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Pathways for Enterprise Informatization Reengineering in the AI Era: Empowering Intelligent Systems and Driving Sustainable Growth

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Abstract:
The rapid development of artificial intelligence (AI) has opened new pathways for enterprise informatization. As data evolves from mere information to knowledge and eventually wisdom, its role has transformed from a simple resource to a strategic asset with substantial economic value, driven by the growing utility and market value of data. In the context of AI, enterprise informatization calls for the construction of a "Growing Basement", a platform that enhances knowledge and data management, integrates legacy systems, and intelligently addresses real-world digitalization challenges within enterprises. By enabling systems to think and self-optimize, enterprises can achieve true digital intelligence", convert it into tangible productivity, enhance competitiveness, and foster sustainable growth.

Keywords: Informatization, AI foundation, Growing Basement

Introduction

In digital economy era, enterprise competitiveness increasingly hinges on the level of informatization. The widely accepted notion that "data defines everything; the world is networked" underscores the fact that productive forces generated through informatization have become a foundational pillar of enterprise development. As such, the effective utilization of information resources and the enhancement of managerial and operational capabilities have emerged as critical tasks for modern enterprises.

With the rapid advancement of AI, its application scenarios are expanding, and its influence is deepening. Against this backdrop, integrating existing information system resources, collecting and structuring knowledge-related data, and deepening the application of AI in enterprise management processes have become historically significant challenges that will shape firms' future development. To adapt to the AI era, enterprises must embrace new conceptual paradigms and reengineer informatization projects with two core orientations: digital intelligence as the defining characteristic and growth as the essential objective. Internally, this transformation involves optimizing processes and improving operational efficiency; externally, it requires delivering suitable

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products and high-quality services in customer and market interactions. In doing so, enterprises can enhance their market image, strengthen competitiveness, and promote sustainable development. Through this transformation, firms are better positioned to fulfill their historical mission—survival and growth—while demonstrating robust vitality.

1. Background: The Transition from Informatization to Intelligence

1.1 Historical Development

The information revolution has ushered a new chapter in the evolution of productive forces. Human society has transitioned from agrarian and industrial civilizations to an information-driven era dominated by the Internet, realizing the vision of "data defines everything; the world is networked". With the rapid advancement of AI, the paradigm of digital intelligence has begun to not only influence but, in some cases, reshape the course of economic and societal development. For one thing, informatization has played a powerful enabling role. It not only facilitates the realization of data's intrinsic value but also opens new avenues for wealth creation, thereby greatly accelerating economic and social progress. For another, the compound effects of AI are increasingly evident, injecting new momentum into informatization progress. AI is driving breakthroughs in scientific research, technological innovation, product manufacturing and distribution, and is also contributing to human well-being. As informatization and digitalization gradually converge toward intelligent digitalization, the digital economy has been revitalized, giving rise to a new wave of innovation and development.

1.2 The Transformation of Data into Wisdom: From Resource to Asset to Living Productive Force

As the most fundamental element of the digital economy, data is playing an increasingly pivotal role. This transformation is primarily manifested in the following aspects:

First, the process from data to wisdom has become a widely acknowledged process, and as the foundational source, the utilitarian value of data is now fully recognized. As the saying goes, "even the cleverest housewife cannot cook without ingredients", data has become the essential driving force. The transformation can be described as follows: data, in its raw form, becomes coherent and meaningful through processing and organization, thus producing information. By analyzing and synthesizing relationships and patterns within that information, it gains actionable utility and forms knowledge. On top of knowledge, the focus shifts toward foresight—enabling prediction, autonomous decision-making, and strategic execution. When systems can automatically extract information, refine knowledge, and apply it intelligently, they can autonomously perceive, decide, and act. They are able to flexibly apply information and knowledge to determine future courses of action and put them into practice. As a result, wisdom emerges and becomes essential.

Second, with the development of the digital economy, the asset-like nature of data has become increasingly prominent. Possessing data grants a position of strategic advantage. Proximity to data sources enables early access, and effective utilization of data creates a first-mover advantage. Furthermore, as data asset markets take shape, the scarcity and market value of data will be further institutionalized. Its exclusivity, monopolistic potential, quantifiability, and tradability will jointly reinforce and formalize its attributes as an economic asset, thereby delivering appropriate and progressively increasing returns to its owners.

Third, as artificial intelligence continues to evolve, the value of data will be further amplified and extracted. Information, as an abstraction of the world, people, and events, is conceptually richer than raw data. It can stem from both human-constructed knowledge and naturally occurring facts. By mining and analyzing hidden structures behind observable phenomena, information and knowledge emerge. However, transforming information into knowledge is not a matter of random accumulation. It requires processes of categorization and conceptual structuring (Bruner, Goodnow, & Austin, 1956). For humans, knowledge building is inherently cognitive; cognition operates through the generalization and classification of external entities. We acquire knowledge through cognition. Knowledge is not simply disorganized information, but a structured set of concepts distilled through analytical integration, forming the foundation for understanding. With the introduction of AI, machines can emulate human cognitive processes, effectively using data and information through machine learning and enhanced reasoning. This enables the automated transformation of data into information, then knowledge, and ultimately wisdom, which can be contextually applied. Data's value continues to expand through both deep mining and broad application, so as to become a tangible force in real-world productivity.

Thus, with the support of artificial intelligence, data has undergone a substantive transformation from a resource, to an asset, and ultimately into a tangible force of productive capacity.

1.3 Current Challenges and Future Directions in the Context of AI

Over the past decade, enterprises have undergone a profound wave of informatization. Systems such as ERP, MES, OA, PLM, and EAM have been deployed successively, enabling organizations to achieve structured operations and improved controllability. Yet a new era has already arrived. The widespread adoption of artificial intelligence, data intelligence, and automation technologies has made intelligentization a new strategic threshold. At this stage, many enterprises are beginning to recognize a common challenge: despite having numerous systems in place, data remains fragmented and unintegrated, and the problem of "information silos" remains severe. While reporting capabilities have expanded, they still rely heavily on manual processes, making real-time analysis difficult and limiting the timeliness of information. Decision-making processes may be digitally supported, but often continue to rely on intuition and experience, falling short of delivering accurate predictions. The aspiration to "let history inform the future" remains largely unfulfilled. These developments signal a broader transformation in enterprise system roles. In the era of informatization, systems were primarily designed to record the past. In the era of intelligentization, they must evolve to retain historical data, interpret present conditions, and anticipate future trends. In the current context of economic realignment, rising cost pressures, and the urgent demand for business model innovation, enterprises must identify new drivers of growth. In our view, the only viable path forward is to activate existing system assets through intelligentization and enable systems to develop intelligence from within.

2. Solution: Intelligent Transformation and the Construction of a "Growing Basement"

2.1 The Engineering Concept of the Growing Basement

In many enterprises' intelligent transformation plans, a common misconception is the idea of "tearing down and rebuilding". This involves repurchasing systems, redesigning processes, and restructuring data—essentially starting from scratch. However, such efforts often require enormous investment and may lead to system discontinuities and heightened operational risk. Human beings have been able to rise above other forms of life with dignity because of the power of growth. This growth is not merely biological or physiological; more importantly, it encompasses the growth of thought and wisdom. Our enduring capacity to understand and reshape both nature and society stems from this intrinsic drive to grow. Therefore, the appropriate course of action should therefore be to build a growth-oriented intelligent foundation upon existing systems. We refer to this foundation as the "Growing Basement", which enables systems to become smarter and more autonomous in action. As Charles Petzold (2000) writes in *Code: The Hidden Language of Computer Hardware and Software*, the book ostensibly explains how computers function. Yet at a deeper level, it illustrates how humans enable computers to operate according to human intention and design. In this light, the attribute of "growth" must be defined by humans and realized through collaboration between humans and systems.

The "Growing Basement" is not a new system, but an intelligent architecture designed to coexist with and co-evolve alongside existing systems, enabling continuous adaptation and development. Anchored in the core principles of connectivity, integration, intelligence, and evolution, it serves as a foundational infrastructure for building a sustainable digital-intelligent enterprise ecosystem. The goal of the Growing Basement is not to replace, but to empower; not to rebuild, but to enable organic growth. This approach ensures security, continuity, completeness, systemic coherence, and scalability. Embracing this conceptual shift is the critical first step toward intelligent transformation and an essential and foundational move for achieving long-term enterprise success.

2.2 Overall Architecture of the Growing Basement

The Growing Basement typically consists of five layers, forming a structural system of a "stable foundation with continuous evolution" from the bottom upward.

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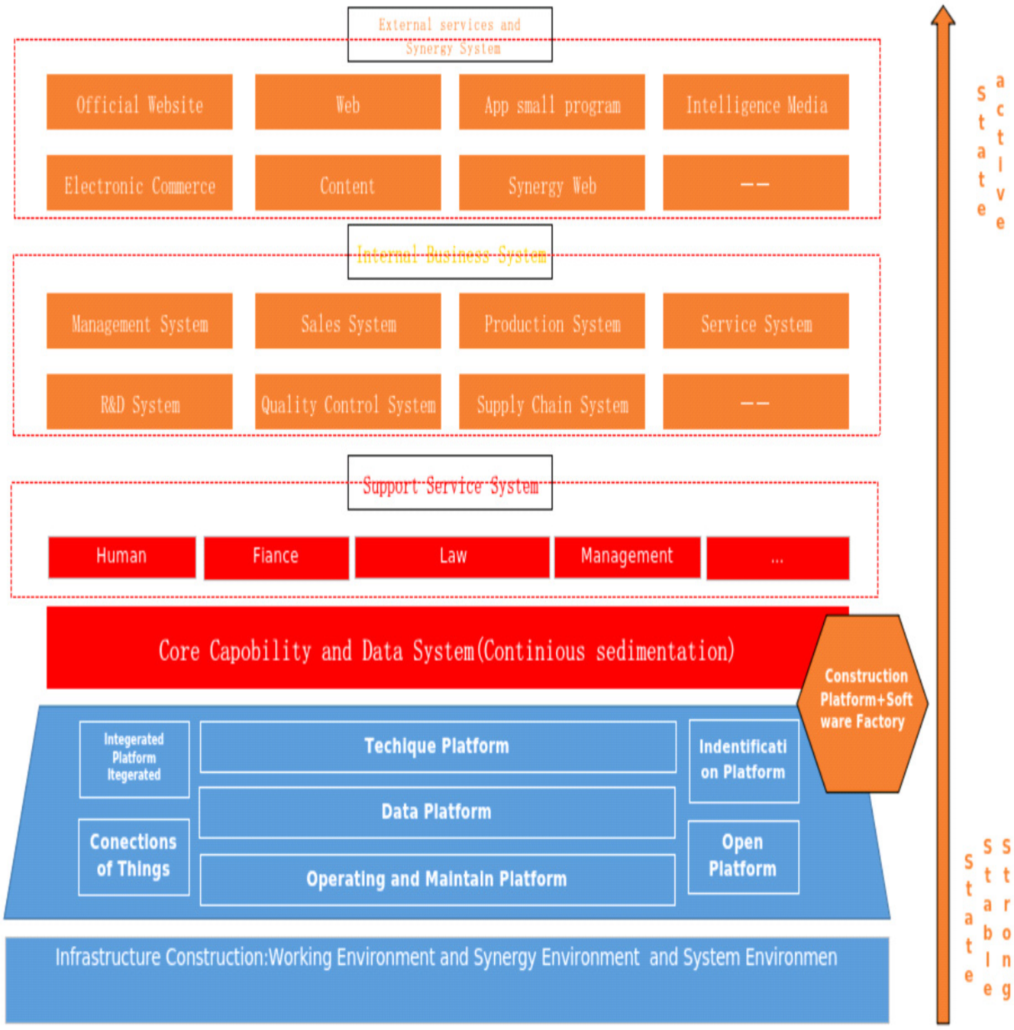

Figure 1. Schematic Diagram of the Growing Basement Architecture

(1) Infrastructure Layer: Foundation of the Digital–Intelligent Ecosystem

The infrastructure layer provides the foundational support for office operations, collaborative environments, system platforms, cloud resources, and network security. It serves as the "soil" of the enterprise digital ecosystem, ensuring that all systems operate in a stable, secure, and scalable manner.

Key components of the infrastructure layer include: office networks, private networks, and hybrid cloud environments; network security and access control systems; system and terminal operating environments; as well as DevOps and automated operation and maintenance support.

(2) Platform Support Layer: Core Framework of the Growing Basement

The platform support layer serves as the key technological support module for intelligent transformation and forms the enterprise's unified technology platform. It consists of seven sub-platforms: the integration platform connects different systems and data sources to achieve interoperability among systems; the data platform enables data collection, cleansing, governance, integration, and analysis; the identity platform unifies the management of users, roles, and permissions, and integrates the authentication system; the technology platform provides capabilities such as low-code development, AI development, workflow engines, and API management; the operations and maintenance platform enables unified monitoring, alerting, and automated operation and maintenance, supporting visualized management; the open platform offers standard interfaces and SDKs to support third-party extensions and ecosystem integration; the Internet of Things (IoT) platform connects devices, sensors, and edge computing nodes to enable collaboration between humans, machines, and physical objects. This layer functions as the "digital nervous system" of the enterprise, allowing data to flow freely between systems and laying the foundation for intelligence in upper layers.

(3) Core Capabilities and Data System Layer: Intelligent Brain of the Enterprise

This layer serves as the "intelligence center" of the Growing Basement. All business data, algorithmic models, and intelligent analytical capabilities are accumulated here and continually evolve. Its core characteristics include: a unified data model and knowledge graph; support for AI algorithms, predictive analytics, and natural language question answering; mechanisms for continuous learning and feedback to enable data-driven business improvement; and support for enterprise-level data lakes and real-time data warehouses. Through this layer, the enterprise builds its own digital intelligence control platform, allowing data to truly become a productive force.

(4) Business Support and Collaboration Layer: Organizational Framework of the Enterprise

This layer carries supporting business modules such as human resources, finance, legal affairs, administration, and general management. These systems adopt unified identity management, unified access control, and a unified data model through the underlying platform. With the aid of AI-powered assistants, process automation and automated data analysis are also achieved.

(5) Business Application and External Collaboration Layer: User-oriented Intelligent Ecosystem

The top layer represents the direct manifestation of an enterprise's intelligent capabilities and includes both internal business systems and external service systems. The internal systems mainly encompass research and development, production, quality management, supply chain, sales, and service systems. The external systems include official websites and portals, e-commerce platforms, web and mobile applications, mini-programs, customer service platforms, and intelligent agents. With the support of the Growing Basement, enterprises are able to rapidly incubate new application modules and achieve effective collaboration across different business functions, organizational units, and digital platforms.

2.3 Key Attributes of the Growing Basement

Connectable: Regardless of whether systems are new or legacy, they can be quickly connected to the basement through standard interfaces or adaptation layers. This breaks down historically isolated systems and data silos, enabling full-domain interconnectivity.

Evolvable: With built-in low-code tools and AI-assisted development engines, business personnel can rapidly build applications. The system can grow and evolve in response to changing needs, eliminating dependence on lengthy customization cycles.

Collaborative: Different systems, departments, and business units can operate collaboratively on a unified basement, forming shared process engines and intelligent analytics centers.

Replicable: All intelligent components, models, and application scenarios can be abstracted into templates, allowing enterprises to rapidly replicate applications across different factories, industrial parks, or subsidiaries.

Sustainable: Through continuous accumulation of data and AI capabilities, the basement enables the system to become smarter the more it is used and run faster the more it operates, forming a positive evolutionary feedback loop.

• Value Realization of the Growing Basement

The value of the growing basement is primarily reflected in the combined enhancement of five capabilities: growth, prediction, reusability, agility, and extensibility. Specifically:

First, it enables enterprise systems to possess growth capability. The basement is not a static platform but a dynamic ecosystem that can automatically generate new functions and optimize existing modules as business develops.

Second, it equips enterprise management with predictive capability. Through continuous data accumulation and AI-driven analysis, it enables a shift from post-event statistics to pre-event warnings.

Third, it enhances enterprise innovation with reusability. Components, models, and processes within the basement can be reused, allowing new systems to be assembled like building blocks.

Fourth, it brings agility to enterprise operations. From requirement initiation to system deployment, delivery can occur within weeks, enabling a "think-and-deploy" approach.

Fifth, it provides enterprises with extensibility in competition. Rather than relying on a single vendor or system, enterprises can build their own intelligent growth framework, enabling autonomous adaptation and continuous evolution in response to future technological changes.

3. Solution Implementation: Understanding the Essence of the Growing Basement and the "Four-Step Method"

3.1 The Essence of Growing Basement

The Growing Basement is not a product; it is a new form of enterprise intelligent capability. It enables enterprises to shift from being "system users" to becoming "system creators," and to move from "project-driven IT" toward an "intelligent, self-evolving organization".

As Gregory Bateson stated, "My opinion is that the Crea-

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tura, the world of mental process, is both tautological and ecological. I mean that it is a slowly self-healing tautology. Left to itself, any large piece of Creatura will tend to settle toward tautology, that is, toward in ternal consistency of ideas and processes. Bur every now and then, the consistency gets torn; the tautology breaks up like the surface of a pond when a stone is thrown into it. Then the tautology slowly but immediately starts to heal." (Gregory Bateson, 2019). In this sense, growth is a process of moving from one form of "rightness" to another, triggered by misalignment or lack of adaptation. The process itself is one of healing, and its ultimate aim is the restoration of internal consistency. This is the essential nature of growth.
In the next three to five years, enterprises equipped with a Growing Basement will possess the core competitive advantages of continuous evolution, rapid adaptation, and independent innovation.

3.2 The Four-Step Method

Intelligent transformation does not need to be achieved overnight. rather, it should follow the rhythm of enterprise growth—progressive, phased, and yielding returns. Digital-intelligent transformation should be carried out step by step, in an orderly manner. This process involves both process-oriented and object-oriented design, both of which require careful analysis and diagnosis. Whether analyzing processes or objects, this constitutes the most fundamental task, and it marks the beginning of a continuous and cyclical effort. In this sense, the traditional concept of the software lifecycle becomes blurred or abbreviated with the support of AI (Behrouz Forouzan, 2018).
Step 1: Diagnose the Problems—Clarify the Current State. Through system scanning, business interviews, and data analysis, enterprises identify their digital–intelligence shortcomings: Which processes are redundant? Which data remains isolated? Which stages involve unnecessary waste? The outcome is an Intelligent Transformation Diagnostic Report, which helps decision-makers gain a clear and comprehensive view of existing challenges.
Step 2: Rapid Validation—Make the Results Visible. Select a high-value and low-risk scenario (such as an "intelligent reporting center" or "AI-based production analysis") and carry out a rapid pilot deployment. This allows managers to directly observe tangible results. For example, a production manager may simply ask, "Which workshop had the highest production fluctuation last month?" and the system will automatically generate the corresponding report and analytical conclusion.
Step 3: Integrated Upgrading—Enable System Collaboration. Following successful validation, an enterprise-level intelligent integration layer is established. This layer connects data channels across ERP, MES, OA, EAM, and other systems, enabling automated data flows and unified cross-system analytics.
Step 4: Continuous Growth—Drive Enterprise Evolution. Built atop the intelligent integration layer, an enterprise-specific intelligent application factory empowers departments to rapidly create intelligent applications based on the Growing Basement. This shifts the enterprise from system user to system creator, enabling continuous digital-intelligent evolution.
• Preliminary Work—Knowledge and Data Management
In *Structure and Interpretation of Computer Programs*, Harold Abelson and his co-authors cite a view on human cognition to emphasize the importance of understanding: "The acts of the mind, wherein it exerts its power over simple ideas, are chiefly these three: 1. Combining several simple ideas into one compound one, and thus all complex ideas are made. 2. The second is bringing two ideas, whether simple or complex, together, and setting them by one another so as to take a view of them at once, without uniting them into one, by which it gets all its ideas of relations. 3. The third is separating them from all other ideas that accompany them in their real existence: this is called abstraction, and thus all its general ideas are made." (Abelson, Sussman, & Sussman, 1996)
It is not difficult to understand that before the four-step process begins, a critical preliminary phase is the integration and management of knowledge data. This step enables the collection of knowledge, the identification of relationships among knowledge elements, and the accumulation of abstracted knowledge. The term "knowledge data" refers to a systematically organized collection of multi-source and multimodal information assets. The core of knowledge data management lies in integrating structured, semi-structured, and unstructured data to build an enterprise knowledge system that is domain-specific, timely, and compliant. Such knowledge data enables artificial intelligence to efficiently understand, reason, and generate enterprise-specific content. At the same time, it serves as a carrier for the extraction and accumulation of knowledge derived from business practices.

3.3.1 Centralized Management of Knowledge Data

All knowledge data used by artificial intelligence should be brought under centralized and unified management. This includes both explicit and tacit knowledge data; structured, semi-structured, and unstructured knowledge data; as well as internal and external knowledge data. At the same time, centralized and coordinated management should be implemented across the entire lifecycle of knowledge data, covering collection, integration, application, governance, operation, and related procedural and institutional mechanisms.

3.3.2 Knowledge Data Collection and Integration

Knowledge data collection methods can be divided into two categories: manually entered knowledge data and system-connected knowledge data. Manually entered knowledge data refers to discrete information scattered across employees' personal devices or retained in their minds. Examples include skills and techniques, reasoning chains, heuristic rules, business understanding, and communication skills. System-connected knowledge data refers to knowledge that is systematically organized and managed, and can be collected through system integration. This type is further divided into public knowledge data and domain-specific knowledge data. Public knowledge data refers to foundational and commonly shared knowledge within the enterprise. Its primary purpose is to ensure operational efficiency, standardize employee behavior, and reduce collaboration costs. Examples include policies, procedures, and corporate culture. Domain-specific knowledge data refers to vertical and specialized knowledge accumulated in specific business scenarios or management domains.

At the collection stage, standardized collection procedures and rigorous validation should be emphasized. Both human input and digital tools should be effectively utilized to support the annotation, cleansing, and verification of knowledge data, thereby laying a solid foundation for its formal application.

During the knowledge data integration phase, a unified design and layered sharing approach should be adopted. From a business management perspective, primary management domains should be defined in a consistent manner. Based on this structure, secondary management domains can be established according to organizational or business architecture dimensions, and further refined into tertiary domains if needed. The scope of data sharing should also be clearly defined at each level.

3.3.3 Classification and Visualization of Knowledge Data Applications

John Seely Brown and Paul Duguid point out in *The Social Life of Information* that "Digital is the wise use of information technology" (Brown & Duguid, 2000). It is not difficult to understand that the effective application of knowledge data is the key to addressing this challenge. To improve the efficiency and effectiveness of knowledge data usage, classification-based management and application visualization can be adopted.

First, knowledge data resources should be incorporated into the enterprise's overall data resource management system, and a unified knowledge data catalog should be established. Based on the source of knowledge data, these resources can be categorized into three types: core knowledge data, extended knowledge data, and other knowledge data. Core knowledge data refers to knowledge maintained within enterprise systems and governed by complete management procedures that ensure data quality and timeliness. Examples include policies and regulations provided by institutional systems, product information managed by product management systems, process and data models generated by modeling systems, and externally acquired knowledge data imported through third-party data management components. Extended knowledge data refers to knowledge entered via the enterprise's unified knowledge data platform and approved by the responsible business unit, such as business operation manuals. Other knowledge data consists mainly of knowledge informally accumulated by employees that has not undergone formal validation or certification. This includes employee experiences, technical sharing, and similar contributions.

Second, application visualization should be achieved. In essence, the effective application of knowledge data requires the following: (1) For core and extended knowledge data, a single source of truth should be established by constructing a unified knowledge data view and clarifying the prioritization of data quality and authority. When applying knowledge data, AI is advised to prioritize core and extended knowledge data. Other types of knowledge data should only be used after verification and confirmation of their validity. (2) A hierarchical knowledge data view should be created by classifying knowledge data into primary, intermediate, and advanced levels based on cognitive depth, tailored to users at different levels within the organization. Primary knowledge data concerns basic elements within a domain, such as terminology, concepts, facts, and simple rules. Its focus is on understanding "what it is". Intermediate knowledge data involves understanding core principles, methodologies, and relationships among concepts within a domain, as well as the ability to apply such knowledge to solve standard problems. Its core lies in understanding "why it is so". And advanced knowledge data refers to deep and systematic mastery of a domain, including its essence, frontier developments, complexity, and interdisciplinary connections. It supports the ability to innovate, optimize, and solve complex or ambiguous problems, with a focus on "how to break boundaries". (3) A registration and record-keeping mechanism should be established for the sharing and use of knowledge data, with proper ledger management. Multiple modes of knowledge data services should be supported. Platforms should enable employees to create, manage, and retrieve knowledge data, while system-based services should provide knowledge data for AI training and retriev-

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al. Meanwhile, application-specific knowledge data views should be built to reflect the utilization of knowledge data across different scenarios. Knowledge generated in various application contexts should also be promptly fed back into the enterprise knowledge database.

4. Additional Reflections: Discussion on Benefits and Implementation Conditions

4.1 Core Benefits Brought by Intelligent Transformation

Intelligent transformation is not about showcasing technical prowess, nor is it a response to fleeting trends. It delivers real, measurable business value, which can be summarized as follows:

Cost reduction and efficiency improvement: Through platform reuse, AI-generated content, and automation, development and maintenance costs can be reduced by more than 50% on average.

Shortened delivery cycles: From project initiation to functional prototype, systems can be launched within a significantly shortened timeframe.

Intelligent insights: Systems acquire capabilities for automated analysis, trend forecasting, and natural language question answering.

Data integration: Enterprises establish a unified data foundation to support cross-departmental and cross-system analytics.

Management enhancement: Executives can access real-time, enterprise-wide insights and shift from experience-based to data-driven decision-making.

Sustainable evolution: A Growing Basement allows intelligent transformation to become a continuously evolving capability rather than a one-time project.

4.2 Conditions for Implementation

First, technological maturity. AI-generated content, low-code development platforms, and data middle platform technologies have entered a stage of maturity, significantly reducing the threshold for intelligent transformation.

Second, economic conditions. Under mounting cost pressures and intensifying competition, intelligent transformation has become the only certain path for enterprises to improve efficiency.

Just as enterprises without ERP systems struggled to survive during the wave of digitalization, intelligent transformation is poised to become the next major dividing line in the industry. Enterprises equipped with an intelligent Growing Basement will possess the capacity for continuous self-evolution.

• Conclusion: Action Recommendation

Intelligent transformation is not a one-time investment but a long-term journey of growth. We recommend that enterprises adopt an approach of "small steps, rapid results, and continuous evolution". Through four stages, intelligent diagnosis, pilot validation, platform development, and full-scale deployment, enterprises can ultimately build their own intelligent Growing Basement and application ecosystem. With this foundation, systems can be constructed, adjusted, and reconfigured like building blocks, extending intelligent capabilities across all business domains such as production, supply chain, finance, and human resources. This enables system-wide collaboration and knowledge accumulation, leading to the emergence of a truly "intelligent, growth-oriented enterprise".

We firmly believe that future competition among enterprises will no longer depend on "who has more systems", but on "whose systems are smarter and grow faster". Intelligence should not be seen as a cost, but as a new form of productive power. Possessing a continuously evolving intelligent basement allows enterprises to respond rapidly to uncertainty, innovate with agility, and grow steadily in complex environments. Intelligence enables systems to think; a Growing Basement enables enterprises to evolve. Together, they will form the core competitiveness of the next generation of enterprises.

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