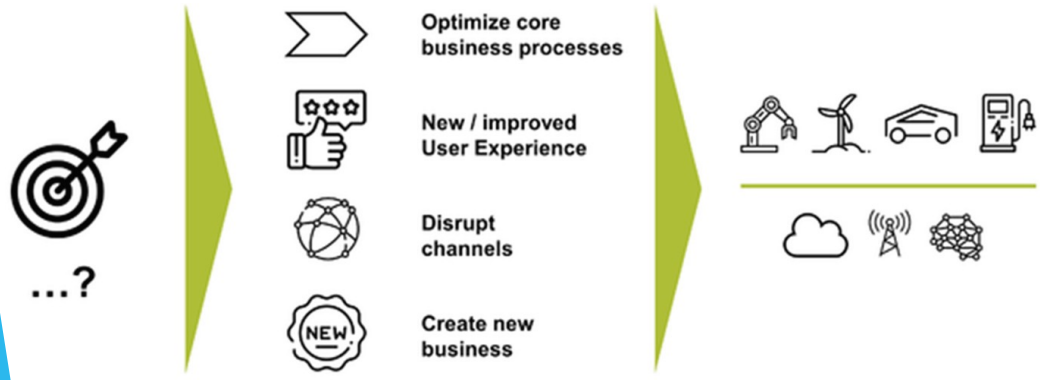
- Coordinates site preparation and large-scale retrofit programs for existing physical infrastructure.
- Drives internal awareness and adoption to ensure stakeholders effectively utilize the solution.

OEE Optimization Strategy targets improvements in equipment availability, performance rates, and output quality.

Clearly Define Your Focus

The Strategic Foundation for Scalability

Focus Definition: Clearly articulating the strategic direction is the essential first step for every AIoT digital transformation.

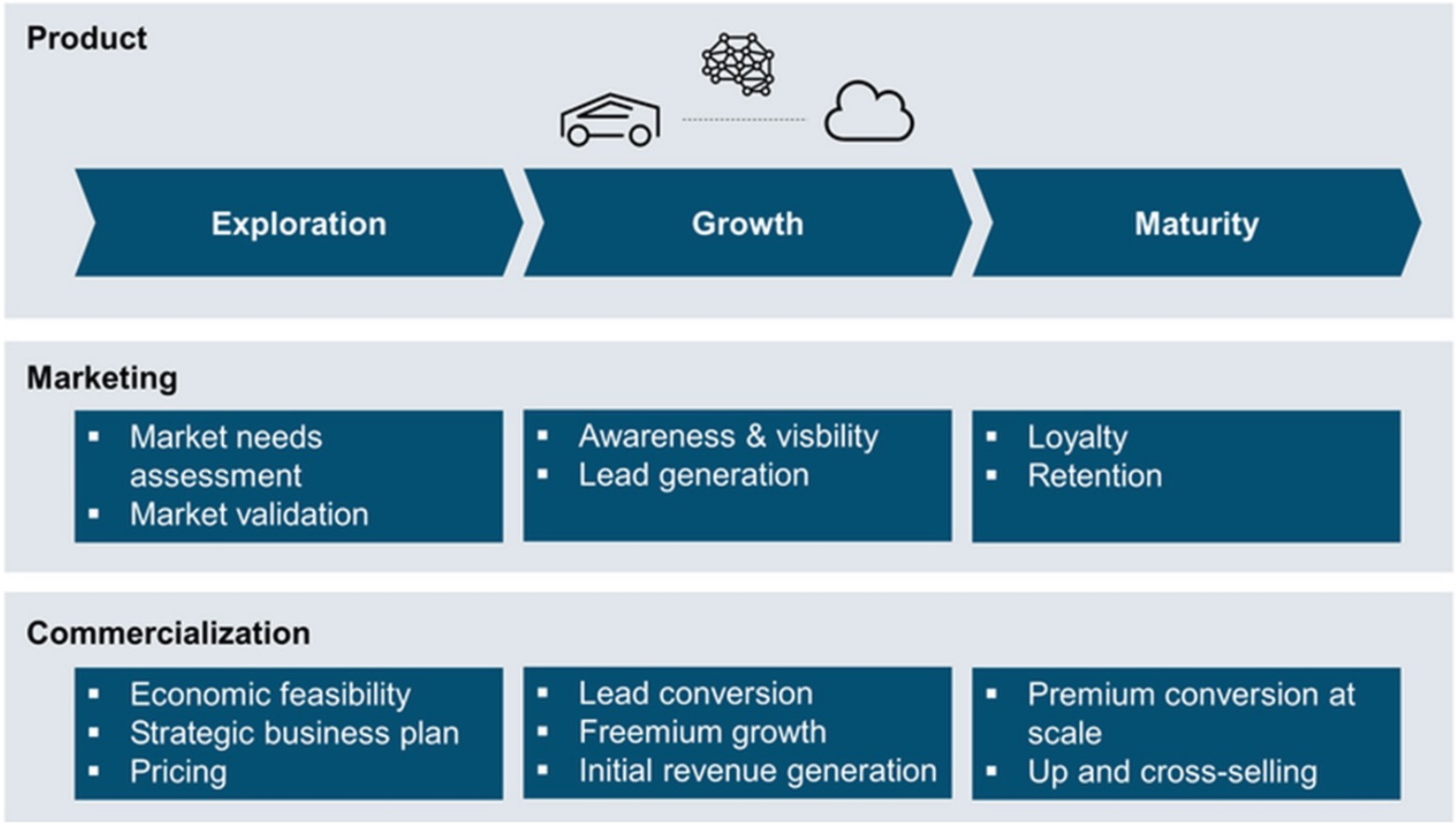


Market and Product Innovation: Leveraging connectivity to redefine how the business interacts with the external market.

- **User Experience**: Improve customer interactions by adding digital layers to previously purely physical product offerings.
- **Channel Disruption**: Open new digital channels that might compete with or disrupt existing traditional sales channels.
- **New Business Creation**: Develop entirely new digital-physical product categories to establish a unique market presence.

Scalability

Take a Holistic View of



Ensure Product/Market Fit

Defining Product/Market Fit and Target Customer Needs

Product/Market Fit requires meeting underserved needs through user experience, feature sets, and value propositions.

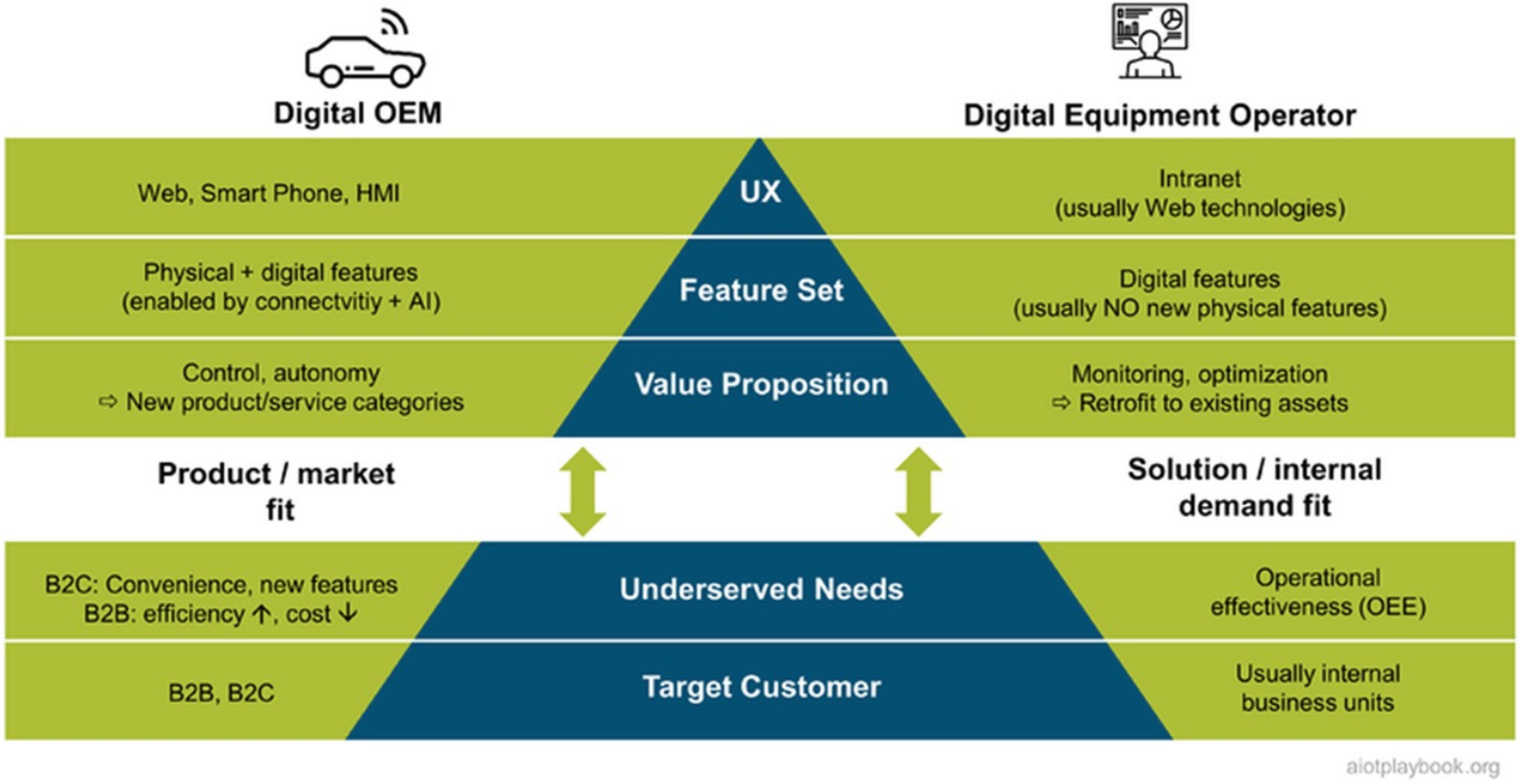
Organizations must continuously adapt their offerings as target customer requirements evolve within the marketplace.

Customer Segment	Primary Value Drivers	Strategic Capabilities
Digital OEM (B2C)	Convenience and innovative features	Control and Autonomy
Digital OEM (B2B)	Efficiency gains and cost reductions	Control and Autonomy
Digital Equipment Operator	Internal operations effectiveness (OEE)	Monitoring and Optimization

Ensure Product/Market Fit

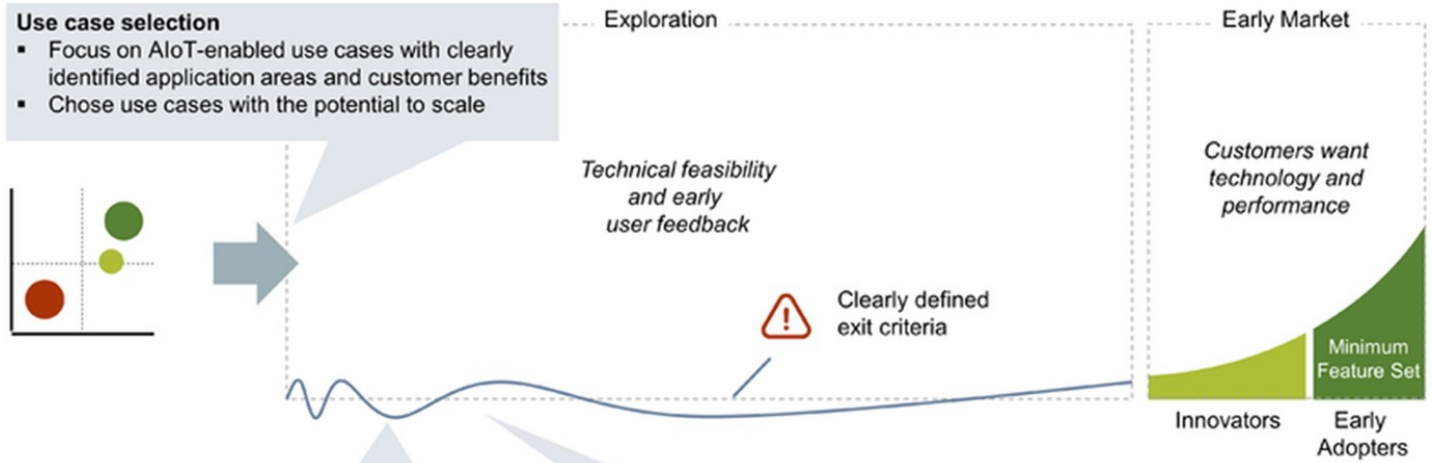
Strategy Aspect	Smart Products (Digital OEM)	Smart Solutions (Equipment Operator)
Feature Composition	Smart products **combine physical and digital features** enabled by IoT connectivity and AI software.	Operators **focus on digital features** because they cannot change the existing physical asset's hardware.
UX Technology	Products utilize a broad range of technologies including **web, mobile, and embedded HMI interfaces**.	Solutions often rely on basic web technologies for intranet applications with **simpler interface requirements**.
UX Investment	High UX investment is necessary to meet **consumer expectations** and ensure market competitiveness.	UX investment **scales with audience size**, differentiating between niche technical operators and wide audiences.
Practical Application	UX must be s**eamless across all touchpoints** to satisfy diverse B2C or B2B customers.	Simple UX suffices for technical monitoring, while operations support apps require **high-quality mobile interfaces**.

Ensure Product/Market Fit



Ensure Efficient Exploration

Foundations of AIoT Exploration: Selection and Environment



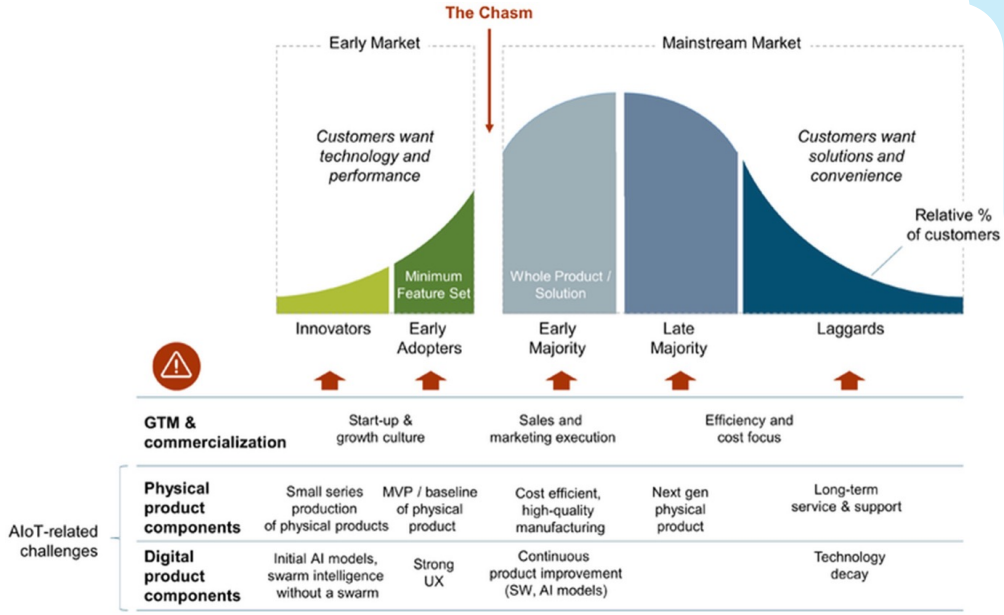
Understand How Best to

Navigating the Early Stages: Innovators and Early Adopters

Crossing the Chasm adapts Geoffrey Moore's framework to address the unique lifecycle of AIoT products.

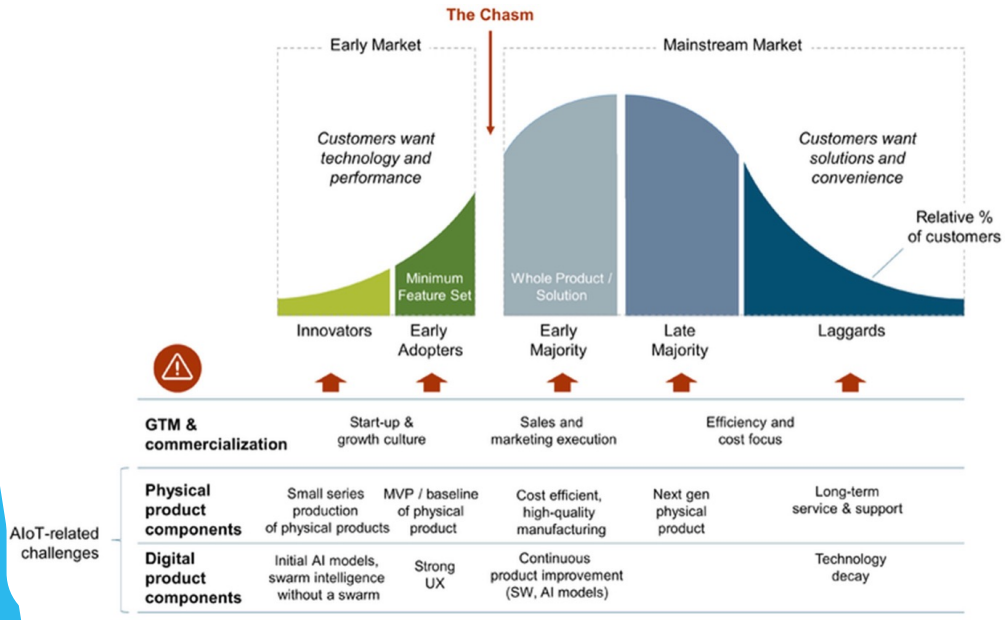
Innovator Challenges focus on technical feasibility and initial data acquisition for AI models.

- **Data Scarcity** requires using simulation and small-scale physical series to train early AI models.
- **Swarm Intelligence** is difficult to implement when the initial field of connected products is small.



Understand How Best to

Navigating the Early Stages: Innovators and Early Adopters



Early Adopter Phase demands a shift from technical experimentation to refined product-market fit.

- **Physical Baselines** must be finalized before the Start of Production because hardware is difficult to change.
- **Minimum Viable Products (MVP)** require careful balancing of physical constraints and digital AIoT features.
- **User Experience** is vital to attract early adopters and compete effectively against agile start-up incumbents.

Scalability

Understand How Best to Scaling for the Early Majority and Sustaining Growth

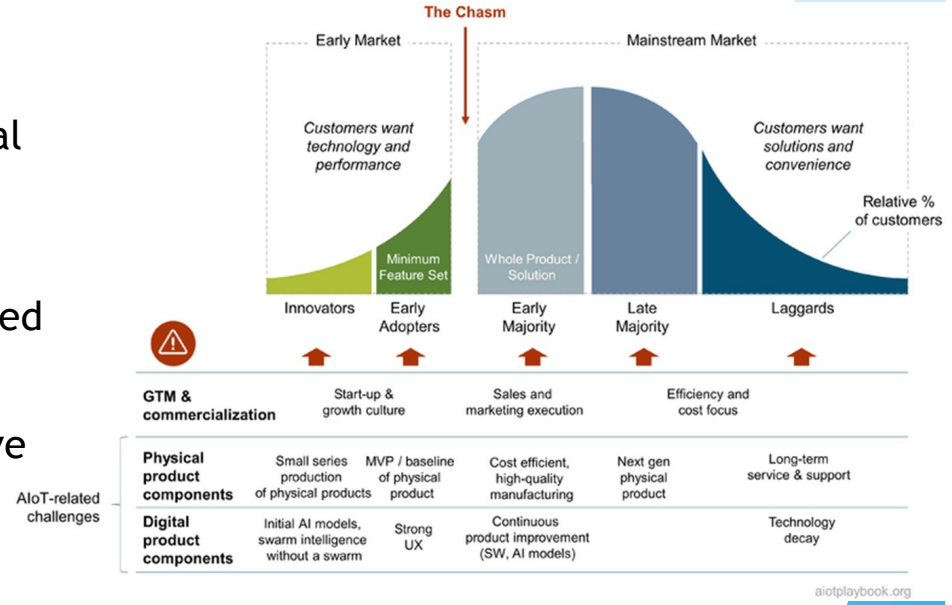
Early Majority Transition: Establishing cost-efficient and high-quality manufacturing processes is vital for reaching the mainstream market.

Scaling Dynamics: Scaling physical production is significantly more challenging than expanding the digital side of the product.

Market Strategy: Success requires shifting from a pull-market to excellence in sales and marketing for sustained growth.

Continuous Improvement: Products must stay attractive through regular software updates and continuous retraining of AI models.

Trough of Disillusionment: Managing high expectations is crucial to maintain management support during the initial scaling dip.



Understand Implications of AIoT Short Tail vs. Long Tail

Case Study and Strategic Considerations for Scalability

Bosch Case Study: The Chassis Control Systems group utilizes a Center of Excellence for global harvesting.

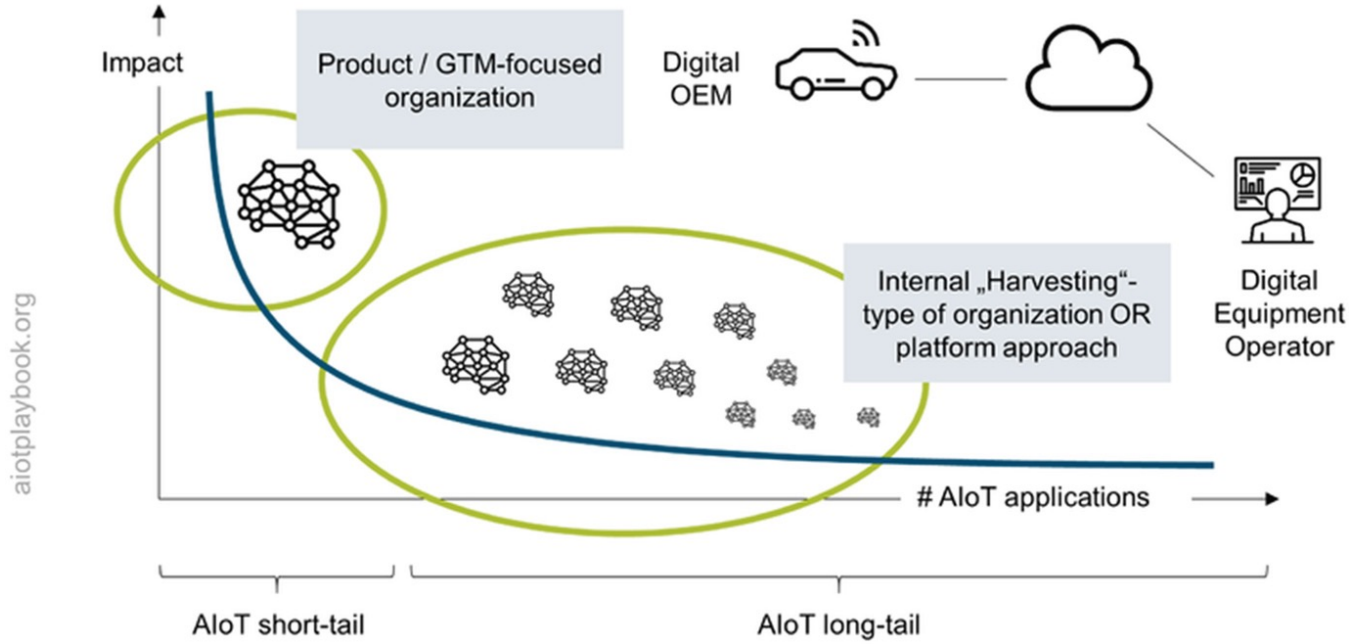
OEE Improvements: This platform manages a portfolio of AIoT projects focused on optimizing high-volume manufacturing networks.

Organizational Balance: Scaling requires balancing centralized expert teams with field specialists who understand individual local opportunities.

Strategic Factor	Short Tail Priorities	Long Tail Challenges
Market Dynamics	Investment size and time-to-market are critical for competing against other market players.	Success depends on addressing custom solutions and securing domain-specific skills for niche applications.
Resource Management	Focus on a Digital OEM organization to drive high-impact productization and scaling.	Requires robust partner management and dedicated budgeting to scale-up diverse, non-standardized opportunities.

Understand Implications of AIoT Short Tail vs. Long Tail

Case Study and Strategic Considerations for Scalability



Gabriel Wetzel, CEO of Robert Bosch Smart Home: "*The short-tail opportunities will often be addressed by other market players as well. This means that investment size and time-to-market are absolutely critical. The long tail requires many custom solutions. You should not underestimate the required resources, the domain-specific skills and the market access. Not all of these can be easily scaled-up. Of course this can be addressed by a top-in-class partner management: but don't forget to budget for it!*

Scalability

Ensure Organizational

The Challenge of AIoT Organizational Scalability

Organizational Scalability involves growing and evolving the business structure as smart products mature from ideas to scale.

IT-Physical Integration creates complexity by combining agile DevOps cycles with traditional heavy engineering and manufacturing capabilities.

Stack Orchestration requires managing diverse domains including deep tech, cloud platforms, and complex connectivity solutions.

Dynamic Evolution ensures the engineering organization adapts its structure and skills as the product matures.

Transition Awareness is critical for identifying shifts in Product Lifecycle Management and changing organizational capability needs.

Scalability

Ensure Organizational

Phase	Primary Objective	Organizational Approach
MVC/MVP	Validating feasibility through high-fidelity experimentation and rapid prototyping.	A 'gang of hackers' focuses on quick solution hacking.
NPE	Validating reliability through rigorous and disciplined multidisciplinary engineering processes.	Teams integrate mechanical, electrical, and data science competencies.
NPI	Managing scale and building the necessary support ecosystem.	Partners and high-speed DevOps provide the backbone for services.

Ensure Organizational Multidisciplinary Competencies and Layered Maturity

Multidisciplinary Engineering integrates mechanical, electrical, electronics, power management, and security into a unified development process.

Mathematical Modeling and data twins mimic physical properties to bridge data science with physical engineering.

Layered Maturity recognizes that different technology stacks evolve at varying velocities during the product lifecycle.

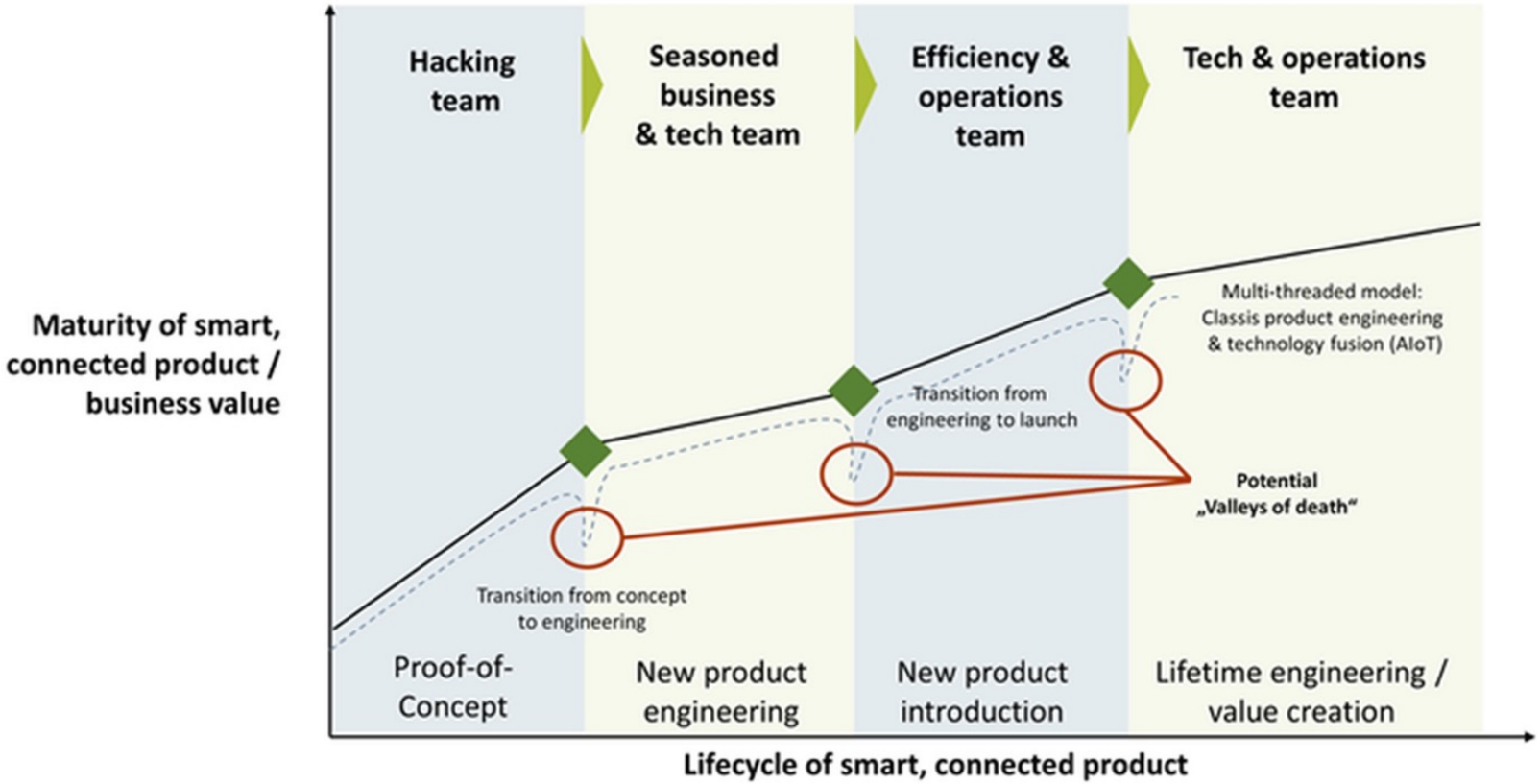
- The electronics and communication layers often mature before data and AI capabilities are fully realized.
- Teams must manage the asynchronous development of network services, data modeling, and final product reliability.

Cross-Domain Teams must understand both mathematical data modeling and the underlying physics of the product.

Scalability

Ensure Organizational

Navigating Transitions and Crossing the Chasm



Scalability

Deal with Repeatability Capacity and Marginal Costs

Digital Business Model	Physical Product Model
Digital offerings achieve high scalability through standardized products and very low extra costs for repetition.	**Physical products** face scaling difficulties because manufacturing effects typically require extremely high production volumes.
Marginal costs for digital repetition are minimal, allowing for rapid expansion without significant resource increases.	**Marginal costs** remain significantly higher than digital offerings even when high production scale is achieved.
The model prioritizes software-driven efficiency to maintain a competitive advantage in global markets.	The core challenge lies in bridging the gap between physical manufacturing constraints and digital efficiencies.

Scalability

Deal with Repeatability Capacity and Marginal Costs

The Digital OEM: Standardization and Software-Driven Differentiation

Digital OEMs must prioritize highly standardized physical products to ensure complexity does not hinder scalability.

Product differentiation should shift from physical hardware variations toward **software-driven configurations** and AI capabilities.

Case Study: Seat Heating-on-demand

- Vehicles use identical physical equipment while software enables specific features based on customer demand.
- Success depends on balancing **marginal production costs** against potential downstream revenue over the life-cycle.

Knowledge Check: Scalability

What is a primary challenge unique to scaling AIoT-enabled businesses compared to purely digital ones?

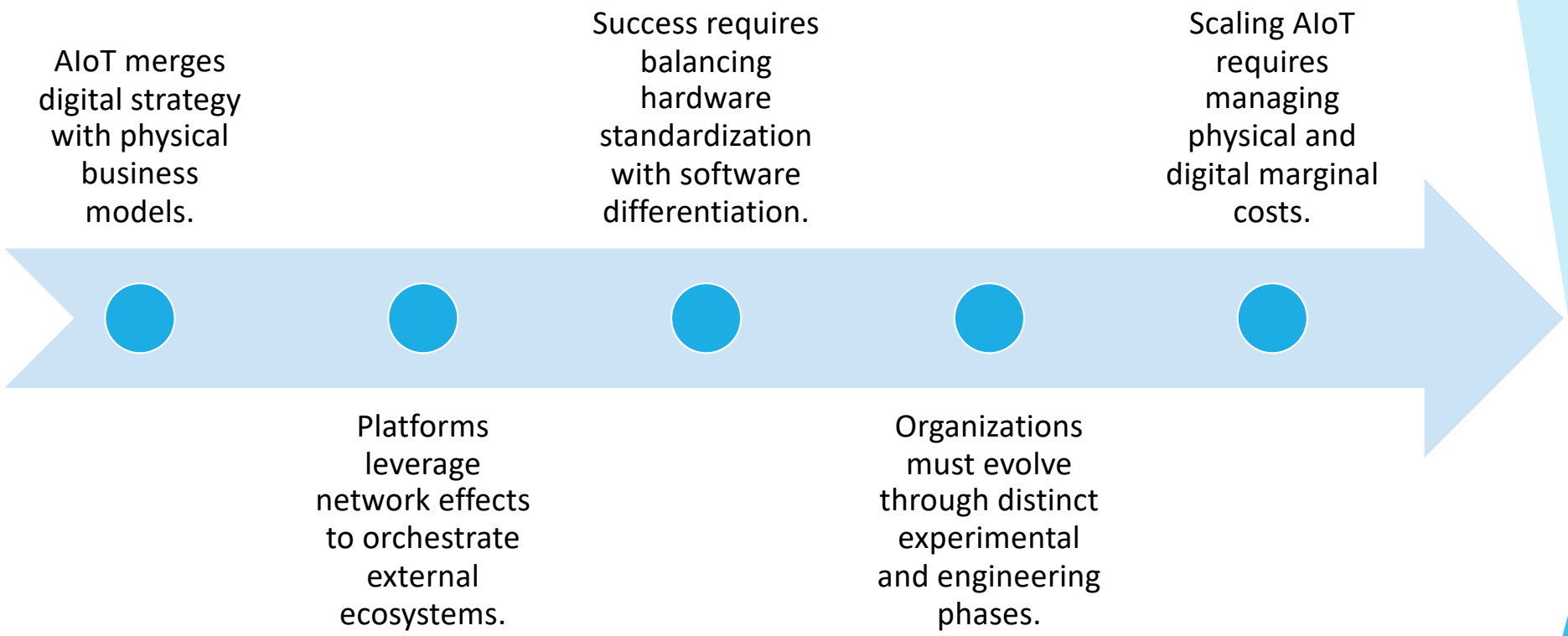
- A) The need to navigate pitfalls of a digital/physical business.
- B) The requirement to skip the exploration phase.
- C) Focusing exclusively on early adopters for long-term growth.
- D) Avoiding business objectives during the scaling process.

Knowledge Check:

What is the primary strategic focus for a Digital Equipment Operator compared to a Digital OEM?

- A) Fundamental changes to the revenue-based business model
- B) Digitalization and optimization of the operations model
- C) Selecting wireless connectivity for basement-level hardware
- D) Eliminating the need for a dedicated digital strategy

Summary & Key Takeaways



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Questions?