DeepAIMind Research Paper 006

Enterprise Autonomy Maturity Model

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Abstract. Enterprise autonomy is not a binary condition and it is not a race toward maximum automation. It is a maturity journey in which organizations progressively develop the representations, loops, agents, simulation capabilities, governance, and human roles required to act with appropriate autonomy. This paper defines a ten-level Enterprise Autonomy Maturity Model, from human-operated activity to a theoretical fully autonomous enterprise system. The levels describe increasing capability and decision authority, while a complementary capability view tracks Business State Model maturity, Enterprise Graph maturity, control-loop maturity, simulation, governance, and self-improvement. The objective is governed autonomy: the right level of authority for the right activity in the right context.

1. Introduction

Organizations are moving from manual processes and reporting toward AI-assisted decisions, governed automation, multi-agent operations, and adaptive enterprise systems. The transition is not uniform. A finance reconciliation process, a customer interaction, a strategic decision, and a safety-critical action may require different levels of autonomy in the same organization.

A maturity model is therefore useful when it describes capability and control, not when it treats autonomy as a single score. The Digital Business Twin provides the operational foundation: it maintains enterprise state, structure, context, objectives, constraints, history, simulation, and feedback. The model in this paper describes how an organization can mature around that foundation.

2. Autonomy Is a Spectrum

The ten levels below describe a progression in AI capability, decision authority, operational scope, and human role. They are not mandatory steps for every activity, and higher levels are not automatically better.

Level 0 — Human Operation — Humans perform activities and make decisions; systems record and report.

Level 1 — AI Assistance — AI provides information, analysis, summaries, and insights; humans decide and act.

Level 2 — AI Recommendation — AI analyzes conditions and recommends actions; humans review and authorize.

Level 3 — Human-Approved Automation — Agents prepare and execute defined workflows after explicit approval.

Level 4 — Bounded Autonomous Execution — Agents execute approved processes independently within permissions, policies, escalation rules, and monitoring.

Level 5 — Multi-Agent Business Operations — Specialized agents collaborate across functions through shared business state, objectives, constraints, and governance.

Level 6 — Adaptive Autonomous Operations — Agents learn from outcomes and improve workflows, resource use, and operating performance within controlled boundaries.

Level 7 — Autonomous Business Management Support — AI supports planning, forecasting, scenario analysis, risk identification, and strategic decision support; humans retain direction and accountability.

Level 8 — Autonomous Enterprise Functions — Major functions operate autonomously with human oversight focused on objectives, governance, exceptions, and values.

Level 9 — Highly Autonomous Enterprise — Most operational decisions execute autonomously within strategic constraints, with humans governing the system and its exceptions.

Level 10 — Theoretical Fully Autonomous Enterprise System — A theoretical maximum in which the enterprise continuously senses, represents, simulates, decides, acts, evaluates, learns, and adapts with minimal intervention.

3. Maturity Is Multidimensional

The level scale should be read together with capability dimensions. An organization may have advanced agents but weak state integrity, or strong simulation but insufficient authority controls. A credible maturity assessment should therefore examine at least seven dimensions:

State: the quality, freshness, ownership, and authority of the Business State Vector.

Structure: the maturity of the Enterprise Graph and its representation of entities, relationships, dependencies, and flows.

Dynamics: the maturity of control loops that observe, understand, simulate, decide, act, evaluate, and learn.

Agents and skills: the ability of agents to reason, plan, use tools, collaborate, and execute within bounded roles.

Simulation: the ability to test decisions, policies, processes, loops, and operating models before execution.

Governance: identity, permissions, policy, authority, monitoring, provenance, intervention, and human oversight.

Self-improvement: the ability to exploit existing systems and explore alternatives through governed learning and change.

The concise relationship remains: vector represents state, graph represents structure, and loops represent dynamics. Autonomy becomes more robust when these dimensions mature together.

4. Operational Excellence and Innovation

Two forms of improvement should be distinguished. Operational excellence is exploit: improving the existing processes, loops, and enterprise graph through measured refinement. Innovation is explore: testing materially different processes, products, services, graphs, or operating models.

Both depend on the Digital Business Twin and Simulation Before Execution. The organization should be able to represent a candidate change, simulate consequences, evaluate uncertainty and governance, and promote only changes it is prepared to own. Explore and exploit are not additional stages in the control loop; they are higher-order activities around repeated execution, evaluation, and learning.

5. Governance and Human Role

Governance must mature alongside autonomy. Higher authority requires stronger identity, permission boundaries, policy enforcement, monitoring, auditability, reversibility where possible, and human intervention. The appropriate autonomy level depends on risk, reversibility, regulation, uncertainty, affected stakeholders, and business criticality.

Human responsibility does not disappear as autonomy increases. It moves upward: from performing individual tasks toward defining objectives, values, constraints, authority, exceptions, and the conditions under which the system may improve itself.

6. Assessment Principle

A maturity assessment should be performed by activity or function, not only at enterprise level. For each activity, ask: What state is available? What structure and dependencies are represented? What loop operates? What can agents do? What can be simulated? What authority is granted? What evidence and oversight exist? What changes can be exploited or explored safely?

The result should identify both an autonomy level and the capability gaps that constrain it. An activity may be Level 4 in execution but Level 2 in simulation or Level 3 in governance. The practical target is the highest level that is appropriate and sustainable for that activity, not the highest number available.

7. Relationship to the Research Framework

Research Paper 001 defines the Digital Business Twin as the operational system for enterprise state, structure, context, simulation, execution, and learning. Research Paper 002 defines the Business State Model. Research Paper 003 defines the Autonomous Business Control Loop. Research Paper 004 defines Agent Governance. Research Paper 005 defines Simulation Before Execution. Paper 006 integrates these capabilities into a maturity view of enterprise adoption and self-improvement.

Conclusion

The autonomous enterprise will emerge through governed capability development rather than a single leap from manual work to full automation. The organization must mature its state representation, graph structure, loops, agents, simulation, governance, and learning together.

The objective is not maximum autonomy. It is appropriate, governed autonomy that improves performance, preserves accountability, supports human purpose, and creates sustainable value. Level 10 remains a theoretical reference point, not a universal destination.