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From agent scarcity to principal bottleneck: the principal bandwidth model and the organizational implications of agentic artificial intelligence

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Abstract

The growing presence of agentic artificial intelligence (AI) systems capable of autonomous goal-directed action raises important new questions for organizational theory and information systems (IS) practice. Prior IS literature has treated technology primarily as a tool that amplifies human capacity. Agentic AI does not simply amplify this relationship; it scales it in ways that shift the nature of the principal-agent problem organizations must manage. This conceptual paper introduces the Principal Bandwidth Model (PBM), which proposes that as agentic AI reduces agent scarcity as a binding organizational constraint while managerial attention and governance capacity emerge as the new limiting factor. The paper also develops the formal construct of Principal Overload to describe the systemic tension that arises when agent proliferation exceeds principal oversight capacity. Drawing on IS delegation theory (Baird & Maruping, 2021), the attention-based view of the firm (Ocasio, 1997), information processing theory (Galbraith, 1974), principal-agent theory (Jensen & Meckling, 1976), and IT governance research (Weill & Ross, 2004), the PBM extends rather than replaces existing IS theory. Construct definitions, discriminant validity comparisons, boundary conditions, and a future research agenda are provided.

Keywords: agentic IS artifacts, principal-agent theory, attention-based view, information systems strategy, organizational governance, principal bandwidth

Introduction

For decades, a central challenge in organizational technology deployment has been a supply-side constraint with too few skilled workers to perform the volume and complexity of required tasks. IS research has largely framed technology as an amplifier of human effort, compressing time and reducing friction while leaving the fundamental human-as-agent relationship intact (Brynjolfsson & McAfee, 2014; Davenport & Kirby, 2016). The growing presence of agentic artificial intelligence invites a reconsideration of this framing, though not a wholesale rejection of it.

Agentic AI refers to systems capable of autonomous, goal-directed action across multi-step tasks. Unlike prior AI applications, which performed discrete, bounded functions such as classification, recommendation, or generation, agentic systems plan and execute sequences of actions to achieve the outlined outcome, use tools, manage memory, and adapt their behavior in response to environmental feedback (Wang et al., 2024). Building on the work of Baird and Maruping (2021), who argued that a new generation of agentic IS

artifacts requires revisiting the assumption of human agency primacy, this paper examines what happens organizationally when such artifacts scale from isolated deployments to enterprise-wide portfolios.

At enterprise scale, a single principal may deploy many AI agents simultaneously, each executing complex, multi-step knowledge-work tasks. As agents become abundant and inexpensive, the binding organizational constraint may shift from agent supply to the cognitive and governance capacity of the human principals who direct, monitor, evaluate, and remain accountable for them. The shift is referred to as the Scarcity Inversion and formalized through the Principal Bandwidth Model (PBM). Rather than displacing established IS theory, the PBM reconfigures the relative salience of monitoring, coordination, and managerial attention as agentic deployment scales.

The paper first reviews the relevant theoretical foundations, then defines the model's constructs and propositions. Next, the paper examines discriminant validity, Principal Overload, boundary conditions, and empirical measurement before discussing implications and future research.

Theoretical Background

Agentic IS Artifacts and IS Delegation Theory

Baird and Maruping (2021) introduced the concept of agentic IS artifacts and a delegation framework for theorizing the relationship between humans and agentic IS artifacts. They argued that a new generation of IS artifacts is no longer passive, is no longer always subordinate to the human agent, and can assume responsibility for tasks with ambiguous requirements and for seeking optimal outcomes under uncertainty. Their delegation framework emphasizes appraisal, distribution, and coordination as foundational mechanisms. The PBM proposed here builds directly on this foundation by extending the unit of analysis from the individual human-artifact dyad to the organizational portfolio of principals governing multiple agents simultaneously.

Principal-Agent Theory in Information Systems

Principal-agent theory (Jensen & Meckling, 1976) has been applied in IS research to characterize relationships among organizations, IT service providers, outsourcing partners, and technology workers (Eisenhardt, 1989; Ang & Straub, 1998). The theory's central concern is information asymmetry and the governance challenges of alignment, monitoring, and incentive design. Conventional principal-agent formulations assume a human agent with intrinsic motivations and interests that may diverge from the principal. Agentic AI systems differ from this characterization in important ways: conceptually, they execute delegated tasks without the social and motivational complexity of human agents (Baird & Maruping, 2021). At the same time, this simplification on the agent side creates new complexity on the principal side, as accountability for agentic outputs remains with the human principal even as the volume and opacity of those outputs grow. The PBM reframes the principal-agent problem for the agentic era by placing the governance burden on the principal rather than on agent alignment.

The Attention-Based View of the Firm

Ocasio (1997) introduced the attention-based view (ABV) of the firm, arguing that firm behavior is the result of how organizations channel and distribute the attention of their decision-makers. The ABV treats managerial attention as a scarce organizational resource whose allocation across issues and answers determines strategic behavior. The PBM draws directly on this theory: principal bandwidth is, at its foundation, a form of organizational attention capacity specifically directed at governing autonomous agents. As agent deployment scales, the structural attention demands on organizations increase. The ABV predicts that governance architectures must evolve accordingly, yet most current structures were designed for human-agent contexts in which this form of demand did not exist.

Information Processing Theory

Galbraith's (1974) information processing theory proposes that organizational effectiveness depends on alignment between information processing demands and organizational processing capacity. When demands exceed capacity, organizations experience overload, resulting in degraded decision quality, delayed responses, and coordination failures (Tushman & Nadler, 1978). The arrival of agentic AI creates a new category of processing demand: not the overload of data or decisions requiring direct human cognition, but the overload of autonomous actions requiring human governance and accountability. The PBM extends IPT by specifying the mechanism through which agentic deployment creates this new form of organizational load.

Resource-Based View and Human-AI Teaming

The resource-based view (Barney, 1991) holds that sustained competitive advantage derives from resources that are valuable, rare, inimitable, and non-substitutable. As agentic AI capability becomes commoditized, the organizational capacity to govern these systems at scale may emerge as the genuinely differentiated resource. The National Academies of Sciences, Engineering, and Medicine (2022) review of human-AI teaming research identified governance, calibrated trust, and shared situation awareness as central challenges in realizing the benefits of autonomous systems. IS scholars applying the RBV should attend to principal governance capacity as a potential source of sustained competitive advantage in an era of abundant autonomous agents.

Agentic AI in the IS Literature

Although IS scholarship has examined AI broadly (Mikalef & Gupta, 2021; Fountaine et al., 2019), agentic AI remains under-theorized at the organizational level. Baird and Maruping (2021) provide the closest foundation at the dyadic level, but the implications of simultaneously governing portfolios of agentic artifacts remain less developed. Research on robotic process automation (Syed et al., 2020) provides partial grounding but focuses on rule-based rather than adaptive autonomous systems. Large language model-based agents with tool use, memory, and multi-step reasoning (Wang et al., 2024), therefore, warrant dedicated organizational-level theorizing.

Construct Definitions

To address definitional clarity, Table 1 provides explicit construct definitions, the primary level of analysis, key antecedents, and proposed outcomes for each core component of the PBM.

Table 1. Principal Bandwidth Model: Core Construct Definitions

Construct	Definition	Level of Analysis	Key Antecedents	Proposed Outcomes
Agent Deployment Scale	The number and functional breadth of autonomous AI agents operating under a	Organizational	Technology adoption, strategic intent, cost reduction pressure	Increases demand on principal bandwidth; beyond threshold, degrades organizational performance

	principal's governance			
Principal Bandwidth	The aggregate organizational capacity to formulate goals for, monitor, evaluate, and intervene in autonomous agents; composed of individual attention, governance structure, and domain expertise	Multi-level: individual cognition, team governance, organizational structure	Principal expertise, governance infrastructure, meta-agent assistance, organizational design	Determines the ceiling at which agent deployment produces positive net value; mediates agent scale - performance relationship
Principal Bandwidth Ceiling	The agent deployment threshold beyond which additional agents produce negative net organizational value because governance failures and error propagation outpace productive gains	Organizational	Task complexity, domain risk, regulatory burden, AI output explainability, principal expertise	Non-linear performance decline; Principal Overload; misalignment between organizational intent and agent behavior
Governance Infrastructure	The organizational systems, protocols, and accountability mechanisms that extend individual principal capacity for overseeing	Organizational	Leadership commitment, IT investment, regulatory requirements	Raises the principal bandwidth ceiling; enables greater agent deployment at acceptable governance quality

	autonomous agents			
Principal Overload	The condition in which agent deployment scale exceeds principal bandwidth capacity, resulting in degraded oversight quality and strategic incoherence despite high agent productivity at the task level	Organizational	Rapid agent deployment without commensurate governance investment; principal bandwidth ceiling reached or exceeded	Misaligned outputs, compounding errors, loss of strategic coherence, accountability failures

In Table 1, principal bandwidth is explicitly a multi-level construct. Individual attention capacity constitutes its cognitive substrate; governance structures at the team and organizational levels determine how that cognitive capacity is amplified, distributed, and formalized. This multi-level nature is consistent with the attention-based view's treatment of attention as simultaneously cognitive and structural (Ocasio, 1997).

Figure 1a. Principal Bandwidth Model: Causal Structure

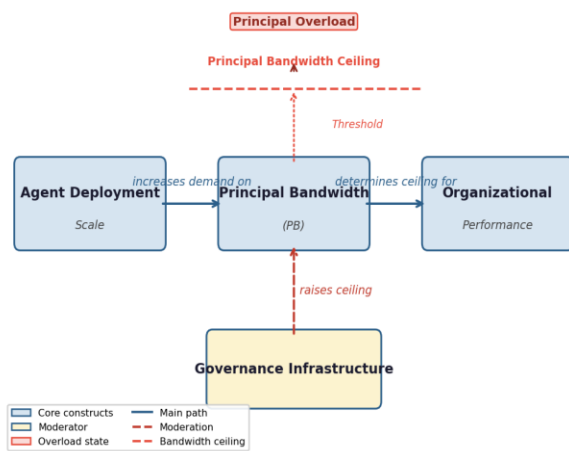


Figure 1b. Principal Bandwidth Model: Performance-Scale Relationship

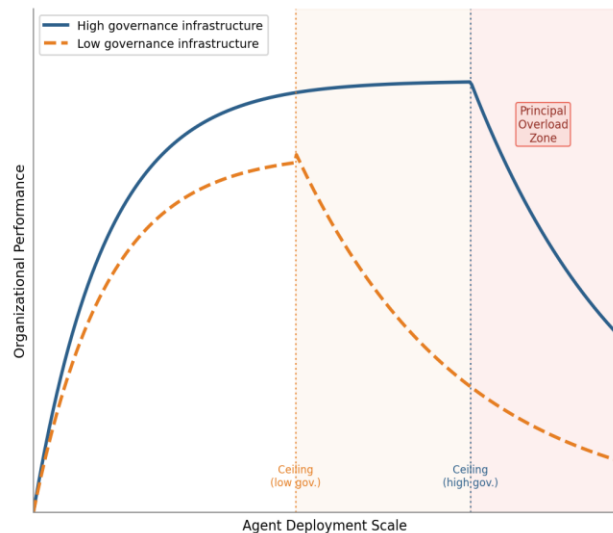


Figure 1. Principal Bandwidth Model: (a) causal structure and (b) predicted performance-scale relationship. Governance infrastructure raises the principal bandwidth ceiling, delaying the onset of Principal Overload.

Figure 1 summarizes the model. Agent deployment scale increases demand on principal bandwidth. Below the principal bandwidth ceiling, organizational performance rises with scale; beyond it, governance failures

compound and performance declines, producing Principal Overload. Governance infrastructure raises the ceiling by improving goal specification, monitoring, review, escalation, and accountability distribution.

The Scarcity Inversion

Throughout the industrial and knowledge economy eras, the dominant organizational challenge has been agent scarcity in one of three forms: (1) scarcity of labor, meaning insufficient human workers to perform required tasks; (2) scarcity of expertise, meaning insufficient specialists capable of executing high-complexity knowledge work; and (3) scarcity of coordination, meaning insufficient capacity to synchronize the efforts of distributed human agents. Each category has driven a distinctive wave of IS investment: enterprise resource planning systems addressed coordination scarcity; knowledge management systems addressed expertise scarcity; and workforce automation addressed labor scarcity.

Agentic AI potentially alters all three scarcities because autonomous agents can execute many knowledge-work tasks in parallel at low marginal cost. The resulting abundance shifts the organizational challenge from producing work to governing it. The Scarcity Inversion describes the shift from agent supply to principal bandwidth as the primary organizational constraint. We frame this as conditional rather than universal: the inversion is most likely to obtain when (a) agents are deployed at scale across high-stakes or high-complexity domains; (b) agent outputs are difficult to verify without domain expertise; (c) principals bear regulatory or reputational accountability for agent outputs; and (d) agent deployment outpaces investment in governance infrastructure. In contexts where tasks are modular, low-stakes, and highly verifiable, the traditional agent-scarcity framing remains more applicable.

The Principal Bandwidth Model (PBM)

The Principal Bandwidth Model (PBM) formalizes the organizational implications of the Scarcity Inversion. The model is developed around three propositions, each incorporating contingency conditions.

Proposition 1: Principal Bandwidth Becomes the Binding Organizational Constraint Under Conditions of Scale

In contexts where agentic AI is deployed at an organizational scale, organizational performance is increasingly bounded by the governance capacity of human principals rather than by agent capability or supply. Principal bandwidth, as defined in Table 1, encompasses cognitive, structural, and expertise components operating across multiple levels of analysis.

This proposition is subject to several contingencies. The magnitude of the bandwidth constraint depends on: (a) task complexity and ambiguity, since high-ambiguity tasks place greater demands on principal judgment than modular tasks with well-defined success criteria; (b) domain risk and regulatory accountability, since principals in regulated industries such as healthcare, finance, and defense face greater scrutiny of AI-generated outputs than those in lower-stakes domains; (c) explainability of AI outputs, since principals can more efficiently evaluate outputs they can interrogate than those operating as opaque decision processes; and (d) organizational hierarchy, since organizations with centralized principal roles will reach bandwidth ceilings sooner than those with distributed governance architectures. We also observe a key distinction from the agentic IS delegation framework of Baird and Maruping (2021): their work focuses on the dyadic delegation decision between one human and one agentic artifact. Proposition 1 addresses what happens when those dyadic relationships multiply across an organization, creating portfolio-level governance challenges that exceed the scope of dyadic theory alone.

Proposition 2: Principal Bandwidth Has a Non-Linear Diminishing Returns Threshold

Unlike traditional agent scaling, which tends to produce roughly linear increases in output, principal-governed agent scaling exhibits nonlinearity. As the number of active agents under a principal's governance exceeds the principal's monitoring and evaluation capacity, output quality degrades at a rate that can outpace gains in output quantity. This threshold, the principal bandwidth ceiling, represents the deployment scale at which additional agents may produce negative net organizational value because governance failures, misaligned outputs, and error propagation outpace productive gains.

The location of the bandwidth ceiling is not fixed and varies across contexts. It is moderated by: (a) the quality and precision of goal specification provided to agents; (b) the sophistication of governance infrastructure, including monitoring dashboards, review protocols, and escalation procedures; (c) the deployment of meta-agent systems specifically designed to assist principals in monitoring other agents; and (d) the domain expertise of principals, which determines how efficiently they can evaluate outputs relative to organizational intent. Organizations with superior governance infrastructure and higher principal expertise will face higher ceiling thresholds, enabling greater agent deployment before performance degradation occurs.

Proposition 3: Principal Bandwidth is Developable but Remains Scarce in the Near Term

Principal bandwidth should not be treated as fixed. Organizations can expand it through: (a) principal upskilling, meaning developing human leaders' capacity to specify, evaluate, and govern AI agent outputs effectively; (b) governance infrastructure investment, meaning building the organizational systems such as dashboards, review protocols, and accountability structures that extend individual principal capacity; and (c) meta-agent deployment, meaning using AI systems specifically designed to assist principals in monitoring and evaluating other agents, effectively multiplying human oversight capacity.

At the same time, principal bandwidth remains scarce in the near term because it depends on a combination of domain expertise, judgment, and governance skill that is not rapidly acquirable. Moreover, the rate at which agent deployment capacity grows, driven by rapidly falling technology costs, is currently outpacing the rate at which governance infrastructure and principal expertise can be developed in most organizations. Consistent with the attention-based view (Ocasio, 1997), organizations must actively design their structures to allocate and distribute the scarce resource of principal attention; this distribution does not occur automatically as agent deployment scales.

Discriminant Validity

A conceptual contribution of this type must demonstrate that its central constructs are distinguishable from adjacent theoretical frameworks. Table 2 provides an explicit comparison of the PBM with six related theoretical traditions.

Table 2. Discriminant Validity: PBM Compared to Adjacent Theoretical Frameworks

Framework	Central Focus	Unit of Analysis	Agent Assumption	Primary Constraint	PBM Distinction
Principal-Agent Theory	Agent alignment and incentive design	Dyad (principal - one agent)	Human agent with private interests	Information asymmetry; agent opportunism	PBM focuses on principal governance capacity across

					many non-human agents, not agent alignment
IS Delegation Theory (Baird & Maruping, 2021)	Delegation to and from agentic IS artifacts	Dyad (human - one agentic artifact)	Agentic IS artifact without human motivational complexity	Appraisal and coordination in individual delegation decisions	PBM extends to portfolio-level governance of multiple simultaneous agents
Information Processing Theory	Capacity-demand alignment for organizational coordination	Organizational	Human workers generating information	Information overload exceeding organizational processing capacity	PBM specifies the governance-of-autonomous-action mechanism rather than general information processing
Attention-Based View (Ocasio, 1997)	Distribution of managerial attention as driver of firm behavior	Individual to organizational	Human decision-makers with bounded attention	Attentional scarcity and structural attention distribution	PBM specifies the agentic AI context in which attention becomes the organizational constraint
IT Governance (Weill & Ross, 2004)	Decision rights and accountability structures for IT	Organizational	Human IT decision-makers	Decision rights misalignment	PBM addresses governance of AI agents specifically, including accountability for autonomous outputs
Managerial Cognition (Hambrick & Mason, 1984)	Influence of top management cognitive characteristics on strategic choices	Individual (TMT)	Human executives with bounded rationality	Cognitive biases and executive schema limitations	PBM focuses on governance load created by autonomous agents rather than executive cognitive

					characteristics per se
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While the PBM draws on all six frameworks, it makes a distinctive contribution by specifying the organizational consequences of scaling the human-agentic IS artifact relationship (Baird & Maruping, 2021) beyond the individual dyad, and by identifying principal bandwidth rather than agent alignment as the critical governance constraint when agentic systems operate at scale.

Principal Overload and the Governance Saturation Effect

Principal Overload describes the organizational failure state that follows when deployment crosses the bandwidth ceiling. Task-level productivity may remain high, yet oversight quality and strategic coherence deteriorate because principals cannot govern the volume and speed of autonomous activity. This condition reflects a broader governance saturation effect, in which the efficiency and scale of autonomous agents outpace principals' ability to monitor, evaluate, and align their outputs with organizational objectives. As agent deployment increases, oversight demands grow non-linearly, creating a point at which additional agents contribute to organizational dysfunction rather than performance improvement.

The Principal Overload dynamic operates as follows. As organizations deploy increasing numbers of capable, task-efficient agentic AI systems, they may experience escalating governance failures because: (1) agent outputs proliferate faster than principals can evaluate them; (2) misaligned agent behavior compounds across parallel task threads before detection; (3) the cognitive cost of governance increases non-linearly with agent count; and (4) the organization loses coherent strategic direction as local task optimization by agents diverges from holistic organizational intent that only principals can provide.

It is important to recognize that this dynamic does not arise from deficiencies in agent capability. At the task level, agents may perform effectively and efficiently. At the same time, at the system level, performance degrades when principals responsible for maintaining strategic coherence become cognitively saturated. Under these conditions, increases in agent deployment may reduce overall organizational effectiveness rather than enhance it. This mechanism is distinct from automation bias, which describes individual over-reliance on automated outputs (Mosier & Skitka, 1996), and from algorithm aversion, which reflects individual resistance to algorithmic decision-making (Dietvorst et al., 2015). Principal Overload is therefore best understood as an organizational-level governance failure rather than an individual behavioral phenomenon.

Principal Overload also differs from general information overload. The problem is not merely that information exceeds processing capacity; it is that principals cannot adequately direct, verify, and intervene in autonomous actions undertaken on their behalf. Information volume may contribute, but the defining mechanism is an accountability-governance gap.

Boundary Conditions

The PBM is unlikely to apply uniformly across all organizational contexts. Theoretical models gain credibility from explicit acknowledgment of their scope conditions. Four primary boundary conditions are proposed. First, the PBM is most applicable in high-stakes, high-complexity deployment contexts. In low-stakes, modular, and highly verifiable task environments, such as routine data processing, scheduling, or

document formatting, agent outputs can be evaluated efficiently, and error consequences are limited. The principal bandwidth ceiling in such contexts is high enough that it may never be approached in practice. Second, the model is most relevant where principals bear clear accountability for agent outputs. In regulatory environments such as healthcare, financial services, legal services, and defense, principals cannot disclaim responsibility for autonomous outputs. In contexts where accountability is diffuse or errors are easily recoverable, the governance stakes are diminished, and principal bandwidth is less likely to become the constraining factor. Third, the model assumes a meaningful gap between the rate of agent deployment and the rate of governance infrastructure development. Where organizations invest proactively in governance capacity before or alongside agent deployment, principal bandwidth constraints may be actively managed rather than passively encountered. Fourth, the model applies most directly to organizations operating in dynamic, uncertain environments where goals and priorities shift. In highly stable, well-defined task environments, agentic systems can operate effectively with minimal ongoing principal adjustment, reducing the governance demand placed on principals even at large deployment scale.

Construct Measurement and Validation

A central concern for any new conceptual contribution is whether its constructs can be empirically measured rather than remaining purely descriptive. This section addresses that concern directly by specifying, for each construct in Table 1, an empirical approach grounded in established measurement. The aim is to demonstrate that the PBM's constructs are measurable with existing methodological tools, not to substitute for the validation studies proposed in the Future Research Agenda section.

Agent Deployment Scale, the most directly observable construct, can be measured through organizational records: the count of active agents, the number of distinct task domains in which agents operate, and the proportion of work processes that include agentic components. These counts can be normalized into a deployment intensity index analogous to existing IT intensity measures (Bharadwaj, 2000), allowing comparison across organizations of different size.

Principal Bandwidth, as a multi-level construct spanning individual cognition and organizational structure, requires a multi-method approach. At the individual level, self-report scales adapted from cognitive load theory (Sweller, 1988) and the attention-based view (Ocasio, 1997) can capture perceived capacity to monitor and evaluate agent outputs. At the structural level, archival indicators such as the ratio of governance staff to deployed agents, the existence of formal review protocols, and audit log volume provide an organization-level proxy. Convergent validity can be assessed by testing whether the individual-level and structural-level indicators covary in the direction the model predicts.

The Principal Bandwidth Ceiling and Principal Overload are best measured jointly, since the ceiling is defined by the inflection point at which overload begins. A practical approach treats the ratio of active agents to principal oversight capacity as the independent variable and tracks output quality, error rates, and audit findings as dependent variables over time. Because the model predicts a non-linear rather than gradual decline, regression discontinuity or piecewise regression techniques are well suited to identifying the threshold itself.

Governance Infrastructure can be operationalized as a maturity index combining the presence of defined escalation procedures, monitoring dashboards, accountability roles, and periodic audit cycles, in the spirit of existing IT governance maturity instruments (Weill & Ross, 2004). Because the model predicts that Governance Infrastructure moderates the location of the Principal Bandwidth Ceiling, this index should be tested as a moderator in the regression designs described above rather than treated only as a control variable.

Taken together, these measurement strategies support a staged validation program: establishing convergent and discriminant validity among the individual-level and structural-level indicators of Principal Bandwidth, testing predictive validity by linking bandwidth and governance infrastructure scores to the performance outcomes specified in Proposition 2, and confirming discriminant validity against the adjacent constructs identified in Table 2. The detailed scale-development and field-study designs needed to execute this program are elaborated in Priorities 1 and 2 of the Future Research Agenda below.

Implications for IS Research and Practice

Implications for IS Research

The PBM generates a set of empirically testable propositions that extend existing IS research streams. IS scholars studying IT governance (Weill & Ross, 2004) should extend their frameworks to address AI governance specifically, including the allocation of principal bandwidth across organizational hierarchies and the design of governance structures that match principal capacity to agent deployment scale. IS researchers examining digital transformation (Vial, 2019) should consider principal bandwidth as a mediating variable in transformation outcomes. Organizations investing in agentic AI without commensurate investment in governance development may achieve technology deployment without the organizational performance gains that transformation promises, a pattern consistent with IS findings on implementation failure (Markus & Tanis, 2000).

The measurement framework above creates a near-term IS research opportunity: develop and validate multilevel measures of principal bandwidth, then test whether the predicted ceiling explains variation in digital transformation outcomes.

Implications for IS Curriculum and Higher Education

The IS discipline carries a distinctive responsibility in the agentic AI transition: IS programs at all levels, undergraduate, graduate, and professional, produce the principals and governance architects of the future. If principal bandwidth is the primary limiting factor in agentic AI environments, IS education should invest in developing the specific competencies that expand it. Drawing directly from the PBM's construct table, three principal competency areas are implied. First, goal specification competency corresponds to the PBM's proposition that clear, well-formed principal instructions determine the precision with which agents pursue organizational intent. IS curricula should develop students' capacity to decompose complex organizational goals into agent-executable specifications with meaningful success criteria. Second, output evaluation competency corresponds to the PBM's governance infrastructure dimension: principals must be able to assess the accuracy, relevance, and strategic alignment of AI-generated work within their domains. Third, governance design competency addresses the structural dimension of principal bandwidth, developing students' ability to design monitoring architectures, accountability protocols, and escalation structures appropriate for agentic deployment contexts.

Implications for Organizational Practice

For practitioners, the PBM suggests that an agentic AI investment strategy should incorporate governance capacity alongside technology capability. The operative question is not simply how many agents can be deployed but how much governance capacity exists to manage them effectively. Investment in governance infrastructure, the organizational systems that extend principal capacity, should be planned in parallel with agent deployment, not as an afterthought. Organizations should also treat principal bandwidth as a potential source of competitive advantage. As agentic AI capability becomes commoditized through cloud platforms and open models, governance quality may emerge as the differentiating factor. Building principal

governance capacity is slow and organization-specific in ways that are difficult to imitate, meeting the criteria of the resource-based view for sustained competitive advantage (Barney, 1991).

Future Research Agenda

The PBM is offered as a conceptual contribution that invites empirical validation and further theoretical development. The article proposes the following research priorities, including concrete operationalization examples for the two most critical measurement needs.

Priority 1: Principal Bandwidth Operationalization

Initial studies should use interviews, expert panels, scenario-based assessments, and surveys to refine the proposed dimensions of principal bandwidth and governance infrastructure. Samples should include principals at multiple organizational levels, with individual scores aggregated only where within-group agreement and intraclass-correlation evidence support a shared team or organizational construct.

These studies should test reliability, convergent and discriminant validity, and measurement invariance across industries. Behavioral indicators such as review accuracy, error-detection time, and intervention latency should supplement self-reports to reduce common-method bias and establish criterion validity.

Priority 2: Bandwidth Ceiling Identification

Longitudinal field studies should pair agent orchestration logs with quality, error, review, and incident data to estimate organization-specific thresholds. Segmented regression or change-point models can test whether performance improves below the ceiling and deteriorates above it, and whether governance infrastructure shifts that threshold.

Priority 3: Governance Structure Design

IS design science research should develop and evaluate governance architectures that extend individual principal capacity, including meta-agent monitoring systems, structured output review protocols, and accountability dashboards. Evaluation criteria should address both governance quality outcomes and principal cognitive load, allowing assessment of whether governance tools raise the bandwidth ceiling without simply adding to principal burden.

Priority 4: Cross-Organizational Boundary Condition Testing

The model predicts that accountability burden, task complexity, and governance investment moderate the bandwidth ceiling. Research comparing regulated versus unregulated industries, high-complexity versus modular task environments, and centralized versus distributed governance structures would allow empirical boundary condition testing. The National Academies (2022) human-AI teaming framework provides a compatible conceptual starting point for studies in safety-critical domains.

Conclusion

Agentic AI creates governance challenges that existing IS theories address only partially. By integrating IS delegation theory (Baird & Maruping, 2021), the attention-based view (Ocasio, 1997), information processing theory (Galbraith, 1974), and IT governance research (Weill & Ross, 2004), the PBM explains how large-scale agent deployment can shift the binding constraint from agent scarcity to principal bandwidth. The PBM constructs, propositions, measurement strategy, and boundary conditions provide a falsifiable foundation for examining when autonomous agents improve organizational performance and

when governance saturation reverses those gains. The IS discipline is well-positioned to advance this work by developing empirical measures, governance designs, and curricula to direct and oversee autonomous systems. Treating principal governance as a first-order IS problem is essential to realizing the benefits of agentic AI responsibly.

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