INFORMATION POLICY: SHAPING THE VALUE OF AGENCY RELATIONSHIPS

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We evaluate how changes in information use affect agency relationships. Information asymmetry redistributes value, but imperfect monitoring also encourages agents to take inefficient actions to influence this redistribution, thereby reducing joint agency value. Changing focus from minimizing principals’ costs to maximizing joint agency value, we argue that more monitoring is not always better, and we explore, through a six-sector framework, how more extensive use of information benefits (or damages) value creation and affects its distribution.

The problem of information policy (IP)—the collection and use of performance information in situations of delegated authority to support executive decisions and to determine rewards and incentives—is becoming increasingly important in organizations. As an input to a structured combination of contractual relations and authority, IP shapes any delegation relationship—employee and manager, CEO and branch manager, board of directors and CEO, and so forth. Each firm hosts many interdependent agency relationships, in which different modes of IP support the creation and distribution of value.

It is clear that managing information requires attention, but proportionately little specific work has been done to date regarding the impact of information management, compared with other variables, on the effectiveness of agency relationships within firms. On the one hand, in work on agency relationships and performance assessment (including the analysis of executive compensation and incentives, which is the traditional application of agency theory in managerial literature; e.g., Holthausen & Leftwich, 1983; Hunt, 1986), researchers have addressed procedures, mechanics, and costs of these assessment techniques (e.g., Ouchi, 1979; Waldman, Atwater, & Antonioni, 1998), rather than focus on the roles of monitoring and information collection and their impacts on the value of the agency relation (see Baron & Kreps, 1999: Chapter 10, for such an analysis). On the other hand, in existing work on information flows, their determinants, and their implications, researchers have focused largely on the peer-to-peer horizontal level of information and knowledge sharing and the transfer of successful practices within firms and professional organizations (Nonaka & Takeuchi, 1995; Orlikowski, Yates, Okamura, & Fujimoto, 1995; Sharma, 1997; Sproull & Kiesler, 1991; Szulanski, 1996; Szulanski & Winter, in press), to the relative neglect of the vertical control focus of agency relationships between supervisor and subordinate.

In this article we focus on evaluating the impact of changes in IP on the effectiveness of agency relationships within firms. We wish to design an empirically testable framework to explain the ways in which ubiquitous applications of information technology, through their intentional or inadvertent impacts on monitoring and the use of information, affect value creation and distribution. In particular, we argue that more monitoring is not always better, and we explain when overextensive use of information may damage the value creation process. Finally, on the theoretical level, we change the focus of analysis from minimizing the principal’s agency costs to maximizing joint agency value, hoping to provide some new theoretical perspectives on the use and implications of IP in agency relationships.

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In the first section we examine the structure of agency relationships, explaining why agency problems arise and why information asymmetry makes efficient outcomes difficult to achieve. We highlight strengths and certain flaws of existing literature relating to agency and suggest a reformulation of the agency problem. In the second section we focus on monitoring as a key component of IP, and we analyze when more monitoring may harm results. In the third section we advance a taxonomy of impacts of changes in IP, and in the final section we suggest possible extensions of the agency value framework and avenues for further research.

INFORMATION AND THE STRUCTURE OF AGENCY RELATIONSHIPS

Why Do Agency Problems Arise?

As Eisenhardt (1989) points out, agency relations as modeled in economic theory (for a comprehensive summary, see Holmstrom & Tirole, 1989) occur more pervasively than classical management literature citations imply and should not be restricted to executive compensation or board-CEO-shareholder relationship analysis (see Sharma, 1997, for related points). Indeed, agency analysis becomes useful whenever delegation of authority within a hierarchical relationship is necessary to complete a task. An analysis of agency relationships, thus, is central to the structure of any multiperson business organization—the first departure from the “black box” theory of the firm (Holmstrom, 1996). Delegation of specific tasks to those relatively more suited to perform them leverages the diversity of skills in the organization’s arsenal—an application of “comparative advantage” on a person-to-person level to create joint agency value.1 Capturing these gains from trade requires a system of performance measurement and compensation to ensure that the work gets done at the appropriate combination of low cost, timely delivery, and high quality. Yet, the principals in these relationships (i.e., the delegators of authority: CEOs to branch managers, branch managers to employees, and so forth) and the agents (delegates) do not necessarily share common objectives. The primary issue in the design of agency relationships (and the reason why agency models continue to interest researchers), thus, is to manage the challenge of achieving the full gains from exploiting comparative advantage in order to achieve joint agency value while overcoming incentive misalignment or incompatibility.

Were a principal to have perfect information about its agent’s actions, this incentive divergence would not matter, since the principal could then pay the agent based on the effort actually exerted, providing the proper incentives for the agent to put in the principal’s desired amount of effort. We define monitoring as any collection of information by the principal in this agency relationship, whether for supporting direct incentives or for setting limits on employees’ behaviors. Absent perfect information, however, an inevitable tension arises in defining an efficient contract between these two self-interested parties. These problems combine to create a situation of moral hazard (Holmstrom, 1979, 1982; Holmstrom & Tirole, 1989), in which the agent can take undesirable actions (e.g., shirk rather than work, or devote effort to undesired tasks) that the principal cannot observe.2

Agents privately bear the full cost of working rather than consuming leisure, but they receive only that part of the benefits explicitly specified by the contract terms. By analogy, incremental agent effort is a public good: it produces benefits for the principal as well as for the agent who exerts it. When choosing an effort level, the agent equates marginal private disutility not to the marginal total benefit (the incremental gain in joint agency value) but to marginal private benefit—that is, to the transfer from the princi-

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1 The idea is that, fundamentally, delegation implies either the existence of an absolute advantage in terms of the skill set (i.e., I ask a gardener to sculpt my garden because he is more adept at it than I) or the existence of gains from trade (because I, who teach and publish papers, have a high opportunity cost of time to sculpt my garden, so the gardener has a comparative value advantage over me in doing so, even if our gardening skills are equal, or, alternatively, because I want a garden that is too big for me to sculpt alone). Compare this comparative advantage approach with the absolute advantage approach (coupled with an assumption of knowledge asymmetry so that the principal cannot effectively evaluate agent performance) of Sharma (1997).

2 Sharma (1997) points out that professional services are an extreme case of this unobservability phenomenon, and they require greatly different institutions (such as professional organizations and within-profession altruism) from the traditional principal-agent model.
pal. Because the agent, when choosing its own effort level, does not take into account the positive externality imposed on the principal, this disregard can lead to an inefficient outcome. The value created by the relationship between principal and agent is less than the ideal level that would be generated in the case of perfect information or goal congruence, regardless of how this joint agency value is divided.

We address these indirect costs to the principal-agent system—not to either individually—here, rather than simply follow the path of traditional agency cost analyses (e.g., Jensen & Meckling, 1976) that focus on risk-bearing rather than value-maximizing agent effort.3

Literature Review and Critique: Monitoring and the Principal’s Problem

The general question answered by traditional agency theory is straightforward—namely, "How can a principal, rationally anticipating problems of moral hazard and recognizing its own limitations in collecting information on which to base a compensation strategy for its agents, devise and implement an agency contract that best safeguards its interest?" Accepting this framework uncritically—an objective of maximizing principal welfare, subject to a constraint of voluntary participation by the agent—leads to a simple syllogism about the proper IP: since (1) the principal’s information condition is initially limited and (2) this limitation impedes superior (from the principal’s viewpoint) contracts, then (3) any improvement in the principal’s information position ought to yield positive results. This result, the "informative principle" (Prendergast, 1999), defines the "traditional agency" view.

Within this framework, information technology (IT)—broadly construed to encompass computers, telephones, videocameras, statistical process control, spreadsheets, online databases about one’s own or competitors’ performance, and so forth—cf. Forrester, 1986) has been characterized as a monitoring tool to reduce the information asymmetry inherent in the agency relationship, largely to the detriment of the agent. The eventual goal of any improvement in IT is to contract more directly on the previously unobservable "effort" of the agent, rather than the noisy but perfectly observable "result," and the focus falls on detecting “shirking” and enforcing principal-preferred behaviors (Zuboff, 1988). Advances in IT, by providing greatly increased (and continually increasing) information-gathering ability for a fixed amount of investment, should lead to an increased use of information gathering—among other applications, in monitoring agents’ performance, both on inputs and outputs (Garson, 1988). As monitoring becomes cheaper, more of it will be used, since it leads to better outcomes for the principal (who, after all, decides how much to spend on information collection).4 All this, of course, relies heavily on the informativeness principle—that monitoring is unambiguously positive and that more of it will improve the outcome—thus defining the optimal monitoring intensity as that level at which additional monitoring costs to the principal exactly offset their incremental benefit costs (Gjesdal, 1983; Grossman & Hart, 1983; Jensen & Meckling, 1976).

Authors of existing managerial and information management literature have largely followed the informativeness principle, examining the impacts of cheaper information in ameliorat-

3 The welfare focus on agency relationships traditionally has been concentrated on the tradeoff between efficient effort and efficient allocation of risk (Eisenhardt, 1989; Holmstrom, 1979; Prendergast, 1999). Although our approach can be generalized to encompass issues of optimal risk balancing, we do not consider this issue; instead, we focus on the more interesting issue of moral hazard, assuming risk-neutral agents (as in Sharma, 1997). Indeed, we believe that focusing overly on risk profiles may obfuscate the more important aspects of the agency relationship. On this issue, see also Lazear (1995), Gibbons (1996), and Prendergast (1999).

4 The total dollar amount spent on monitoring may either decrease or increase as the price of monitoring declines. To put this budget-share ambiguity in intuitive economic terms, the answer to the question "How much less will we spend on the new total amount of monitoring that we choose, now that each monitoring unit has become cheaper?" depends on three factors: (1) the pure price effect of reduction in monitoring costs ("Now that monitoring has become less expensive, how much money are we saving on our previous level of monitoring?"); (2) the elasticity of substitution of monitoring for other inputs ("Given that monitoring is now cheaper, how much more monitoring should we use as a replacement for some other inputs?"); and (3) the income elasticity of monitoring as an input ("Now that a reduction in monitoring’s price makes us richer because we’re spending less money to get the same amount of monitoring, how much of our newly increased purchasing power should we spend on additional monitoring?").
ing the principal’s lot (e.g., Forester, 1986; Merchant & Traynor, 1983). The literature has also run the full gamut from critical examinations of the threshold between good business practice and blatant invasion of privacy (Marx, 1990) to occasional forays into ideological rejections of the principal’s “right” to monitor (Garson, 1988; Zuboff, 1988). Most often, the source of agency problems is motivated by simple incentive incongruity, which leads agents to fulfill their own objectives rather than either the principal’s or the maximization of joint agency value (Holmstrom, 1979, 1982; Holmstrom & Tirole, 1989).

Theoretical explanations of why the observed actions of monitored agents differ from those of unmonitored agents, and why monitored agents do not necessarily behave in a socially optimal way, include contractual incompleteness (Grossman & Hart, 1986; Hart, 1995), bounded rationality (Holmstrom & Tirole, 1988; Williamson, 1975), inability to identify and specify (or lack of existence of) a particular observable measure (Baker, 1992; Barzel, 1982), lack of connection between monitoring and incentives or punitive actions (Tosi, Katz, & Gomez-Mejia, 1997), and inability to interpret collected performance information because of lack of specific knowledge about the task (Sharma, 1997). While IT’s impacts on organizational design and firm processes have received significant attention in the information systems research literature (Daft & Lewin, 1993; Hitt & Brynjolfsson, 1997; Orlikowski et al., 1995), the sparse discussions of IT’s impact on agency relationships (Bakos & Kemerer, 1992; Davenport, 1993; Forester, 1986) endorse uncritically the traditional conclusions that gathering more information about agents’ performance is uniformly better and, thus, that an optimally designed information acquisition system collects maximum information for a given cost.

Notice how this objective of maximizing principals’ welfare, inherent in extant scholarly work, differs from the “social planner’s” viewpoint of maximizing total welfare (here, total agency value), where both objectives are subject to constraints of limited available technology and rational participation by both principal and agent. The theory of “agency costs” (Holmstrom, 1979; Jensen & Meckling, 1976; Meckling & Jensen, 1992), which focuses on the difference between the principal’s achieved welfare in the agency relationship and that achieved under ideal conditions of perfect information and aligned incentives, can mislead in two ways. First, it ignores some agency benefits: the gain in allocative efficiency that results from getting the task completed by the agent. Second, part of this agency “cost” is a transfer between the principal (or the shareholders the principal represents) and the agent: the amount the agent can appropriate without destroying it is a “cost” of the agency relationship only from the principal’s standpoint; it is not a social cost attributable to the manner in which the task is organized. These reductions in total surplus, representing a reduction of joint agency value—or, alternatively put, an increase in joint agency costs—are incurred only when agent actions differ from those that would have been undertaken under perfect information and full goal congruence. Joint agency value, thus, is invariant to lump-sum transfers between principal and agent; traditional agency cost increases when this transfer comes from the principal, even though agent efforts remain unchanged.

Under this definition, changing the policy of how and how much information on agent performance is to be collected can affect both joint agency value creation and distribution, even if the information can be gathered without direct cost. Thus, information asymmetry redistributes surplus from principal to agent (accounted for as an agency cost in traditional analyses, despite being an obvious transfer payment from a social welfare perspective). Additionally, information asymmetry induces the agent to take inefficient actions to influence this redistribution in the presence of imperfect monitoring, often reducing the total surplus available. (Note that this reduction in joint agency value would be omitted from agency cost analyses, despite being an empirically and analytically significant deadweight loss).

The change in perspective we advocate, then, significantly alters the perceived benefits and shortcomings of different ways to use information in agency relations (summarized in Lord & Maher, 1990). As Zajac and Olsen (1993) observed for the analogous deficiency in the traditional transaction cost economics framework, the policy structure that minimizes principals’ (or, in Zajac and Olsen’s case, transactors’) cost does not necessarily correlate perfectly with the policy structure that maximizes total value created. Past a certain level of monitoring, this correla-
tion will likely be negative, and the principals might find themselves ultimately worse off by monitoring at all much—as shown in a large-company context by Zajac and Westphal (1994).

Devising the best ways for the principal to extract benefit from the agent (without looking simultaneously at the process that creates value) will lead to plenty of monitoring but to little effort aimed at creating joint agency value. This has been implicitly recognized in the managerial literature in the context of buyer-supplier agency relationships. “Japanese supplier practices” (Aoki, 1990), now widely adopted in the United States (Dyer, 1996; Womack, Jones, & Roos, 1990), have shown that a profit-maximizing buyer may gain higher quality from contractors by foregoing immediate returns to improve future value creation (Croson & Jacobides, 1999), in keeping with the “efficiency wage” tradition in economic research (Klein & Leffler, 1981). The emphasis on joint agency value, along with concomitant sparser monitoring in the context of such “enlightened” practices, underscores the merit of explicitly considering agency value, and information’s impacts thereupon, in picking appropriate IP choices.

Finally, the current literature indicates that the basic problem information gathering and processing technology attempts to address is the information asymmetry that permits moral hazard to escape undetected. We suggest that this view is incomplete, as it leads to an uncritical increase in information gathering and measurement. Rather, we should be thinking in terms of IP’s ability to address the goal incongruence that typically precludes first-best outcomes. The nature of information and its relation to the task at hand will determine whether increased use of information and monitoring, rather than a limit on the extent of potential moral hazard, may actually encourage agents to engage in it. This distinction becomes particularly important whenever increasing information gathering magnifies social agency cost.

As an illustrative example, consider the contract offered to Ken O’Brien, an NFL quarterback, in the mid 1980s (Brown, 1990; Prendergast, 1999). Since O’Brien had a history of throwing interceptions, the contract specified that interceptions would be monitored and penalized. Unsurprisingly, O’Brien did not attempt many pass plays, even in situations where he should have done so, leading to a decline in both his reputation and his team’s (principal’s) performance. As Joe Namath (who, as few others, could accurately evaluate Brown’s true performance based on his own professional expertise as an NFL Hall of Fame quarterback) put it, “I see him hold onto the ball more than he should . . . I don’t like incentive contracts that pertain to numbers” (Brown, 1990). This professional football example (anticipating Sharma’s [1997] treatment of professional peer review) illustrates an incentive misalignment caused by the contract, which “everybody should have known” would not work, in measuring performance that only Namath (and his peers) could evaluate. Unfortunately, this type of behavior is exactly what many firms pursue in their agency relationships, relying uncritically on available performance measures even when such reliance hurts all parties involved. A classic error of “overemphasis on highly visible behaviors” (Kerr, 1975) coupled with monitoring technology growing dramatically faster than measure-interpreting ability, this creates a significant technology-amplified managerial problem.

In particular, a maximizer of total value should eschew certain available opportunities to intensity monitoring, because an increased level of monitoring might have perverse effects that destroy social welfare even as they add to principal welfare. The consideration of total value might, paradoxically, result in an even higher surplus for the principal than will the myopic minimization of agency cost. In keeping with analyses of “enlightened” supplier management (Dyer, 1996) or human resource management (Laszear, 1995), which illustrate nontraditional methods of compensating suppliers or employees, we suggest that managerial implementation of a broader analysis of agency relationships will yield superior results for all parties involved.

**MONITORING AS IP**

Based on our proposed change of vantage point in analyzing agency relations, the second part of our argument is that the activity of monitoring itself may be detrimental to value creation. Our analytical objective, then, is to examine the conditions under which we expect this to happen.

In Table 1 we collect a set of measures (measure imperfection and “perversibility,” asym-
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<th>Measure</th>
<th>Effect</th>
<th>Links to Literature</th>
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<tr>
<td>Measure imperfection</td>
<td>• Measure is &quot;noisy,&quot; not improving on previous Bayesian update on</td>
<td>• Gesdal (1983); Holmstrom (1979); Levinthal (1988)</td>
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<td>underlying activity (measure with increased variance around true mean)</td>
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<td>• Measure is <em>pervasive</em>; has only indirect relation with value</td>
<td>• Asch (1990); Leventis (1997); Meyer (2000); Meyer &amp; Gupta (1994); Dyer (1998)</td>
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<td>creation, which it may lose as agents actively game the system to</td>
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<td></td>
<td>beat the numbers</td>
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<td></td>
<td>• Measure may lose ability to represent any meaningful underlying</td>
<td>• Goodhart (1984); Kydland &amp; Prescott (1977); Marschke (1996); Meyer (2000)</td>
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<td></td>
<td>activity or influence agent action; becomes &quot;inert&quot;</td>
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<td>Multiple tasks in agency</td>
<td>• Agent has <em>multiple activities</em>, of which only a subset can be</td>
<td>• Drago &amp; Garvey (1998); Holmstrom &amp; Milgrom (1991)</td>
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<tr>
<td>relations</td>
<td>measured; effort goes only to measurable activities, destroying</td>
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<td></td>
<td>value</td>
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<td></td>
<td>• Degree of <em>correlation and complementarity</em> is critical: negative</td>
<td>• Baker (1992); Holmstrom &amp; Milgrom (1991)</td>
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<td></td>
<td>correlation between measurable and nonmeasurable will lead value</td>
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<td>astray</td>
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<td></td>
<td>• Principal has <em>multiple objectives</em> (possibly on multiple activities),</td>
<td>• Donaldson &amp; Lorsch (1983)</td>
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<td></td>
<td>tradeoffs are hard to enunciate and integrate with measures</td>
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<td>Ex ante causal ambiguity</td>
<td>• Principal does not know at onset what processes and measures add</td>
<td>• Kaplan (1989); Thompson (1967)</td>
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<td>value; no sense in sacrificing <em>relevance for precision</em></td>
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<td></td>
<td>• Benefits from <em>learning and experimentation</em> will be wiped out by</td>
<td>• March (1991); Sabel (1994)</td>
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<td></td>
<td>bootstrapping and fine tuning known dimensions</td>
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<td></td>
<td>• <em>Evolutionary prospects</em> at risk if organization monitors and follows</td>
<td>• Levinthal (1997); March (1991)</td>
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<td>successful path too closely—detrimental with imperfect measures</td>
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<td>Latent economies of</td>
<td>• <em>Multiperiod</em> agency relationships can have different structures</td>
<td>• Cyert &amp; March (1955); Ghoshal &amp; Moran (1996); Granovetter (1985); Kreps (1990a,b);</td>
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<td>continuation</td>
<td>from single-period relationships; this change can make them more</td>
<td>Lazear (1981, 1995); Zajac &amp; Olsen (1993)</td>
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<td>incentive compatible and, hence, potentially less monitoring</td>
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<td>• Periodic &quot;jumps&quot; in compensation rather than discrete rewards may</td>
<td>• Baker (1992); Fama (1980); Holmstrom (1982)</td>
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<td></td>
<td>alleviate monitoring imperfections and reduce agency value</td>
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<td>dissipation</td>
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<td></td>
<td>• Long-term and multiperiod contracting *substitute for monitoring</td>
<td>• Asanuma (1993); Asanuma &amp; Kikutani (1992); Dyer (1996); Nishiguchi (1994)</td>
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<td></td>
<td>intensity, thus reducing impact of problematic monitoring</td>
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metrically monitored multiattribute activities, ex ante causal ambiguity, and latent "economies of continuation" from the economics and management literature and from our own experience that determine when more extensive use of information in agency relations leads to a
measure of agency value. These four variables, which we deem to be the most important, affect the potential value added (or detracted) by monitoring and help us predict the impacts of a change in uses of information on the agency relationship. They also describe the conditions under which a principal pursuing “agency cost minimization” (ignoring agency value that does not directly accrue to the principal) introduces inefficiencies.

**Measure Imperfection**

*Misunderstood imperfection*, the “noise” in traditional agency formulations, leads to a divergence between value creation and the principal’s private cost minimization. As Holmstrom (1979) demonstrates, the ability to provide *information about efforts not assessable by looking at their direct results* is a necessary and sufficient condition for a monitoring system to be valuable to the principal. We concur with traditional agency theorists that any improvement in measures will reduce information asymmetry, helping principal and agent move toward a more efficient solution. The literature focuses, however, on whether measures are efficient in a Bayesian sense—that is, whether new measures produce more accurate information than the existing performance measurement infrastructure, allowing managers to obtain measurements with a smaller variation over the real construct (Gjesdal, 1983; Levinthal, 1988). Noisy measures, however, are not the only concern for designing an efficient performance compensation scheme: the real problem is that measures may be corruptible or inherently flawed, rather than inefficient.

Why would this be so? First, quantifiable measures are inherently imperfect indicators of the underlying value creation process (Kerr, 1975; Meyer, 2000). The amount of the agent’s time spent on the telephone or in the office, for instance, is not a particularly reliable indicator of the effort exerted or value created from this effort—no matter how exactly and consistently quantifiable these measures might be.

Second, agents have a notoriously high ability to “learn their way around” measures. As Williamson (1975, 1985) remarks, the presumption in standard economics that real-world economic agents will always behave in a benign manner and abide by some “rules of the game,” even though they are presumed to be self-interested, seems naive, if not self-contradictory. By precisely measuring an imperfect indicator, the principal encourages agents to “game the system,” generating high scores on the indicators measured at the expense of suboptimizing the underlying effectiveness and extent of their actual efforts. Such a measure, therefore, is perversely—it can be turned to the principal’s disadvantage if relied on uncritically. As Goodhart (1984) and Meyer and Gupta (1994) observe in different contexts, most performance indicators used in practice are perversible, and, thus, over-reliance on monitoring will have perverse effects, simply because agents are self-interested, smart, and have a plausible motivation to engage in perverse learning—so the active use of a particular performance measure for incentive compensation leads to its obsolescence as a measurement of truly effective effort. This perversibility means, in our terminology, that not only principal utility but also joint agency value will decline if the principal aims at minimizing costs through imperfect measures, barring ethical and social constraints on such behavior.

Managerial executives prefer measures they can control (or manipulate; Dyl, 1989; Hunt, 1985), because they can (and often do) manipulate them to their advantage (e.g., Groff & Wright, 1989; Holthausen & Leftwich, 1983; Hunt, 1986; Verrecchia, 1986), particularly using the accounting and financial reporting framework as a tool. While Wiseman and Gomez-Mejia (1998) suggest that framing and risk aversion explain managers’ preferences for accounting-based (rather than stock-market-based) incentives, we propose that they prefer being compensated on these “malleable” measures simply because they can use their malleability (as opposed to an exogenously determined stock price) to “beat the numbers” more easily.

This measure imperfection phenomenon is empirically more prominent than extant theoretical work might lead us to believe, with a number of studies demonstrating the potentially devastating effects of measure perversibility. In the theory literature only Holmstrom and Milgrom (1991) and Baker (1992) examine the equilibrium implications of such incomplete or perversible measures. Empirically, Asch (1990) examines how Navy recruiters change their performance to meet specific quotas; Oyer (1996) discusses similar intertemporal inefficiencies
induced by the structure of monitoring and incentive systems for sales forces; Leventis (1997) provides disturbing evidence that New York surgeons cease performing certain operations if their mortality rates are monitored and get close to a particular threshold; Marschke (1996) explains how a training agency actively manages to “meet the numbers” for its own governmental principals, rather than optimize its real training effort; and Heckman, Smith, and Taber (1998) show how agencies “cream-skim” apprentices to maximize placement. Meyer (2000) also mentions the educational testing industry as one of the most unabashed cases in which metrics are openly “tricked” and lose any relation to the underlying performance they are supposed to measure.

Multiple Tasks in Agency Relationships

As Holmstrom and Milgrom (1991) observe, devising compensation schemes and appropriate uses of monitoring for an agent who has multiple objectives or multiple tasks is a substantially different problem from the traditional agency model. If the agent’s effort can be measured on only some tasks (e.g., hours spent typing on the PC) and not on others (e.g., hours spent helping colleagues), then monitoring and rewarding that measurable activity might be counterproductive, if the total value created by the employee depends on striking a balance among these complementary tasks. The employee may devote so much time to typing (and, hence, so little to helping out new colleagues) that value might actually be destroyed when considered against the case of no performance compensation at all; even as some monitoring and strong incentives will help reduce shirking, they will induce an inefficient allocation of effort to the various tasks.

If the correlation of time spent on these tasks is positive (i.e., if tasks are complementary and naturally performed together, even when only one is rewarded), then the existence of only partial information will not be too troublesome: by catering to one task, the agent will also advance other tasks. However, if there is a negative correlation, then measuring only a subset of these substitute tasks might induce significant inefficiencies. Under task substitutability, the IP dictum of “monitor what we can” implicitly discourages effort on all unmeasurable substitute dimensions. Empirical research by Drago and Garvey (1998) indicates that the introduction of strong performance incentives along narrow measurable dimensions does lead to significant reduction in the willingness of employees (agents) to help their colleagues—potentially a significant loss of value if a balance between productiveness and collegiality is desired.

The same problem arises when the principal has multiple objectives for the agent to achieve (e.g., simultaneously achieve growth, improve return on investment, and increase quality and customer satisfaction). If only some of these objectives can be measured and are used as drivers of compensation, then inefficient time-allocation decisions will result unless the activities are perfect complements. Given that at least a few of these objectives are likely to be negatively correlated, increasing monitoring will increase the magnitude of the problem, perhaps so much so that doing away with the monitoring system may improve overall results. Quality, for example, may be inversely correlated with costs, customer satisfaction with return on invested assets, and foundations for future success with immediate and measurable returns.

This might account for the myopia that corporate executives feel is induced as a result of extensive monitoring (Donaldson & Lorsch, 1983). Inasmuch as crucial information remains qualitative or hard to gauge, companies may be misdirecting their agents to cater to the few (yet not always most important) measurable attributes—the classic problem of “fascination with an objective criterion” (Kerr, 1975). Such a problem is exacerbated by the existence of or need for multiple changing and conflicting goals in the first place (Cameron, 1986).

In conditions of multiattribute objectives or tasks, especially whenever the tasks or objectives are substitutes, more monitoring on a subset of the relevant dimensions may lead to an apparent reduction of agency cost but an even greater reduction in overall agency value through encouraging redirection of effort (Holmstrom & Milgrom, 1987, 1991). However, if IP expands to count more dimensions (both in accounting for costs and crediting value created), then measured agency costs can decrease while total agency value increases. Much of the current interest in managerial accounting systems, such as the “balanced
scorecard" (Kaplan & Norton, 1992, 1993), is essentially an effort to reduce the magnitude of this problem. Increased breadth of information collection, thus, solves this problem, even as increased intensity or depth of existing measures exacerbates it.

**Ex Ante Causal Ambiguity**

*Ex ante causal ambiguity* (Thompson, 1967) occurs when the specific agent actions that add value are not known at the relationship's start, saddling the principal with the difficult position of being forced to commit to a measurement scheme to assess the usefulness of the agent's effort before learning how to do so. In such a case, the "more monitoring is better" prescription will mislead—not because the agent will exploit the incentive scheme but because the ad hoc incentive system sacrifices relevance in the name of precision (Kaplan, 1989) and induces effort of random relevance. Companies in analogous situations (measuring the financial performance of e-commerce subsidiaries, for example), to their own detriment, extrapolate their IP from established fields to new ones, in which established measures and metrics mean little. Evolutionarily, emphasizing monitoring in an area where ex ante knowledge of critical success drivers is scarce will impair an organization's survival ability. Even though the organization's agents may work harder, the experimental discovery of mutually beneficial outcomes is foregone, leading to reduced adaptive ability (Levinthal, 1997). This imbalance of exploitation over exploration (March, 1981) might lead to tracking the wrong indicators, impairing even successful exploitation of environment-driven opportunities.

A related point is that safeguarding the principal's share of the pie may lead to the inadvertent loss of latent economies of learning and innovation. When compensation is limited to specific, contractible dimensions, the agent will be left with no incentive to advance a mutually beneficial (but privately costly) learning or revenue-increasing activity, inasmuch as such activities do not enter the compensated results—the public-good theme again, combined with rivalry among substitute tasks of different measurability. Here, the ex ante ambiguity about the value of the results of learning may prevent investment in it from ever occurring. Upon comparison of 1980s era U.S. versus Japanese manufacturing practices (Dyer, 1996; Womack et al., 1990), it seems that U.S. automotive firms had fine-tuned their procurement practices to minimize principals' costs, whereas Japanese practices were oriented to the maximization of agency value, and only subsequently to its division. Consequently, as Sabel (1994) has remarked, the value-maximizing practices of the Japanese system encouraged a higher level of learning, which led to a long-term cost advantage.

**Latent Economies of Continuation**

Myopically foregoing latent economies of continuation is a related problem linking today's performance with future performance under a different contract between the same partners. Assuming that the relationship will terminate after one interaction is costly. The principal's focus on safeguarding its own "slice" may compromise the necessary slack that enables learning and innovation (Cyert & March, 1956, 1963) in a continued relationship. The appropriate incentive structure for multiperiod principal-agent cooperation might be quite different from a single-period contract; the agent's expected future benefit from continuing the relationship might itself deter shirking (Klein & Leffler, 1981), with this long-term perspective substituting for the traditional tradeoff between contract completeness and flexibility (Masten & Crocker, 1985). Recent research on the duration of interorganizational relationships further underscores this point (Baker, Faulkner, & Fisher, 1998).

Recognizing the potential of a mutually profitable multiperiod relationship as an incentive scheme, in which value creation is a criterion for renewing a contract and, consequently, is an inducement for the agent to act efficiently in period-by-period decisions, can improve on outcomes in the one-shot relationship. Classic theory in organizational economics sheds some additional light on mechanisms to substitute reputation for tight contracts and intensive monitoring. Tournament models of managerial promotion extended to multiperiod settings (Lazear, 1981, 1995; Lazear & Rosen, 1981) cope with limited performance information. Fama (1980) and Holmstrom (1982) have further suggested that discrete "jumps" in compensation (such as pro-
motions and career advancement, a form of ex post "settling up" with agents for either superior or disappointing performance) provide the requisite incentive basis for efficient effort allocation, even under imperfect information. Kotlikoff and Ghokale (1992) and Gibbs (1995) focus on long-term career concerns of employees whose short-term actions are difficult to monitor.

Similarly, empirical evidence from Japanese automotive manufacturing practices (Dyer, 1996) shows that the success of the (highly competitive) subcontracting system is linked to the durability of agency relationships within companies and subcontractors. Not only are reworking rates for parts subcontractors to Japanese auto manufacturers almost twice as high as they are in corresponding U.S. firms, but Japanese manufacturers do not insist on prespecifying dimensions on which quality monitoring will occur. As Asanuma and Kikutani (1992), Asanuma (1993), and Nishiguchi (1994) describe, this system induces agents to perform at a high level by offering attractive terms for future continuation; the more efficient an agent's effort, the higher the chances of moving to a better tier of more highly preferred subcontractors, characterized by higher value added and, hence, higher future agent profits. Using economies of continuation as an incentive scheme thus offers an attractive substitute to monitoring intensity, especially if the latter is imperfect and costly (Baker & Faulkner, 1991; Croson & Jacobides, 1999).

Finally, some of the measurement problems that lead to opportunistic renegotiation and "ratcheting" of expectations can disappear in repeated interactions. Authors of the management and economic sociology literature (Ghoshal & Moran, 1996; Granovetter, 1985; Zajac & Olsen, 1993) have pointed out that such repeated interaction allows for more incomplete contracting than transaction cost economics (Williamson, 1975) would lead us to expect and that repeated interaction and social norms and mechanisms can substitute for strict monitoring (Barney & Hansen, 1994; Croson & Jacobides, 1999; Kreps, 1990b).

Monitoring Imperfections and Agency Value, Revisited

Given that measure imperfection, multitasking, ex ante uncertainty, and latent economies of continuation are present, increased monitoring depth may result in reduction of agency value. Also, maximizing the share of the principal—and excessively focusing on this relative measure in the presence of such problem-monitoring structures—may lead to significant reduction in overall value, even to the point of reducing the absolute amount of benefit the principal captures. Finally, if the same information is used for coordinating as well as for compensating, extensive monitoring (for incentive purposes in agency relations) contaminates that information, leading to significant value dissipation, as the coordination problem is tangled in the web of agency relations. Results are "massaged," weaknesses are concealed for private benefit of local actors, and problems are misconstrued to the detriment of not only the principal but also the joint agency value created by the principal-agent system taken together. Problematic measures and monitoring will act to exacerbate the underlying agency problem rather than relieve it.

Monitoring leads astray not only because it implements the "wrong" kinds of incentives (i.e., straightforward incentives for agents to undertake perverse actions) but also because it interferes with coordination; even agents who fully share the principal's objectives may dissipate joint agency value through miscoordination. An information system's role is not solely (or even primarily) to provide compensation and incentives to organizational participants; it also coordinates, facilitating efficient resource allocation within the firm and directing the effort of employees to the most efficient goals (von Hayek, 1945). IP issues will arise even in a volunteer organization staffed by altruists when excessive monitoring of particular dimensions leads to suboptimal actions; for example, differences between espoused theories and theories in use (Argyris, 1995) will dupe participants into chasing the wrong goals. Whether because of the coordination problem, the monitoring-incentive problem, or a combination of both, extensive use of information under conditions of measure imperfection, unobserved multitasking, causal ambiguity, and latent economies of continuation leads to substantial deadweight loss, detracting value from the agency relationship.
A TAXONOMY OF POSSIBLE EFFECTS OF ADDITIONAL MONITORING

Given this example, how can we generally classify the various effects of a change in IP that affects the agency value as well as the distribution of delegated tasks? In particular, what impacts result from an increase in monitoring, mediated by characteristics of the information used and the underlying business situation, on the principal, the agent, and the joint agency value created? Such a taxonomy would incorporate how gathering and interpreting information affects principals, agents, and joint agency value outcomes.

The IP and Agency Value Framework

In the interest of tractability, we keep the business situation fixed (that of a supervisor-subordinate relationship) and trace the various potential impacts of IP changes on it, rather than vice versa. Our taxonomy partitions the possibility space into six categories, representing feasible permutations of principal gain/loss, agent gain/loss, and joint agency value gain/loss following an IP change. The creation and division of benefits caused by the IP change generate six possibilities, ranging from [P+, A+, V+] (to be read "[principal gains, agent gains, joint agency value increases]") to [P−, A−, V−] (i.e., "[principal loses, agent loses, joint agency value decreases]"). Note that the third element denotes the overall creation of joint agency value by implementing a new IP, whereas the first and second elements describe the distribution of this value (and redistribution of other surplus) to the principal and agent, respectively. The pluses and minuses for the agents and principals do not refer to their respective shares of joint agency value but, rather, to the changes in their gross remuneration (or, more generally, their utility level) from the previous condition. This [P+/P−, A+/A−, V+/V−] notation, thus, compactly expresses the directional impacts of a change in IP measured in changes in utility/benefits from the prechange status quo. Note that these sextants denote the effects of a change in IP, not the characteristics of the base-level IP.

In the sextants with [V+] as their third element (i.e., Sextants I, II, and VI), the IP change in question creates an overall social gain. Conversely, in the other three sextants we see that insistence on monitoring destroys value through creating organizational dysfunctionality (Asch, 1990; Drago & Garvey, 1998; Leventis, 1997; Marschke, 1996; Meyer & Gupta, 1994) or simply wastes resources on ineffectual incentive schemes (Healy, 1995; Meyer, 2000). Table 2 summarizes the difference between the blissful [P+, A+, V+] and miserable [P−, A−, V−] sextants.

Adaptability and Sustainability

When the question of adoptability (i.e., "Can this change in agency policy be implemented at all?") is being considered, the authority to implement a given IP can rest with the principal, can rest with the agent, or can require a consensus between the two. If the party (or coalition) with the authority to implement is made better off by the new policy, we call the new policy "adoptable." For sustainability (i.e., "Can this change in IP be sustained once adopted?"), the authority to undo a given policy, once put into place, can similarly rest with the principal, can rest with the agent, or can require a consensus between the two. If the party (or coalition) that holds the authority to "reverse" or "escape" back to the previous status quo (Row, 1997) is made no worse off by the new policy than by the old, we call the new policy "sustainable." Table 3 summarizes the distribution of adoption and veto rights that make each sextant adoptable or sustainable.
TABLE 2
The Sextant Taxonomy: Describing the Business Situation in Each Sextant and Links to Existing Research

<table>
<thead>
<tr>
<th>Number</th>
<th>Sextant Name</th>
<th>Who Gains/ Losses</th>
<th>Summary of Effects of Increased Information Intensity</th>
<th>Links to Evidence in Existing Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Monitoring for mutual benefit</td>
<td>P+, A+, V+</td>
<td>Agents' ability to commit to high effort leads to increased efficiency and gains for all concerned</td>
<td>Davenport, Eccles, &amp; Prusac (1992); Kaplan (1989); Rodgers (1990)</td>
</tr>
<tr>
<td>II</td>
<td>Loading a truck</td>
<td>P+, A-, V+</td>
<td>Slack redistributed from agent to principal while efficient effort levels are encouraged</td>
<td>Alchian &amp; Demsetz (1972); Bakos &amp; Kemerer (1992)</td>
</tr>
<tr>
<td>III</td>
<td>The electronic sweatshop</td>
<td>P+, A-, V-</td>
<td>Slack redistributed from agent to principal, and monitoring is outright detrimental to agent welfare</td>
<td>Garson (1988); Zuboff (1988)</td>
</tr>
<tr>
<td>IV</td>
<td>Productivity paradox</td>
<td>P-, A-, V-</td>
<td>Monitoring induces “beating the numbers” and inefficient actions; value declines so much, all are worse off, or so much is spent on monitoring, costs cannot be fully recovered</td>
<td>Brynjolfsson (1993); Brynjolfsson &amp; Hitt (1996)</td>
</tr>
<tr>
<td>V</td>
<td>Perverse learning/pyrrhic victory</td>
<td>P-, A+, V-</td>
<td>Agents distort effort in inefficient directions to exploit incentive system, leading to ongoing social losses, or large fixed costs, coupled with limited patience for investment returns, lead to principal's taking losses while value also declines</td>
<td>Asch (1990); Meyer (2000); Meyer &amp; Gupta (1994)</td>
</tr>
<tr>
<td>VI</td>
<td>Giving away the store</td>
<td>P-, A+, V+</td>
<td>Although investment is socially efficient, more incentive bonus is paid to agent than total benefit created</td>
<td>Baker (1992)</td>
</tr>
</tbody>
</table>

TABLE 3
Distribution of Decision Rights: Determining the Adoptability and Sustainability of New Information Policies

<table>
<thead>
<tr>
<th>Number</th>
<th>Sextant Name</th>
<th>Who Gains/ Losses</th>
<th>Sextant Will Be Adopted If Following Party Has Adoption Rights</th>
<th>Sextant Will Be Sustained If Following Party Has Veto Rights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Principal</td>
<td>Agent</td>
<td>Consensus</td>
</tr>
<tr>
<td>I</td>
<td>Monitoring for mutual benefit</td>
<td>P+, A+, V+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Loading a truck</td>
<td>P+, A-, V+</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>III</td>
<td>The electronic sweatshop</td>
<td>P+, A-, V-</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>IV</td>
<td>Productivity paradox</td>
<td>P-, A-, V-</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>V</td>
<td>Perverse learning/pyrrhic victory</td>
<td>P-, A+, V-</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>VI</td>
<td>Giving away the store</td>
<td>P-, A+, V+</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Key: / should be read "the corresponding sextant is adoptable/sustainable if that party has the respective adoptability/veto rights"; X should be read "the corresponding sextant is not adoptable/sustainable if that party has the respective adoptability/veto rights."

Note: This table excludes the adoptability and sustainability that may occur by irrational players or by organizational pathologies and behavioral boundedness. These factors are discussed separately in the text.

What Puts Us in Each Sextant?

Finally, by diagnosing the business situation leading up to placement in a given sextant, we can identify ex ante how agency value creation and distribution will be affected by an IP change. Table 4, an important complement to this text, summarizes the conditions that put a firm in each of the six sextants following an increase in monitoring. These factors are also
### TABLE 4
Assessing How Changes in IP Affect Agency Value and Distribution: What Conditions Foretell Our Ending Up in Each Particular Sextant After an Increase in Monitoring

<table>
<thead>
<tr>
<th>Number</th>
<th>Sextant Name</th>
<th>Who Gains/Loses</th>
<th>Under What Conditions We Enter Each Sextant Following an Increase in Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Monitoring for mutual benefit</td>
<td>$P+, A+, V+$</td>
<td>• Underlying reducible incentive incompatibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Measures reliable, useful; multitasking not an issue</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential issue: agreeing on cost bearer for new technology</td>
</tr>
<tr>
<td>II</td>
<td>Loading a truck</td>
<td>$P+, A-, V+$</td>
<td>Traditional agency theory conditions: measures reliable and not easy to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>corrupt; incentives not easily alignable; previously lax use of information</td>
</tr>
<tr>
<td>III</td>
<td>The electronic sweatshop</td>
<td>$P+, A-, V-$</td>
<td>Scenario I: measures appropriate, principal myopic and exploitative; agents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>have few alternatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Scenario II: measures somewhat inappropriate and corruptible, but still</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>present a net improvement in previously large information deficit; thus,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>principal can end up better off while value creation suffers</td>
</tr>
<tr>
<td>IV</td>
<td>Productivity paradox</td>
<td>$P-, A-, V-$</td>
<td>Measures deficient and corruptible; multitasking with negatively correlated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>activities not accounted for; monitoring wipes out benefits from learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and innovation, significant and hard-to-fix underlying incentive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>incompatibility</td>
</tr>
<tr>
<td>V</td>
<td>Perverse learning/pyrrhic victory</td>
<td>$P-, A+, V-$</td>
<td>Scenario I: measures deficient, in particular regarding measure of agent's</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>contribution, agents can meet numbers while dissipating value,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>multitasking not accounted for; agents can &quot;figure out&quot; measures while</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>adding less value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Scenario II: cost of investment (visited on principal) so big that overall</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>value and principal share decline while agents are marginally more productive</td>
</tr>
<tr>
<td>VI</td>
<td>Giving away the store</td>
<td>$P-, A+, V+$</td>
<td>Incentives are alignable, but price paid is high for principal, or measures,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>while correlated with value creation, are mildly perversive; new effort</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>likely to be overoptimal</td>
</tr>
</tbody>
</table>

discussed in the review of each individual sextant.

We now examine the possible impacts of any given change in IP on the lot of the principal, the lot of the agent, and the overall creation of agency value. For each sextant we mention the conditions leading to and the characteristics of the business situation in the sextant, as well as its adoptability and sustainability conditions.

**Sextant I: Monitoring for Mutual Benefit**

($P+, A+, V+$)

Sextant I exhibits characteristics of "technocratic utopianism" (Davenport et al., 1992); efficient arrangements could not previously be negotiated—not because of insurmountable conflict of interest but because of the inability of the existing performance measurement system to support a contract that both sides sincerely desired. In this sextant improved monitoring technology really is the solution. Social gains from exhorting agents to the socially efficient level of effort are divided in some manner to yield strong Pareto improvement.

Sextant I displays the simplest pattern of adoptability and sustainability: the new policy is always adoptable and is always sustainable. First, adoption is guaranteed—both principal and agent desire independently to implement the new policy. After the policy is adopted, neither will wish to reverse, both preferring the new situation to the previous status quo. As a result, Sextant I is sustainable.

This highly desirable solution is not, however, the most commonly observed case. First, it presumes that there is limited incentive incompatibility between principal and agent and that all that is needed to solve agency problems is the existence of technology that allows for more efficient contracts to be inked. In addition, the elements of the IP itself must be reliable: measures must be hard to pervert or "trick": they must correlate closely with the underlying value creation process; immediate results must be congruent with long-term benefits; and if effort
choices or objectives are multidimensional, either many dimensions should be measurable or the various dimensions should be positively correlated (or both). Cypress Semiconductor, with its legendary extremes of performance compensation and monitoring (Rodgers, 1990) that led to both outstandingly generous employee compensation and strong incentives to innovate and perform, might serve as a prototypical case example. Similarly, Kaplan (1989) suggests that improvement in targeted cost reduction when information flows freely may easily create a pie sufficiently large that mutual gains in value are feasible.

**Sextant II: Loading a Truck (P\(^+\).A\(^-\).V\(^+\))**

Sextant II’s designation honors the model specification of Alchian and Demsetz (1972), in which task supervision in a team production setting eliminates shirking for both principal and social gain—at the “expense” of transferring a considerable amount of utility from agent to principal. The agent’s rents, previously generated by the principal’s information deficit and commensurate inability to write an efficient contract, are “appropriated” (or “returned to the rightful owner,” depending on one’s ideological view) with the increase in transparency. In this sextant a coincident by-product of the principal’s (re)appropriation of the surplus is an incentive system moving agent effort closer to the efficient level; joint agency value thus increases, and the principal gains more than the agent loses.

The requirements for being in this sextant resemble those of Sextant I, with the exception that limited incentive incompatibility is not required; indeed, significant incentive incompatibility is the driver of the redistribution of surplus, as well as the principal’s incentive to move to this sextant. Measures must still be robust and efficient and must discourage perverse learning or hampering of the real underlying goals of the principal. Previously lax use of information (with the resulting slack left for agents) suggests that a new IP will lead us to Sextant II.

Sextant II offers the first conflict between adoptability and sustainability. Because the principal gains but the agent loses, adoption will result only when the principal holds unilateral implementation authority. In other cases (the agent has unilateral adoption authority, or consensus is required) this new policy is not adoptable—the agent will veto it. Similarly, since the principal benefits, reversal will occur only when the agent holds the unilateral authority to reverse. In the other cases Sextant II will be sustainable.

Finally, if a cost for adopting this IP exists, only the principal will have an incentive to cover it. The tradeoff between the monitoring cost and its expected benefits from adoption under these conditions—and the resultant principal’s willingness to pay to reach Sextant II—have been extensively studied in the agency literature (e.g., Bakos & Kemerer, 1992; Jensen & Meckling, 1976). Note, however, that even though some monitoring creates social value, the principal has the incentive to overinvest in monitoring relative to this social optimum.

**Sextant III: The Electronic Sweatshop (P\(^+\).A\(^-\).V\(^-\))**

In Sextant III, which we named after Garson’s (1988) treatment of stressful workplace conditions of knowledge workers, monitoring leads to a poor overall outcome, even as it improves the principal’s lot. Costs visited on the agent more than outweigh the principal’s gain, creating a net overall loss. This sextant represents the ideological view that monitoring is a tool to extract surplus and redistribute it, rather than to create benefit from encouraging efficient provision of noncontractible dimensions of effort (as in Sextants I or II); furthermore, it accounts for value destruction through the act of monitoring itself.

Two plausible scenarios put us in this sextant. The first is that new IP measures are initially effective but drastically overused: the principal improves its own lot, disregarding the efficiency and joint agency value losses (an extreme case of the overinvestment described in Sextant II). This might occur whenever the agent’s effort is “plentiful” and, hence, when the agent is more committed to the relationship than the principal (Bowles & Gintis, 1988). Second, new IP measures may be so inefficient (or overly intrusive) that implementing them leads to a reduction in total value. The agent therefore loses any slack previously enjoyed and now puts all effort toward “meeting the performance measures.”
Sextant III is adoptable only when the principal (the only winner) has unilateral authority to adopt the new policy. Similarly, Sextant III is sustainable only when the principal holds unilateral authority to reverse the policy. This situation differs slightly from Sextant II in that, after investment, the principal and agent, who in consensus hold the ability to reverse the policy decision, may be able to renegotiate to a better sextant. There is no obvious reason why the social loss from Sextant III cannot be avoided and the proceeds split between the parties—barring contractual incompleteness, a common culprit. In either of these cases, if both parties could agree (and contract on) on side payments, the movement from Sextant III to Sextant II could make both better off. This “reversal” is really a new policy move to Sextant I (since it is mutually desirable and also creates social benefit [Croson, 1996]); the compound policy move (first to Sextant III and then to Sextant I) yields a net move into the \([P+, A-, V+]\) situation of Sextant II.

**Sextant IV: Productivity Paradox \([P-, A-, V-]\)**

In Sextant IV overinvestment leads to a suboptimal result; despite heavy investments in technology, net productivity does not improve—an empirical regularity found in early studies of IT investment (Brynjolfsson, 1993). Improving information costs more than the social efficiency gain, visiting losses on both principal and agent. For instance, instituting a draconian system with perversible measures minimizes the agent’s slack, yet the agent’s newly available effort is guided in all the wrong directions. The agent loses while having to work much harder, but there is no surplus to be “transferred,” because new measures lead the organization so much astray that efficiency losses shrink the pie, reducing the principal’s lot.

For the productivity paradox to manifest itself, there must be a significant incentive incompatibility between principal and agent; in addition, measures must be inappropriate, which magnifies the loss caused by goal incongruence. Alternately, the costs of monitoring may be so expensive (and socially wasteful) that any gain is swamped.

Sextant IV displays a situation so miserable that little conflict between adoptability and sustainability is possible. No rational party (or coalition) would ever implement technology known to be in Sextant IV; similarly, any rational party would act to reverse such a move if it were accidentally made. If there were significant costs associated with returning to the previous system, this sextant might become sustainable, since on the margin it might cost less to remain in a poor situation such as Sextant IV than to reinvest to move out. As for adoption costs, while they should be considered sunk and, hence, irrelevant, empirical research shows that they are—alas—often taken into account, possibly leading to sustainability of this sextant (cf. Keil, 1995).

**Sextant V: Perverse Learning/Pyrrhic Victory \([P-, A+, V-]\)**

In Sextant V the new contracting technology harms the principal more than it benefits the agent, for a net overall loss. In this case new incentives “work” all too well, with the level of agent effort moving in one leap from suboptimal to superoptimal. The new incentives created by this “overshooting” are relatively further from the optimal level, on the other side—so far in excess, in fact, that an even greater social loss occurs.

The information-gathering aspects of such a new IP are far from perfect. Inefficient measures allow the agents to beat the numbers without increasing underlying value. This might also be a case of mistakenly pursuing IP depth when breadth is called for: many different (and negatively correlated) dimensions of performance, of which only a few are measured and rewarded, encourage the agent to destroy joint agency value, even while the agent improves its own lot. Reliance on inappropriate measures also increases the incentive incompatibility between agent and principal. This sextant, then, defines perverse learning: the agent has responded extremely “well” to the new setup, optimizing behavior against the incentive structure rather than against the firm’s true objectives.

The agent is better off, and the principal worse off, when compared to the status quo. Thus, Sextant V technologies will be implemented only if the agent has sole right of adoption, and they will be sustainable except when the principal has the sole right to reverse the investment.

The principal’s “P−” (as well as part of the overall “V−”) could alternately represent the re-
sponsibility for paying to implement the new system. Although future productivity gains will indeed be realized, the present cost of switching to the new state (perhaps a large sunk investment in IT or recontracting) swamps the present value of these future gains from improving the efficiency of marginal effort—a pyrrhic victory. This case is the first time that the existence of costs of IP changes and the allocation of responsibility for bearing them affects adoptability and sustainability; although the principal would be foolish to enter Sextant V initially, the principal might find it better to stay in it to collect future benefits, rather than write off the entire initial investment as valueless. Thus, the pyrrhic victory interpretation of Sextant V is adoptable only if the agent has full adoption rights, but it is sustainable no matter who holds rights of reversion.

Sextant VI: Giving Away the Store \([P-.A+.V+]\)

In Sextant VI social value is created at the principal’s expense; the agent receives more than 100 percent of the value created. This situation might occur under two alternate conditions, both of which result from a poorly formed payment system. In the first, contracts might even evoke first-best levels of effort but simply transfer too much in a lump sum from principal to agent. The effort level is socially efficient, but its distribution is privately inefficient for the principal—the overly generous incentive system “gives away” more than the entire value created from the new IP. In this case the measurements and structure of the IP may be efficient, but their use is not fully rational. In the second case, contract terms may specify incremental payments that are slightly too high, encouraging superoptimal effort (a mild “perverse learning” story). Although these slightly skewed measures do bear some relationship to the underlying value creation process (which will ultimately define the principal’s lot), the relationship is not perfect.

In both of these cases, and in contrast to Sextant V, the inaccuracy of marginal payments is not so great that the new social loss from superoptimal effort exceeds the old loss from suboptimal efforts—as in the case of grossly excessive executive compensation. Compared to Sextant V, Sextant VI improves on the status quo from a social perspective, even though the principal is worse off.

The asymmetry in division of the created social benefit indicates that Sextant VI will be adopted only when the agent has sole implementation rights and will be stable unless the principal has sole reversal rights. Partial recontracting for mutual benefit is possible when the principal has the sole rights of reversal; it will be in the agent’s interest to give back just enough of the windfall to make the principal prefer to stay with the technology, rather than return to the preinvestment situation. By reaching such an agreement, the principal and agent move into Sextant I.

APPLICATIONS AND IMPLICATIONS OF THE AGENCY VALUE FRAMEWORK

IP Politics: How to Agree on Unsatisfactory Outcomes

When considering an IP change, the adopting decision maker presumably wants to improve the status quo and arrive in a desirable sextant. How can this be done? First of all, an instigator of IP change can reduce the costs of moving to inferior sextants by recognizing his or her own limitations in predicting the future and by hedging against making an irreversible mistake (e.g., by establishing the option to make side payments), in the spirit of “humble decision making” (Etzioni, 1989). This mistake correction ability guarantees at least a weak Pareto improvement.

However, in half of the sextants we analyzed, value does not increase, and changes can even hurt both parties. As we suggested earlier, and as Kerr (1975, 1995) has observed, such unfortunate changes in IP are not uncommon. But what brings them about? Bounded rationality (Cyert & March, 1963; March & Simon, 1958; Simon, 1982) may lead to the adoption of inefficient structures. An erroneous prediction of the organization’s future needs, a misreading of the nonobvious attributes underlying the choice of IP policy, or an underestimation of the impact of the four major destroyers of agency value generates a plausible mistake. Adhering to the strict prescriptions of the “traditional agency” view and disregarding total agency value could similarly lead to an inefficient sextant. The decision maker might also “frame the wrong prob-
problem right," using an IP change to address a problem that was not actually the organization’s real difficulty.

Finally, both sides may be stuck with an inefficient outcome, even upon agreeing on its undesirability when the rights to implement and veto may be both inefficiently allocated and inalienable (Meckling & Jensen, 1992). In the absence of credible and contractible side-payment opportunities, such inefficient distribution of decision rights forecloses possibilities of mutual gain. In game theoretic terms, the distribution of decision rights, which determine the components of participants’ strategy sets, determines whether welfare-maximizing outcomes are Nash equilibria in the one-shot game. Frequently they are not, because the side with decision rights does better for itself by choosing a different outcome.

Similarly, a repeated relationship between principal and agent might lead to a political stalemate, in which each party does not dare seek efficiency in today’s IP decision for fear of losing bargaining power in another linked negotiation with the same party. When information serves as an important “political currency” within the firm (Davenport et al., 1992), internal political interests sustain and propagate inefficient uses of information.

New Technologies and Administrative Inertia As Active Destroyers of Agency Value

The role of newly available (and ever cheaper) IT in shaping IP is an empirically significant phenomenon, driving the proliferation of detailed measurement (Kaplan, 1989). By determining technologically feasible alternatives, IT evolution defines the “possibility frontier” and the cost structure of any IP. As we observed earlier, IT evolution also brings about cheaper monitoring: the organization’s response to this reduced price of monitoring should generally be to do a little more of it. As argued above, significantly extending monitoring simply because its price drops may drown the improvements from reduced technology expenditure in the costs of the error in the complementary management technique.

Organizational inertia (Hannan & Freeman, 1984) and other pathologies derailing the efficient use of information are significant barriers to realizing gains from new IT. The practice of following slowly evolving rules-of-thumb and routines for capital allocation and investment decisions (Nelson & Winter, 1982) and gradually “muddling through” new decisions (Lindblom, 1968) leads to significant continuity of budgets for IT investment, despite price reductions; also, doing “more of the same” is an organizational reflex that does not disturb operations (Postrel & Rumelt, 1982). If the IT infrastructure budget remains the same, rather than being optimally scaled to reflect new prices, the dramatic increases in the power of technology will be turned into inadvertent increases in IP depth per dollar spent, since more often than not the ability to monitor more (and cheaply—or “within the budget limits”) gets translated into more monitoring. Administrative inertia, thus, leads to an unintentional increase in monitoring intensity—an implicit change in IP—which, as our taxonomy shows, may lead to either beneficial or deleterious effects. Rigid rules in general (and IP structures in particular) serve as the backbone of bureaucratic settings (Blau, 1956). Unfortunately, the bureaucratic tendency to use measures as substitutes for real performance, and to have imperfect monitoring devices reified as organizational goals, marks one of the basic processes of institutionalization, documented in the post-Weberian tradition (Merton, 1957; Selznik, 1957) but hostile to the adoption of optimal IP.

A related problem is the isomorphic use of information in different agency relationships. Given our discussion so far, it should be obvious that each business and information situation should lead to a different use of information and monitoring: the business situation and tasks...
faced by line-level casino employees (Merchant & Traynor, 1983) are vastly different from those faced by senior executives (Holmstrom & Milgrom, 1991). This leads to a different optimal choice of information use, with traditional monitoring-intensive prescriptions more likely for the former and more monitoring-free prescriptions likely for the latter. Thus, if organizations prefer homogeneity across their employees to contingent contract design, they may be leaving sizable rents on the table for all, in an ill-conceived perception of “equitable treatment.”

Finally, an additional problem leading to inefficient IP is that principals (managers) making decisions on IP strategies, especially when presented with the opportunity of cheap and extensive monitoring, lean toward more monitoring purely because it increases their perception of control over future relationships. This culture of control seems to be deeply ingrained in the science of organizational management, especially through the Cartesian tradition, in which the notion of human control over natural and social systems and behaviors is inherent (Clegg, 1979). The perceived positive effect of monitoring on underlying behavior and its commensurate assumed value have a long history, especially in Western thought (Foucault, 1977; Zuboff, 1988).

**IP Within and Across Firm Boundaries**

Although we focus here on the general form of the agency relationship, our emphasis on information use allows us to distinguish between within-firm and across-firm agency relationships, given that the use of information is one of the key legal differentiators of employment-based, within-firm contracts from outside contracting (Masten, 1993). In outside-the-firm-boundary agency relationships, agents either must agree to the adoption of a new IP structure or have implicit veto power to revert to the status quo. At a minimum, they have significantly more power than employees have over their employers, especially with regard to the use of information toward their principals (Kronman, 1978).

This implied allocation of veto rights to agents in interfirm relationships has two effects. First, it means that some sextants (in particular, Sextants II, III, and IV, representing “A−” movements, which harm agents compared to the status quo) will be seen more frequently in within-firm agency relationships than in across-firm relationships. Second, we expect to see “P+” relationships more frequently within firms than across and more “V+” relationships across firms than within. Our general conclusion is that differences in adoption and veto rights, which are unlikely to be distributed identically in across-firm and within-firm agency relationships, will matter significantly in determining the frequency with which various sextants will be observed.

**DIRECTIONS FOR FUTURE RESEARCH**

In this age of reengineering and the changing role of managerial supervision, we need a new conceptualization of agency that can inform business policies governing investment in IT, corporate information collection practices, and the analysis of information thus gained. New technological alternatives for sharing information, contracting on previously noncontractible dimensions, and reducing information asymmetry will definitely provide new possibilities—which are there for the spurning if management theory does not keep up. For instance, in the ostensibly more “illuminated” Japanese manufacturing practices, reliance on monitoring and short-term incentives is minimal (even in interfirm transactions; cf. Dyer, 1996), despite pervasive information collection on process efficiency, because it is understood that monitoring and the flexibility to create maximal value sometimes conflict. This approach suggests that IT in firms could be used for self-metering and reputation tracking, rather than for explicit performance compensation, alleviating pressures to meet measures and corrupt information about actual performance, while giving both better information to coordinate complex tasks and provide more appropriate value creation incentives. In the broadening discussion of uses of information and knowledge management, understanding vertical uses of information is a foundational issue with substantial ramifications and a needed complement to the growing discussion on horizontal knowledge and information management.

Our theoretical approach to agency value creation elaborates and expands upon recent theory developments, going significantly beyond traditional agency formulations focused on risk bearing rather than incentives. By describing
the key informational factors that mediate the impact of IP, we propose a new template to analyze the increasingly important issue of interaction between information collection and underlying performance. The sextant-based framework proposed gives the basis for negotiating a move toward a better IP solution and provides general suggestions for directing the use of information delivered by new technology. In future research efforts, scholars might address the problem of choosing policy instruments (and the levels at which the instruments might be employed), with an eye toward empirically measuring IP's effects on the power of agency relationships.

More generally, formulating an IP provides an opportunity to rethink organizational structure and incentive systems and to reexamine the structure of delegation and agency relationships. The structure that minimized agency costs or maximized agency value some years ago, under different technology, is not necessarily the most efficient solution now; dramatic future changes in technology will enable alternative arrangements as yet unthought of. In particular, there is absolutely no reason to believe technology causes IP to move in a straight line; although monitoring may be much cheaper now than before, consuming more monitoring (even without spending more) is not necessarily an efficient use of resources. This may arguably be one of the reasons why productivity has not surged following IT investments in monitoring technology (Brynjolfsson, 1993).

The bottom-line benefit from a successful combination of information-gathering policy and less clumsy contracting is that tasks can be allocated according to maximum joint value of the principal-agent system, rather than minimal agency costs to the principal. The identification of the business situation and the information factors that affect agency value, as outlined in this paper, should serve as a guiding principle in structuring the agency relation and the uses of information therein. We hope that with this article, by qualitatively extending the traditional beliefs about the changing role of monitoring and information in agency and by providing a theoretical framework, we will contribute to a timely analytical approach to redesigning organization structure.

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