

A Review of IT Governance: A Taxonomy to Inform Accounting Information Systems

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ABSTRACT: This paper reviews Information Systems (IS) literature that is relevant to Information Technology Governance (ITG) and examines how it informs Accounting Information Systems (AIS). We present a taxonomy of research encompassing the focus areas identified by the IT Governance Institute (ITGI), namely Strategic Alignment (SA), Risk Management (RK), Resource Management (RM), Value Delivery (VD) and Performance Measurement (PM). Based upon 496 papers in ten IS/AIS and two Management Accounting journals over the period 1998–2008, we discuss research perspectives and identify avenues for future research. Results revealed a lack of integration between focus areas, with little about ITG as a whole.

Keywords: governance; strategic alignment; accounting information systems; information technology.

I. INTRODUCTION

An enduring problem for Information Technology (IT) research and practice is how to maximize its potential. Inspired by corporate governance, IT Governance (ITG) aims to ensure effective utilization of IT by focusing on Strategic Alignment (SA), Risk Management (RK), Resource Management (RM), Value Delivery (VD) and Performance Measurement (PM; [ITGI 2008](#)). These focus areas make it clear that ITG shares many issues considered in Accounting Information Systems (AIS) research. The aim of this paper is to review ITG and provide a taxonomy that informs research and practice in both Information Systems (IS) and AIS, with literature drawn from research about AIS, IS, Management Information Systems (MIS), and Management Accounting (MA).

There is growing awareness of IT's role in managing knowledge through the ubiquity of IS, which captures, stores, manipulates, and presents data for facilitation of firms' business processes and value-adding activities. AIS helps external and internal reporting, tax and assurance services, while MIS provides a technological appreciation of issues related to system, information, and service quality to support decision-making. Thus, IS, AIS, and MIS are ultimately concerned with the production of information in a timely, accurate, relevant, cost effective, and replicable manner to facilitate business processes such that firms are economically and socially effective in their competitive environments.

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The increasing centrality of IT to business performance and growing demand for corporate governance, means a number of factors have played a significant role in strengthening the impetus for ITG. Such factors include: compliance regulations like Sarbanes-Oxley (SOX); the significance of organizational investment in IT; the poor track record of IT investments; and information flows crossing national and inter-organizational borders. Resultant demand for IT necessitates supporting, sustaining, and growing IT investment through careful consideration of strategy, risk, resources, delivered value, and performance. Thus ITG, being a stream of MIS research and practice, goes beyond technological solutions to comprehensive governance of all IT functions.

ITG has strong links to earlier themes in IS research including Strategic Information Systems Planning (SISP), change management, the IT Productivity Paradox, and the demands/effects of regulatory compliance. The IT Governance Institute (ITGI) has enhanced understanding ITG's processes and value.¹

Our paper begins by reviewing earlier literature and summarizing understanding provided by ITGI. We then survey literature published for the period from the foundation of ITGI in 1998 until 2008 as the basis for developing a research taxonomy that provides organized appreciation of the literature and evidence of further concerns. Since 1998 approximately 496 papers related to ITG have appeared in ten leading "IS" journals (including one AIS journal and another published by the American Accounting Association) and two MA journals (see Table 1). Our review shows progress in understanding the building blocks of ITG but in an atomistic manner with little integration of focus areas. We adopt SA, RK, RM, VD, and PM to frame our taxonomy within which we investigate inherent themes in existing research and offer suggestions for future research. Accordingly, in Section II we define our understanding of the term ITG and summarize early relevant literature. Section III details our taxonomy of research during the surveyed period. Section IV provides perspectives on our findings and presents concluding comments.

II. AN OVERVIEW OF IT GOVERNANCE

Just as corporate governance has been driven by the imperative to manage firms' operations to more effectively meet shareholder expectations for financial and environmental prudence, reputation, competitive edge, and risk management, so have firms focused on ITG to achieve similar IT accountabilities. This is significant given its ubiquity in key organizational roles involving production and coordination activities (Scott Morton 1991). Initially ITG was "used to describe how those persons entrusted with governance of an entity will consider IT in their supervision, monitoring, control, and direction of the entity" (ITGI 2003, 1; Van Grembergen 2002). The increasingly strategic and functional role of IT and related issues of decision rights and tactics has led to a broader understanding of ITG. Called Enterprise Governance of IT, it places ITG as "an integral part of corporate governance" through defining and implementing "processes, structures, and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enabled business investments" (Van Grembergen and De Haes 2009, 3). The application of IT has "an immense impact on whether the entity will attain its vision, mission, or strategic goals" (ITGI 2003, 1) as evidenced by Weill and Ross (2004) who claim firms with effective ITG have shown profits 20 percent above those using similar strategies.

Strategic answers to better IT performance have long been sought by many researchers. For example, Garrity's (1963) survey closely examined the decision-making, control, and review processes for IT. Similarly, SISP focuses on integrating investment and management of IS with

¹ Founded in 1998 as a research "think tank," its aim is to provide leadership in research and practical tools for facilitating adoption of ITG (ITGI 2008).

TABLE 1
Overview of Articles Reviewed from Selected IS, AIS, and MA Journals
 Number of Articles in the Respective Journal for Each Focus Area

Journal	Strategic Alignment	Resource Management	Risk Management	Value Delivery	Performance Measurement	Governance	Total
MIS Quarterly	10	22	2	9	3	1	47
IBM Systems Journal	6	5	1	1	—	2	15
Journal of Management Information Systems	20	9	11	8	9	—	57
Communications of the ACM	13	16	11	7	2	—	49
Information & Management	19	8	3	6	2	2	40
Information Systems Research	7	1	1	2	7	—	18
Journal of Strategic IS	17	4	2	8	—	2	33
Sloan Management Review	45	23	5	7	6	1	87
<i>Journal of Information Systems</i>	—	4	7	2	5	—	18
<i>International Journal of Accounting Information Systems</i>	4	4	3	8	1	3	23
Accounting, Organizations and Society	5	8	7	—	29	—	49
Management Accounting Research	6	9	7	—	38	—	60
Total	152	113	60	58	102	11	496

Roman = IS Journals (including MIS); *Italic* = AIS Journals; and **Bold** = MA Journals.

organizational strategy (Lederer and Sethi 1988). As IT has evolved from a focus on internal processes to a more strategic role, SISP assists organizations in achieving business goals. Notwithstanding its strategic approach, SISP has problems in effectively linking IS strategy with business planning, IS capabilities, and performance appraisal (Galliers 1991). The term ITG first appeared in research during the 1990s (Loh and Venkatraman 1992; Henderson and Venkatraman 1993), including use of the term “IS Governance Frameworks” (Brown 1997; Sambamurthy and Zmud 1999).

Likewise when considering ITG’s strategic concepts, there are historic links to ITG with the view that an IS is concerned as much with human activity and organization as it is with technology (Galliers 1991). This connection is extended by his argument that IS strategy is embedded in business strategy, feeding from and into business processes (Galliers 1991). He presaged ITG as: a strategy comprising maintenance of comparative strategic advantage; a structure of centrally coordinated coalitions; inter-organizational systems with IS-based products and external/internal data integration; IS influence at the Board level; IS staff functioning as a business team; senior management understanding of IS and its potential; and interactive planning. Further he stressed that IS strategy had to incorporate change management as well as evaluation and review. Years later the literature shows that all of these components must be realized for successful ITG.

In developing a strategic approach to ITG, a key organizational issue has been the need to manage adroitly change to facilitate gaining market share, creating competitive advantage, and adapting to meet the challenges of new business environments (Harison and Boonstra 2009). As such, the ability to achieve organizational change is essential for long-term business performance (Ventris 2004). Being successful requires the creation of effective strategies for goal setting, plans and policies for action, and benchmarks for evaluating performance. Essential to achieving this is strong leadership and sound communication of both vision and process, with IT both a fundamental enabler of change and a key driver of change (Kettinger and Grover 1995).

Second, IT and the Productivity Paradox is a longstanding strategic theme in IS research that has sought to relate IT investments to business value. Initially it highlighted a lack of association between IT investment and business performance (Brynjolfsson and Hitt 1998). Surveys have revealed a poor track record from IT investment, consistently showing “20 to 70 percent of large-scale investments in IT-enabled change are wasted, challenged, or fail to bring a return to the enterprise” (Val IT 2008, 7). Similarly, The Standish Group (2004) found a success rate of 2 percent for IT projects over \$10 million dollars, with no discernible improvement in IT failure rates since 1994.² Some research has clarified and elaborated upon earlier findings demonstrating that the Productivity Paradox related to lagged results of IT investment and further that IT has the capability to generate business value (Brynjolfsson and Hitt 1998; Broadbent et al. 2003) by increasing market share, improving product quality/differentiation, and tightening supply chains (Dos Santos and Peffers 1995).

Third, government regulation has been influential in requiring greater organizational accountability with ITG providing a pivotal role. Research has tracked the invasive extent of compliance requirements like SOX (USA) and Basel II (Europe), showing expenditure of up to 15 percent of firm IT budgets on regulatory compliance (Gartner 2006), and implications for IT investments and competitive advantage (Hall and Liedtka 2007; Pula et al. 2003). A fourth consideration is globalization that has added another level of complexity, especially considering IT capability and its ubiquitous integration into expanding global business operations. This has led to increasing de-

² Likewise, a Fortune 1000 survey found that CIOs believed 40 percent of all IT spending brought no return (Watters 2004), and an ITGI Survey (2009) of CEO’s found 75 percent believed there were barriers that prevent full returns from IT investments.

mand for governance with IT investment, implementation, and maintenance managed by a global system in which all stakeholders have input, including the Board, top management, and internal customers (finance, operations, audit, as well as IT).

The overall outcome from the identified antecedents to ITG has been a range of initiatives related to ensuring more strategic adoption of IT by sound investment through deliberate strategies, planning, and policies in order to manage risk and achieve performance outcomes, compliance, and accountable delivery of value. One example is [ISO/IEC 38500: 2008](#) that addresses the role of corporate governance in evaluating, directing, and monitoring current and future IT use (see Section IV). Similarly, ITGI stresses that ITG is as critical at the Board and management level as corporate governance, and provides tools and frameworks like Val IT, COBIT, and [Risk IT](#) to assist enterprise leaders ensure that IT supports business goals and maximizes IT investment, with appropriate management of risks and opportunities.³

Similarly, the Information Technology Infrastructure Library (ITIL), established in the 1980s under the auspices of the UK Government's Central Computer and Telecommunications Agency, is designed to assist firms in developing a framework for IT service management by providing them with "consistent and comprehensive documentation of best practice for IT Service Management" (ITIL 2009). Other frameworks used to a lesser degree include CMMI, Prince 2, COSO, and ISO 17799 (PricewaterhouseCoopers [PWC] 2006). These frameworks formulate and formalize both the understanding and application of ITG in a practical business environment, particularly regarding the aims of ITG: alignment of IT with the business; IT enablement of business processes; maximization of benefits; responsible use of IT resources; and appropriate management of IT risk. This relates to understanding of ITG being concerned with delivery of business value through strategic alignment of IT with the business; risk management related to building accountability into the organization; appropriate resourcing; and performance appraisal. Thus, effective governance of IT requires a holistic approach that coordinates the focus areas SA, RK, PM, VD, and RM, wherein SA, RM, and PM direct ITG activities and VD and RM are outcomes (ITGI 2003). Figure 1 summarizes these relationships.

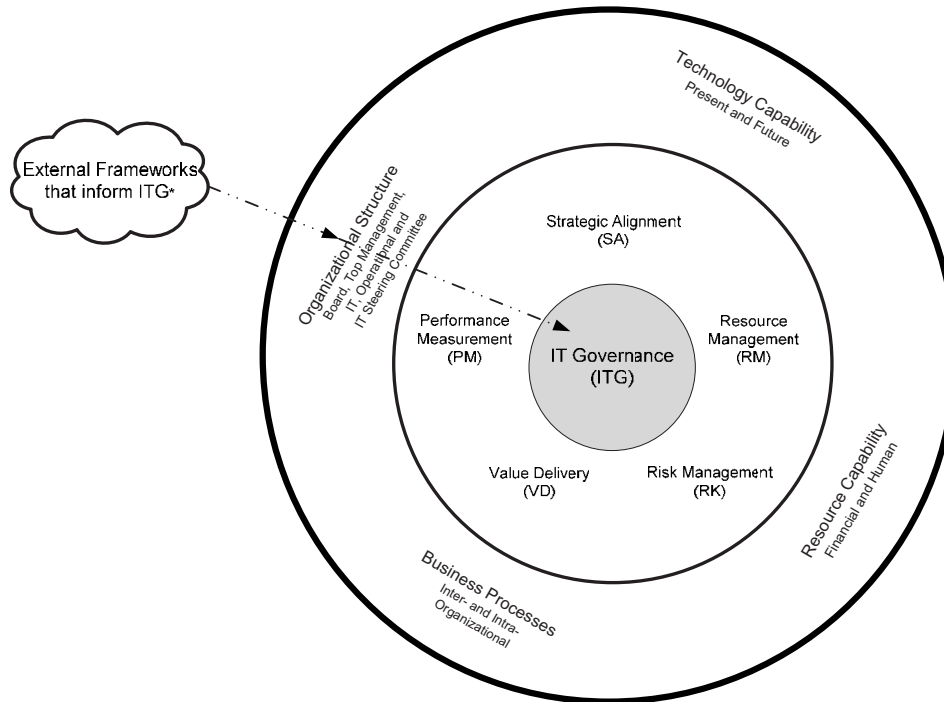
Our taxonomy presented next recognizes the role of the focus areas in achieving ITG and our literature review is framed by research questions that are significant issues in the relevant AIS and IS literature and ITGI's (2003) Board Briefing Paper. Although this taxonomical approach facilitates comparative evaluation of the research, we are mindful that "there is a tendency for these topics to be considered as relatively isolated phenomena" (Galliers 1999, 229). While Galliers was referring to research about knowledge management and IS strategy, we heed his concern. Given our premise that effective ITG requires firms to consider most, if not all focus areas, we address each, despite the breadth of the undertaking. Covering five focus areas means commentary about each may, through necessity, be less comprehensive. However, reviewing the breadth of the literature permits reflection on future research. In reporting, we tabulate selected papers that contribute significantly to each part of the taxonomy.

III. A TAXONOMY OF RESEARCH RELATED TO ITG

We compile our taxonomy by identifying and classifying papers in twelve leading journals related to ITG published during the period 1998–2008, spanning IS, MIS, AIS, and MA, with deliberate effort to include research journals with an audience of researchers, educators and prac-

³ For example Val IT provides "enterprises with the structure they require to measure, monitor, and optimize the realization of business value from investment in IT," while COBIT "provides a comprehensive framework for the delivery of high-quality information technology-based (IT-based) services" (ITGI 2008, 6). Growing demand for managing IT risk has resulted in the development of [Risk IT](#), a new ITGI framework for enterprises to identify, govern, and manage IT risk (Risk IT 2009).

FIGURE 1
An Organizational Perspective of the Interactive Components of ITG



* Including frameworks like COBIT, Val IT, Risk IT, ITIL, Prince2, PMBOK, and standards like ISO/IEC 38500:2008, ISO 27001:2005, AS8015:2005, ISO 31000.

tioners (see Table 1). Given the strong similarities between AIS and IS research in our taxonomy, we looked to MA to demonstrate how the accounting literature can inform ITG and the practice of AIS. We acknowledge the limitation of subjectively restricting our focus to MA.

The selection criteria for papers included whether they were typical of research in the focus area and the insights provided. Some subjectivity arose because our scan produced in excess of 100 papers in some focus areas. Second, we allowed subsections of research areas to emerge within focus areas if this contributed to greater appreciation of ITG. Finally, we refer to materials beyond the scope of our literature scan when their relevance was self-evident. Overall, our aim is not to review all papers related to ITG research: rather we sought to capture the essence of the research and suggest scope for the future. The two AIS journals⁴ contributed 10.6 percent of papers, with these being similar in spread to that from the eight IS journals. MA journals⁵ followed a similar distribution, except most discussed concepts that linked two or more focus areas, with a concentration on PM (65 percent). The distribution is revealed in Table 1.

⁴ Namely, the Journal of Information Systems and the International Journal of Accounting Information Systems.

⁵ Namely, Accounting, Organizations and Society, and Management Accounting Research.

We structure discussion about each of the five focus areas by presenting a table summarizing key papers, identifying questions raised, and concluding with suggestions for future research.

Strategic Alignment (SA)

As the foundation for ITG, SA requires that IT strategies and plans are aligned with strategic business objectives so that IT provides capability to deliver business value. Being strategic, it should be driven by the Board and indicate how all components of the IT function (business processes together with the supporting applications and technology, staffing, and funding) are attuned to an organization's risk tolerance and strategic directions. As such, SA should address the direction for other ITG focus areas with business value delivered through effective investment and planning including tactical plans for RK and RM. This would deliver business value as informed by coordinated PM.

In our review this focus area received the most attention (31 percent of papers), with 31 papers related to delivering business value from IT investment. This attention suggests a view that value may be achieved with strategic business/IT alignment, without the use of governance structures and processes. Research with an SA focus (see Table 2) addresses business/IT strategic imperatives confirming the view that this area is valuable in directing IT capability. Much of the identified literature considers strategy without embedding discussion in a broader understanding of aligning IT with business strategies. Key considerations are:

- SA1. What is meant by strategy and alignment?
 - SA2. What are the qualities of IT strategy and alignment?
 - SA3. How should IT strategy be devised?
 - SA4. What is the role of the Board?
 - SA5. What roles should be adopted by the CEO and CIO to maximize SA?
- Research has explored other issues related to this focus area including:

- SA6. What are the alternatives to SA?
- SA7. What is the linkage between SA and VD?

It should be noted that critical to effective organizational performance, SA has been identified as important for change management and to control IT costs (Hess 2005), with alignment of IS with business planning related to use of IT for competitive advantage (Kearns and Lederer 2000).

SA1. What is Meant by Strategy and Alignment?

It is pertinent to distinguish strategy and alignment. Strategy's military origins (Tzu 2009) are evidenced by Mitreanu (2006) who explored the failure of corporate strategy. He concluded that failure occurred when firms had not moved beyond the belief that competition is the focus of strategy and that successful sustained strategy should be more specific and focus on a firm's customers. Others clarified what strategy is not: vision (Humphreys 2004), technology, technology dependence, or marketing (Singer 2008). Rather, good strategy concerns clarifying the current organizational position, selecting where the organization should be in a given time, and planning how to get there (Humphreys 2004; Grover and Segars 2005). Further strategy has a component of knowledge management (McDonough et al. 2008).

Alignment, in the context of ITG, means that IT strategy is developed not merely in response to business plans but rather dynamically in conjunction with their development so that the role of IT is evaluated as an intrinsic enabler (Henderson and Venkatraman 1993; ITGI 2008). In this manner, strategic business/IT alignment of plans ensures that IT investments have been assessed for RK, support and advantage defined business needs, integrate with existing architectures, and facilitate maximizing business processes (Law and Ngai 2007) in order to achieve competitive advantage (Kearns and Lederer 2000) and create customer value (O'Donnell 2005).

TABLE 2
Selected Papers Related to the Strategic Alignment (SA) Focus Area

Reference	Relevant Research Question	Purpose	Key Result
Kearns and Lederer (2000)	SA1	To look at the link between strategic alignment and performance.	ISP-BP and BP-ISP alignment related to using IT for competitive advantage. Senior executives saw this only related to ISP-BP. Concluded barrier to competitive advantage is lack of shared understanding of BP-ISP.
Grover and Segars (2005)	SA1, SA2	To look at the planning process for SISP and how it evolves.	Focus on the balance between the “rational” and “adaptive” dimensions according to circumstance is better. Successful SISP needs a top down focus, participatory involvement, frequent assessment of process status, and adjustments regarding organizational culture.
Hess (2005)	SA1	To explore challenges in aligning IT and business.	Issues included the firm’s ability to change quickly and to decrease IT costs. Describes how patterning of business requirements assists translating these to software designs.
Wang and Tai (2003)	SA2	To explore factors affecting effective IS planning.	Too centralized a structure can negatively affect improved planning capability but may facilitate better assessment during planning. Content and dimensions of the planning system are important.
Sull (2007)	SA2	To explore need to tighten link between strategy and business action.	Strategy needs to be constantly reviewed with a focus on revising when new circumstances and decisions are present. “Making sense, making choices, making things happen, and making revisions” are quoted as four steps.
Tallon (2007b)	SA2	To investigate a process focus on strategic alignment and its impact.	This process focus was shown to highlight whether firms are following the correct set of processes to support the chosen strategy and that this is a better approach for selecting IT support than looking at a whole strategy.
Humphreys (2003)	SA3	To report on benefits of a bottom-up approach to management.	Initiated due to management failure to consider views of key stakeholders & how customer value created. Adoption linked to failure to lead particularly in goal setting.
Neirotti and Paolucci (2007)	SA3	To consider IT’s strategic value in the insurance sector.	Uniqueness more related to a continuous, planned approach in investment decisions rather than a clever choice of an application. Discipline and consistency in governance with a focus on strategic goals and sound management of IT decisions were important.
Prybutok et al. (2008)	SA3	To review role of IT quality and leadership in success.	Found that leadership, strategic planning and a customer focus were related to IT system, service and information quality.

(continued on next page)

TABLE 2 (continued)

Reference	Relevant Research Question	Purpose	Key Result
Strebel (2004)	SA4	To report on Board's role in governance.	Sound management with sustained creation of value, monitoring and policy development are all that is required. When this changes, Boards must be more dominant.
Thomas et al. (2009)	SA4	To explore how Boards can function better.	Information relationship between Board and management is critical. Trust is linked to agreeing on performance measures. Directors should use new IT to manage information and support decision-making.
Willcocks and Sykes (2000)	SA5	To report on the role of the CIO and IT in ERP.	The paper reported that top management saw ERP as too significant and consequently made decisions without meaningful CIO and other IT input. The reasons for this were that ERP was too far reaching or the IT department was seen to have a poor record.
Law and Ngai (2007)	SA5	To study relationship between decision to use ERP & success in BPI, ERP and performance.	Organizational benefits, BPI and ERP success were closely related and affected by organizational variables; that closeness of the CEO-IT relationship did not affect outcomes, but better CEO-IT reporting fostered more senior management support.
Simonsen (2007)	SA6	To discuss how top management can be involved in IT projects.	IT sellers must convince management the IT proposal meets firm's needs by mapping it to business needs.
Cragg et al. (2002)	SA7	To study IT alignment in small manufacturing firms.	Significant portion of firms had high IT alignment. These firms had better organizational performance than firms with low alignment.
Kearns and Sabherwal (2007)	SA7	To review business/IT alignment re outcomes and results.	Top management's IT understanding related to emphasis on managing knowledge and centralizing IT decisions, assisted with IT managers' involvement in business plans, and business managers' involvement in strategic IT planning; and this affected business/IT alignment.
Shpilberg et al. (2007)	SA7	To identify problems with IT alignment processes.	Performance failure not necessarily from lack of IT alignment but to misalignment, complex nature of IT, and problems in cross-unit coordination. Less complexity, seeking good IT people and software were part of the solution.

SA2. What are the Qualities of IT Strategy and Alignment?

Being concerned with the extent of fit between IT and business strategy (Tallon 2007b), strategy should encompass key IT capabilities, future IT requirements, and operational IT resourcing (people and assets) to meet business needs (Schwarz and Hirschheim 2003; Bernroider 2008).

Indeed, IT strategy was identified as a top issue for American firms (Peak et al. 2005) and a Critical Success Factor (CSF) (Read 2004). A focus on organizational goals is required to ensure IT support for individual strategic processes (Tallon 2007b). Similarly, important concerns are shared understanding and good communication between IT and business leadership, successful IT implementation, and connecting business and IT planning related to success (Reich and Benbasat 2000). The first factor was particularly important for long-term alignment.

To be effective, strategy must be dynamic, shared, and reshaped to meet changing landscapes (Coutaz et al. 2005; Grover and Segars 2005; Kim and Mauborgne 1999) to avoid failure (Wang and Tai 2003). Accordingly, strategy should not be linear (Sull 2007). In contemporary environments that are characterized by increased competition and globalization, many firms face a need for innovation to help create value and produce long-term growth (Kim and Mauborgne 1999), which produces imperatives for developing strategic flexibility (Eisenhardt 2002).

Consequently, any recipe for effective strategy must now focus on individualized strategic processes with simple rules with modular patching to meet fleeting market opportunities, and evolutionary timing for ongoing strategic moves.

SA3. How Should IT Strategy be Devised?

Here, a variety of approaches pertain, including centralized, bottom up, or a combination. Firms with centralized structures may be better at defining their internal/external contexts (Wang and Tai 2003), but risk not benefiting from the fresh, practical insights of a wider array of personnel associated with bottom-up approaches (Roos 2004). Irrespective, it is important to avoid jargon-inducing tools, circumstances, and methodologies, and focus on creativity (Mintzberg and Lampel 1999). Despite merit in a bottom-up approach to planning (involving IT professionals), without top management communication of core values to those involved in strategy formulation, negative motivation can follow (Humphreys 2003).

Tactically IT strategy should be formulated against each business strategy (Sabherwal and Chan 2001). Strategic leadership and IT quality have been linked to positive performance (Prybutok et al. 2008) as has a series of carefully evaluated decisions rather than one striking success (Neirotti and Paolucci 2007). However, with opportunities for other firms to copy strategic initiatives, real value is delivered by imaginative and inspired use of data and knowledge (Dhillon 2008).

SA4. What is the Role of the Board?

While management has responsibility for managing a firm (Trites 2004; Thomas et al. 2009), Boards have responsibility for appropriate and effective oversight with respect to strategic planning and policy development; processes for risk management; and integrity of outcomes. Some involvement may be delegated through an IT steering committee (Read 2004), yet the interplay between the Board, top management, operational, and IT management is critical (see SA5). Trust between the Board and the CEO (Thomas et al. 2009) is important without obviating the need to challenge the CEO (Lawler et al. 2002). Such trust facilitates a balance between rigorous debate and conflict, avoiding potential harmful effects on organizational performance (Hasson 2006). There is dispute about how to ensure independent Board leadership, whether by separating CEO and chairperson roles or by allowing their combination and deliberately building strength among directors (Lorsch and Zelleke 2005). Governance demands vary with the power and effectiveness of top management, but Boards must maintain sufficient strategic monitoring to command dominance, particularly in situations of waning CEO performance (Strebel 2004).

One important Board function is selection of a CEO with strategic vision (embracing IT) for the firm (Johnson 2002). The Board's selection committee must clearly understand organizational strategic direction so that each candidate's skills can be evaluated against requirements (Khurana

2001). In addition, Board failure to manage the transition between CEOs with comprehensive initial briefing and informed exit briefings has led to short tenure (Conger and Nadler 2004).

SA5. What Roles Should be Adopted by the CEO and CIO to Maximize SA?

The relationship between the CEO and the CIO influences strategy and IT alignment (Kearns and Sabherwal 2007). Strong top management was found to be consistently significant but is related to a range of archetypes for decision-making from centralized to federal and others depending upon senior management power and responsibility (Weill and Ross 2005; Xue et al. 2008). Researchers have found failure of top management to consult CIOs, for instance in ERP implementations, to be a significant cause of failure (Willcocks and Sykes 2000). Best scenarios occur when CEOs and top management have a sound appreciation of IT at management rather than functional levels (Earl and Feeny 2000), and CIOs understand business complexities (Khandelwal 2001). Further, the capacity of CIOs to explain how IT solutions meet business needs is critical (Simonsen 2007). Similarly, sound IT planning and the extent of alignment with business planning can impact management's support for IT initiatives and their contribution to business performance (Cohen 2008). Unsurprisingly, close reporting relationships between CEOs and CIOs has been linked to stronger top management support for IT-enabled strategic initiatives (Law and Ngai 2007). Interestingly, there were reported differences between the academic literature that detailed CIOs as initiating innovation and driving strategy to the Board, and CIOs who see themselves as operationally providing services, not identifying/delivering strategic capabilities related to business performance (Teubner 2007).

SA6. What are the Alternatives to SA?

One study where 80 specialized outlets adopted IT applications without alignment to individual strategies suggested SA might not always be essential (Palmer and Markus 2000). Others argue that most benefits from SA have been achieved with the next phase for performance improvements being attained through sustained focus on management and use of existing IT, rather than new capability and alignment with business goals (Peppard and Ward 2004; Prahalad and Krishnan 2002). Another approach fostered successful IT implementation through focusing on innovative ideas of forward-thinking people (Chow et al. 2007). Bernroider (2008) found that decisions about ERP investment were related to technical and integrative rather than strategic issues. Further investigation of these approaches would be informative.

SA7. What is the Linkage between SA and VD?

Some research has explored the value of SA. Here studies have reported that those with high alignment had better performance (Cragg et al. 2002) and improved SA increased business value without larger IT investment (Ravinchandran and Lertwongsatien 2005). The positive relationship between IT planning quality and IT success was evident in firms with more flexible, non-traditional, corporate approaches (Bradley et al. 2006). However, use of IT for cost savings was found to be positive for all firms with other IT uses requiring alignment with business strategy (Fairbank et al. 2006). Yet, fundamental value from IT investment may lie not in IT capacity to manage information, but in information itself, and business/IT strategy should address capabilities to manage this resource (Evernden and Evernden 2003).

Bergeron et al. (2004) were more equivocal about the directness of the relationship between alignment and value, suggesting the need to consider other complimentary facets like infrastructure and service delivery. Even with an alignment focus, organizational performance was often held back by time, energy, and maintenance costs of complex IT systems that hinder coordination across business functions (Shpilberg et al. 2007). Indeed, quality of IT planning and problems in implementing IT projects affect relationships between SA and IT/business value (Kearns and

Sabherwal 2007), with globalization, the increasingly inter-organizational business focus and IT costs delivering value through innovative business/IT alignment (Eisenhardt 2002).

SA: Conclusions and Directions for Future Research

SA is a motivator for ITG (PWC 2006), ensuring linkage of business, IT plans, and operations through establishing, ensuring, and evaluating IT value. Hence, SA research should go beyond the issues raised in SA1–7 and include holistic research into strategic issues like decision rights and responsibilities, policies for risk metrics, reporting requirements to ensure continuous value delivery, and oversight of controls. Thus, a number of these issues relate to the other four focus areas, highlighting the value of research exploring these linkages.

Achieving good SA requires good communication between IT and management, strong Board commitment, CEO support, and flexibility (PWC 2006). Research that highlights sound Board policies, practices, procedures, and accountabilities related to RM (including CEO selection) would be fruitful, as would research into the importance of sound CEO/CIO relationships.

Research has highlighted the value of strategies that have individuality and flexibility but further research should identify successful procedures and investigate mechanisms for competitive advantage. Here, it would be insightful to explore variations according to industry sector and organizational size. SISP has long been regarded as an effective and practical studies that explore its wider application in ITG would be useful.

As some have argued that competitive advantage from SA has been achieved (Peppard and Ward 2004; Prahalad and Krishnan 2002), future research could focus on how IT is managed and used, and less on what IT can do. Here, it would be relevant to investigate maximizing existing IT capability, particularly its capacity to manage knowledge and to co-create business value in intra/inter-organizational environments. Some results show that the complex nature of IT systems and applications has held back organizational performance, hindering coordination across business functions. Consequently, there is scope to investigate maximizing existing IT capability rather than new investment, particularly for knowledge management and regulatory compliance.

Greater linkages between the endeavors of researchers and practitioners would be insightful and could include measurement of the comparative benefits of COBIT and other frameworks for implementing ITG (see footnote to Figure 1). Other topics could include tailoring frameworks and standards for application to particular industry sectors and outsourcing environments; and the influence of power and politics.⁶

Risk Management (RK)

IT risk always exists, whether it's detected or recognized (Risk IT 2009), making this a growing concern for Boards and top management (Bowen et al. 2007). Since risk is concerned with the chance that an event will interfere with the achievement of objectives (COSO 2004), RK requires risk awareness by top management, appropriate appraisal of a firm's tolerance for risk, allowance for regulatory compliance demands (Basel-II and SOX), identifying exposure to significant risks, and establishing responsibilities (Risk IT 2009). RK encompasses financial and operational exposure, data integrity, and identification of and containment strategies for risk. Security, privacy, and disaster recovery are components (Read 2004). RK coverage in frameworks like COBIT (2007), Enterprise Risk Management (COSO 2004), and Risk IT (2009) demonstrate the growing importance of RK. Significantly, IT is not only a major facilitator of business processes but also a source of operational risk (Wolf 2005), so RK "is most effective when these mechanisms are built into the entity's infrastructure" (COSO 2004, 17).

⁶ Here, components of COBIT's processes like PO1-5, PO8-10, AI15, DS2, ME1, and ME4; Val IT's VG1-5, PM1, PM2, PM4, and PM6 and Risk IT's RG1-2 apply. It would be useful to investigate their completeness and comparative merit.

RK research highlighted relevant areas of responsibility, risk identification, and strategy, without exploring the contribution to ITG (see Table 3). Strategic imperatives included loss from risk like virus attacks (U.S.\$43 million) and insider attacks (U.S.\$7 million) (Johnston and Hale 2009). Loss is also linked to reputation damage, financial status, and even survival (Obuchowski 2006). Key considerations are:

- RK1. What are the types of risk?
- RK2. What are the strategies to manage risk?
- RK3. What is the role of the Board and shareholders?
- RK4. What is the role of senior management?

RK1. What are the Types of Risk?

The spectrum of risk exposure requires methodical identification of risk types unique to a firm's operating environment. For ITG, categories include IT service delivery risk, IT solution delivery/benefit realization risk related to IT's contribution to improve business solutions, and IT benefit realization associated with efficiency and effectiveness gains (Risk IT 2009).

The reviewed literature discussed specific types of risk rather than categorizing them, with some relationship between types of risk and industry sector (Yeh and Chang 2007). Examples included inadvertent release of confidential information worsened by networking and inter-organizational structures like routers (Dijiang et al. 2006), inaccurate data entries, employees' accidental destruction of data, sharing passwords, employees' introduction of viruses (Abu-Musa 2006), job mobility (leading to improper training), and excessive focus on job efficiency (Wright and Wright 2002). External risks include virus threats and hackers' breaches of confidentiality and privacy (Yeh and Chang 2007). These risks have been associated with significant disruption of operations with strategic implications especially when linked with asset failure (Suh and Han 2003). While some operational types are readily quantifiable, risks associated with intangible assets are less so. This complexity has generated more strategic awareness as Boards have moved beyond financial controls to consider concerns like legal liability and brand/reputation damage (Raghupathi 2007).

RK2. What are the Strategies to Manage Risk?

Identifying risk is the first step to management, then comes decision-making regarding responses like risk avoidance, risk reduction/mitigation (Kumar 2002), risk sharing/transfer, and risk acceptance (Risk IT 2009; Gemino et al. 2008). Informed decision-making requires assessing the balance between probability and impact (Bonabeau 2007). Quantifying asset and operational losses from downtime (value-at-risk) has been suggested to raise strategic awareness of the necessity for risk analysis and management (Suh and Han 2003; Jingguo et al. 2008). Testing processes rather than system output has been suggested as a risk mitigation strategy (Wright and Wright 2002).

Risk IT advocates a structured approach to RK built around three domains.⁷ COBIT has risk strategies (Lainhart 2000), including audit assessments (Tuttle and Vandervelde 2007). Another risk strategy involves mapping events that could impact organizational ability to meet strategic and operational objectives (O'Donnell 2005). IBM's Research Enterprise Risk Management framework adopts a similar approach (Abrams et al. 2007). OBRiM (an option-based risk framework) was also reported to accurately identify risks in IT investment (Benaroch et al. 2006, 2007).

⁷ Risk governance includes establishing and maintaining a common risk view, integrating this with ERM, and making risk-aware business decisions. Risk Evaluation entails collecting data, analyzing risk, and maintaining a risk profile. Risk Response demands that risks be articulated and managed with appropriate reaction to events.

TABLE 3
Selected Papers Related to the Risk Management (RK) Focus Area

Reference	Relevant Research Question	Purpose	Key Result
Wright and Wright (2002)	RK1	To consider risk in ERPS.	ERP implementation impacts system reliability and therefore risk through a lack of personnel training, poor process re-engineering, and testing of processes not output.
Suh and Han (2003)	RK1	To review analysis of IS risk.	Traditional risk analysis methods don't fully capture the loss from business disruption nor do quantitative methods based on replacement costs. Qualitative methods can evaluate impact but don't support cost-benefit decisions. Better to determine the asset value of the business function.
Abu-Musa (2006)	RK1, RK4	To elicit perceived security threats.	Main threats are accidental bad data entry and/or accidental data destruction by employees, introduction of computer viruses, natural and man-made disasters, employees sharing passwords, and misdirection of material to unauthorized people. More reporting of threats from internal audit people than IS staff.
Lainhart (2000)	RK2	To discuss the role of COBIT in managing information and IT risks.	Shows how COBIT addresses the need for management and control of information.
Bonabeau (2007)	RK2	To identify strategies for managing risk.	The larger a firm grows, the greater the risk. Strategies include assess the level of risk and purchase insurance cover, identify and fix the problem before it happens, and design away a problem.
Tuttle and Vandervelde (2007)	RK2	To empirically test the internal consistency of COBIT.	COBIT conceptual model was superimposed onto audit assessments made by experienced IT auditors. Confirmed its internal consistency.
Dhillon and Backhouse (2000)	RK3	To report on the need for information security management.	The paper suggests that this is best addressed at the time that organizational changes are made and not decided as a later add-on. Careful planning about the use of networks and IT systems must be sorted strategically.
Oppliger (2007)	RK3	To discuss IT security.	IT security is shown not to be an add-on but rather the result of in-house mechanisms like organizational change that includes political, infrastructure, and strategic planning.

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TABLE 3 (continued)

Reference	Relevant Research Question	Purpose	Key Result
Johnston and Hale (2009)	RK3	To achieve IT security through security governance.	Reported that improved security comes from management practices and involves strategic implementation, planning, and security programs on a firm-wide scale to deal with constant attacks, including those from the inside.
Hu and Cooke (2007)	RK4	To review the internal and external influences on IS security.	Found that whilst SOX and similar regulations may be strong forces for change, other factors fostering resistance to security initiatives included work mobility and company efficiency drives especially those involving IT. Security was enhanced when security initiatives were championed by the CEO and communication of security awareness is widespread.

While risk and its management are costly, a balance between RK and its costs is decided by informed decision-making (Kumar et al. 2008), which like all strategies needs to be flexible and dynamic, based on awareness through knowledge (Yue and Cakanyildirim 2007). Knowledge management is important in ensuring that IT personnel have greater knowledge about security measures than hackers (Kesh and Ratnasingam 2007).

The AIS literature has explored internal controls as a strategy (Weidenmier and Ramamoorti 2006; Armour 2005) reporting the need to assess risk across the whole enterprise (Sutton and Hampton 2003). It was found that internal audit people are more prone to report risk than IS staff (Abu-Musa 2006). Here the growth of ERP systems has consolidated accounting systems and in turn adoption of Embedded Audit Modules. While yet to be widely used, these have functional capacity to assist with prevention and detection (Debreceeny et al. 2005).

RK3. What is the Role of the Board and Shareholders?

The Board has responsibility to monitor that the firm's IT and RK frameworks have been defined, that they are aligned with each other and with the firm's objectives and predetermined levels of tolerance, and that practices are regularly monitored (COBIT 2007). Board roles, principally with regard to corporate governance and compliance with SOX requirements, have been documented (Debreceeny et al. 2005), as have responsibility to establish policies to manage risk strategies (Risk IT 2009). Information Security Governance was identified by Johnston and Hale (2009) as a cornerstone for RK, and elaborated by showing RK as a fundamental strategy, achieved by strategic planning and not as a late add-on (Oppliger 2007; Dhillon and Backhouse 2000).

RK4. What is the Role of Senior Management?

RK requires strong support from senior management (Hu and Cooke 2007; Risk IT 2009). Regulatory requirements demand strategies for compliance in risk assessment. Assurance about controls and assessment of privacy and security all entail sound CEO/CIO/CFO working relationships (Weidenmier and Ramamoorti 2006). For embedded and technologically enabled internal

controls, the CIO's role is especially important (Braganza and Franken 2007), as lack of functional links between IT applications may cause problems (Armour 2005)—itself an argument for ITG. Relying on IT risk assessment from non-IT specialists may be problematic. For example, Hunton et al.'s (2004) study reported over-confidence in auditors' capacity to assess ERP risk. Another study showed senior audit personnel reported a high level of IT internal breaches (Abu-Musa 2006).

RK: Conclusions and Directions for Future Research

Corporate governance and related accountability have strengthened the importance of RK with this being reflected in a practitioner survey (PWC 2006) and the MA literature (Mikes 2009; Wahlström 2009; Woods 2009). Indeed, interdependencies between RK, corporate governance, and MA are evident in research by Bhimani (2009), Langfield-Smith (2008) and Collier and Berry (2002). Concerns reflect its growing complexity and increased capacity to impact organizations (Johnston and Hale 2009). Exploration detailing how effective RK is related to Board involvement, active policies, clear decision rights, currency in risk profiling, and risk metrics is another area of research. Thus further investigation of the potential interplay between risk, security, privacy and legal issues, and alternative management strategies is warranted. Here, evidence from case studies and surveys would raise awareness.

Conflicting results concerning the capacity to identify and assess risk would suggest more research is needed (Hunton et al. 2004; Abu-Musa 2006). With the release of Risk IT (2009) and the presence of RK components in both COBIT and Val IT, research that maps strengths and shortcomings would be beneficial.⁸

Resource Management (RM)

RM concerns formulation, enactment, and adherence to processes, budgets, and tactical plans for applying IT strategies to support, enhance, and complement business strategies (see Table 4). ITG's operational heart lies in these structures, processes, and relational mechanisms (Van Grembergen 2002; Read 2004). Here, the social as well as financial management of organizational change must be carefully addressed according to strategic imperatives (Ward and Daniel 2006). RM includes people, skills, applications, technology, and data that serve business needs as determined by budgets for IT investment, use, licenses, and resources. This focus area is where divergence between ITG practice and the reviewed literature was most apparent as a number of practical considerations are not addressed in the literature. Key considerations are:

- RM1. What processes and strategies manage and ensure accountability for existing IT projects?
- RM2. How is the extent of accountability and decision-making clarified with those responsible?
- RM3. What strategies are used to identify and ensure appropriate skills are present to manage IT?
- RM4. What processes ensure appropriate training for all staff?
- RM5. What processes and financial resources are allocated to recruit and retain suitable people?
- RM6. What processes and strategies monitor and manage software licenses, service contracts, standardization of IT applications and architectures, together with replacement for existing IT?

⁸ ITGI provides the means for RK in COBIT's PO9–PO10, DS5, DS11–DS13, ME2, and ME4 and Val IT's VG1–VG2, VG4–VG6, PM1–PM5, IM1, IM3, IM6–IM8, and IM10. The recent release of Risk IT by ITGI Survey (2009) gives a framework with all three domains targeting required deliverables.

TABLE 4
Selected Papers Related to the Resource Management Focus (RM) Area

Reference	Relevant Research Question	Purpose	Key Result
Rose and Kræmmergaard (2006)	RM1	To report on an interpretive case study about ERP implementation.	Project experience during implementation changed the approach to treating it as an organizational change that was technologically driven. Success was linked to organizational learning and continual use of the ERP system.
Worley and Lawler (2006)	RM	To explore change management.	Reported that to be successful, organizations must regard strategy as a process, so that structure, leadership styles, business and decision processes, and capability are re-engineered at times.
Sauer et al. (2007)	RM1	Using a survey of 412 project managers, the authors explore volatility in project performance.	Project performance is found to be likely to perform positively when run by experienced project managers and kept to schedules, budget, and product quality. A change of project manager is harmful.
Bradley (2008)	RM1	To examine 10 CSFs previously reported about ERP implementation.	Selection of a correct full-time project manager, training managers about how to minimize user resistance, and use of a steering committee are related to success. Not critical are integration of planning with business approval, level at which project manager reports, CEO involvement for other than project approval, allocation of resources and infrequent project reviews.
Tuttle and Harrell (2001)	RM2	To examine how to influence IS people re firms' objectives.	Found no need for economic incentives.
Silva and Hirschheim (2007)	RM3	To develop understanding of IS implementation by exploring social structures and relationships.	Core values, power, and control were aspects of the social context—just as important as technical issues in understanding IS implementation processes.
Allen et al. (2008)	RM3	To explore factors influencing perceptions of support for IT workers.	Factors included ambiguity regarding the job, conflict about the nature of the job, exhaustion in the role, level of mentoring, and fair pay for performance.

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TABLE 4 (continued)

Reference	Relevant Research Question	Purpose	Key Result
Thatcher et al. (2002)	RM4	To explore the effect of attitude, job nature and markets on turnover of IT employees.	Firm culture was found to be important and encouraged positive attitudes towards jobs + improved retention.
Jun et al. (2007)	RM4	To explore how teams develop common understanding.	Influential factors included how often meetings were held, phone calls (emails ineffective), and a gender mix.
Sharma and Yetton (2007)	RM4	To look at training as a component of IS implementation.	Found that the effect of training depended upon the technical difficulty and interdependence of use.

RM1. What Processes and Strategies Manage and Ensure Accountability for Existing IT Projects?

The reviewed literature was not particularly informative about control mechanisms for RM, including structures, processes, and relational mechanisms. For example, there was little about the role of the IT steering committee. The centrality of this steering committee (Trites 2004; Read 2004; Van Grembergen and De Haes 2009) to implementing frameworks like Prince 2 and COBIT makes this surprising and may be responsible for a lack of research about RM2. The literature included insightful commentary about people and motivating factors during change management, and addressed what qualities of human resources, behavioral characteristics, training, and communication strategies productively support IT implementations. This focus sharply differs from the rigor of ITGI's control frameworks.⁹ Nevertheless, research provides RM indicators.

In dynamic business environments, just as there is need for flexibility in SA, so should processes for managing resources be flexible (Worley and Lawler 2006). Parise (2006) explored mechanisms to minimize the risk of knowledge loss in people, which links to evidence that more successful IT projects are run by experienced managers (Sauer et al. 2007). Careful choice of project manager, personnel training, and a champion supporter were linked to success, yet CSFs did not include management attention to resistance, use of a steering committee, reporting levels of project manager, resource allocation, and CEO involvement (Bradley 2008). In large implementation projects that were reported as inherently evolutionary, organizational learning and continual development were more important to success than fixed planning and procedures (Rose and Kræmmergaard 2006).

RM2. How is the Extent of Accountability and Decision-Making Clarified with Those Responsible?

For effective ITG, decision rights and responsibilities are integral, from the Board through top management to all levels of participants (Lapointe and Rivard 2005). Hence, policies and procedures must be clearly developed, communicated, and monitored (Bowen et al. 2007) to ensure that

⁹ COBIT (PO3–PO10, AI1, AI12–AI17, DS1–DS4, DS6–DS13, and ME1–ME4), Val IT (VG1–VG2, VG4–VG6, PM1–PM5, IM1, IM3, IM6–IM8, and IM10), and Risk IT (RG1, RE3, and RR1–RR3) provide clear direction here.

relational mechanisms (Van Grembergen 2002) work and actions do not deteriorate into issues of power and conflict (Thomas et al. 2009). This is important given the complexity of project management and the criticality of human resources. The literature also highlights the importance of having inclusive, consistent leadership (Viator 2001; Sauer et al. 2007), with ITG success clearly linked to individuals confidently understanding their roles (ISO/IEC 38500: 2008; Yen et al. 2008). Failure can often lead to poor retention rates (Allen et al. 2008).

RM3. What Strategies are Used to Identify and Ensure Appropriate Skills are Present to Manage IT?

The literature has highlighted the importance of key stakeholders championing new initiatives (Kulkarni et al. 2007) and educating business leaders about IT to improve their leadership capacity (Bassellier et al. 2003). Some literature discussed the qualities of good leaders and identified management regarding planning, prioritizing, and optimizing (Andriole 2007), technical and functional expertise (Lee and Choong 2006), having a trustworthy support network (McGrath and Zell 2009), and being able to use sensible and personal argument to enlist support (Enns et al. 2003). Additionally, leadership requires those with the capacity to identify positive performers (Gandossy and Guarnieri 2008), acknowledge clear perceptions of roles (Allen et al. 2008), and value employees rather than offer incentives (Tuttle and Harrell 2001).

Strategies or processes like ITG that rely upon people must appreciate the implications of power (Boonstra and de Vries 2008; Silva and Hirschheim 2007). As power is a technique or action that individuals exercise, organizational change alters power relations forcing new structures, processes, and relational mechanisms on individuals that subsequently alter the roles participants play (Jasperson et al. 2002). Power and conflict need to be actively managed by superiors (Sherif et al. 2006) for positive IT outcomes (Barki and Hartwick 2001) and employee retention (Allen et al. 2008).

RM4. What Processes Ensure Appropriate Training for all Staff?

For senior managers, training is often “in situ” or commercially delivered with limited tertiary options (Thomas 2008; Glass 2006). Moreover, training and development related to change management and large IT undertakings need a holistic rather than technical view, focusing on trust, relationships, communication, and team building (Li et al. 2008). Building sound communication plans includes identifying their value in facilitating social networks so trust and a shared sense of obligation induce positive behavior and enhance business performance (Bruque et al. 2008). Employees’ perceptions of fair treatment generate responsive performance (Moore and Love 2005). Linked to trust is cooperation, a cornerstone for advancing new initiatives (Bagranoff and Brewer 2003). Cooperation can be strengthened by active team building with both frequent communication and gender mix having positive effects (Jun et al. 2007).

RM for ITG is concerned with overcoming potential resistance to new initiatives and gaining commitment. This is the key to successful outcomes with improved employee perceptions of initiatives directly related to commitment and employee retention (Thatcher et al. 2002). Consequently training processes and strategies are important, not merely for enhancing skills but for breaking down barriers to knowledge acquisition, particularly technical knowledge (Sharma and Yetton 2007). In general, training processes will be more successful when they foster motivation (Pan et al. 2008).

By encouraging involvement and commitment, communication is enhanced and this has been identified as important for overcoming resistance and perceived threats from new initiatives (Lapointe and Rivard 2005). Internet and intranets have been shown to improve commitment (Andersen 2001), but all communication must be clear, timely, sell the core message to its audience, and be flexible in delivery (Yazici 2002; Bieberstein et al. 2005). Here, IT facilitates its own

success and IT management should proactively foster links across organizational boundaries and challenge technical limitations to encourage knowledge sharing (Pawlowski and Robey 2004).

RM5. What Processes and Financial Resources are Allocated to Recruit and Retain Suitable People?

RM6. What Processes and Strategies Monitor and Manage Software Licenses, Service Contracts, Standardization of IT Applications, and Architectures, Together with Replacement for Existing IT?

Identifying decision rights and responsibilities involves establishment and monitoring of policies and procedures with ramifications for all levels in an organization, including the Board. The ITG steering committee is significant here (Read 2004). Our review revealed little, except that maintenance of software and hardware licenses has legal implications for Boards (Trites 2004).

RM: Conclusions and Directions for Future Research

Given governance requires appropriate procedures to be in place for processes and decision-making, including evidence that outcomes have been achieved in accordance with strategic planning. Lack of material in this focus area provides obvious research opportunities. For example, it would be interesting to highlight its importance by benchmarking the 14 CSFs related to the IT steering committee (Van Grembergen and De Haes 2009).

Regulatory compliance is both a driver for and an outcome of governance, and this role concerning RM2, RM5, and RM6 would give one focus to research. Similarly, examining COBIT's relevant processes¹⁰ could well frame interpretive studies about RM6. While MA research into management control systems (e.g., Auzair and Langfield-Smith 2005; Vélez et al. 2008; Chenhall and Euske 2007) and Accounting/AIS into audit committees and controls is informative, the necessity of policies, processes, and structures for ITG needs investigation.

Some research shows that organizational learning and continual development are more important to success than fixed planning and procedures (Rose and Kræmmergaard 2006), but further evaluation has merit. Similarly, communication to manage resistance and ensure adherence to implementation processes (PWC 2006) has been identified as CSFs but the importance of innovation in this area means there is scope for future research.

Leadership is critical to RM and we would expect benefits from research in this area, with an expected relationship between good project managers and successful outcomes. Research reveals that resistance to change is an important issue, with power struggles and conflict requiring active management. Consequently investigation into how to manage power and conflict to ensure commitment will help inform appropriate ITG policies and structures. This has some relevance to COBIT,¹¹ with case studies an avenue of research to explore the processes involved.

Value Delivery (VD)

Value has been defined as "the total life-cycle benefits net of related costs, adjusted for risk and (in the case of financial value) for the time value of money" (Val IT 2008, 10). Delivering value requires strategically evaluating and comparing opportunities, considering risk and impact of IT activities on business processes and resources, clarifying roles and responsibilities for delivering IT capabilities and business benefits, management through an investment's economic lifecycle, and defining and monitoring performance metrics (Gregor et al. 2006; Rivard et al. 2006; Jeffery and Leliveld 2004).

¹⁰ For example, COBIT's A12, A14, A15, DS07, DS09, DS10, and DS13.

¹¹ For example, COBIT's PO6, PO7, and DS10.

Strategies related to value delivery include evaluation of IT across alignment, prioritization of objectives, feasibility, development and implementation, and ongoing operation (Willcocks and Lester 1999). Yet, identifying how IT provides value can be difficult as the benefits become absorbed into business processes, with VD from IT difficult to assess at the business unit level, less for business operations, and least discernible at the level of financial reporting. Essentially, VD (see Table 5) and PM are outcomes, dependent upon sound practice in SA, RK, and RM. Key considerations are:

- VD1. What is the value delivered through SA?
- VD2. What are the problems in achieving VD?
- VD3. What is the role of the Board?

VD1. What is the Value Delivered through SA?

Given support in the literature for assessing value at strategic rather than operational levels, how is value generated? Do its generative mechanisms have implications for ITG? Reports suggest that effective IT use generates a combination of better profits and efficacies (Stratopoulos and Dehning 2000) with IT a positive force for improving productivity (Shu and Strassmann 2005; Ray et al. 2007).

VD is realized through strategic appreciation of a firm's activities. At times, leveraging IT capability will achieve competitive advantage (Rivard et al. 2006). For others, like cost reduction strategies, VD from IT does not have long-term value (Tallon 2007a), and where the market is price not quality sensitive, value was reported from an operational efficiency perspective (Quan et al. 2003). Purpose, cost leadership, or product differentiation all contextually affect performance, although for first entrants, IT investment in a price-sensitive market is risky because reducing IT costs advantages later entrants (Demirhan et al. 2006). However, linkages between IT and competitive strategies have been found to increase market performance. Use of IT to improve organizational capability improves both profitability and performance (Peppard and Ward 2004) and intangible benefits like the transforming, informing, and strategic role of business/IT initiatives provide value (Gregor et al. 2006). This appreciation of value in synergy (Tanriverdi 2006; Melville et al. 2004) links with findings suggesting best value is generated where IT resources and processes are complementary across business units (Zhu 2004). IT capability is increasingly important for generating business value. IT can reduce cycle time and cost, sales per employee, and turnover of inventory, with optimal results by using IT to improve processes (Zhu 2004; Lee 2001). Knowledge management is increasingly the focus of business/IT value (Gregor et al. 2006; Zadrozny 2006), especially strategic flexibility (Weill et al. 2002).

VD2. What are the Problems in Achieving VD?

Assessment of IT investment and potential enhancements in economic value should consider associated risks, especially given the size of investment in communication and information technologies (Kobelsky et al. 2008). A central concern in IT investment is that it leads to increased risk. This flags a need for further research to examine connections between needs for additional IT investments and consequent implications for risk. This is particularly important, as an aspect of IT is its role as a RK tool (Kobelsky et al. 2008).

VD3. What is the Role of the Board?

With the atomistic focus of most research papers in our review, a lack of discussion about the Board's role in evaluating VD is unsurprising. Given the strategic importance of VD, it follows that accountability should necessitate Board involvement (Stratopoulos and Dehning 2000). Wilson and Howcroft (2005) illustrate its VD's operational aspect because formal evaluations undertaken within VD are a means of enlisting and consolidating support. Similarly, value is about

TABLE 5
Selected Papers Related to the Value Delivery (VD) Focus Area

Reference	Relevant Research Question	Purpose	Key Result
Weill et al. (2002)	VD1	To report IT investment for strategic direction.	IT investment should relate to service, not equipment, and where this is managed regularly and systematically, there were improved results.
Demirhan et al. (2006)	VD1	To study the issue of strategic investment in IT in eras of declining cost.	IT costs decline overtime. Thus, there's a financial benefit to late entrants. When costs are declining, the extent of competition between firms depends on whether competitions related to a market that is price-driven or concerned with quality.
Gregor et al. (2006)	VD1	To look at how IT achieves organizational transformation that results in new, even intangible value.	Transformation benefits were found as a discernible and important component of value from IT. Information benefits were most important. Others included transactional benefits. Concluded that real business value is gained when IT investment is linked with organizational learning and change. Firms must appreciate time lags between IT investment and full benefits.
Stratopoulos and Dehning (2000)	VD2	To review successful IT investment and productivity.	The literature review considers the arguments related to Brynjolfsson's productivity paradox. These authors found that part of the problem was mismanagement with high rates of investment and failure. The research found that successful use of IT will produce more performance advantage than is gained by competitors.
Kobelsky et al. (2008)	VD2	To evaluate factors related to IT investment.	Noted that the impact of IT investment on future earnings risk has yet to be addressed in accounting and IS research, yet IT is the largest category of corporate fixed investment (\$447 billion in U.S. in 2004).
Jeffery and Leliveld (2004)	VD3	To investigate the best ways to manage IT investment.	Need to balance return and risk. Few companies were found to have "synchronized" IT spending, but most were found to be reasonably focused.
Wilson and Howcroft (2005)	VD3	To examine the political and social influences related to IT evaluation.	Formal evaluations merely justify decisions already taken and facilitate enlisting new supporters of IT. Successful enlisting of supporters leads to stability and hence success—with the reverse equally true.

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TABLE 5 (continued)

Reference	Relevant Research Question	Purpose	Key Result
Rivard et al. (2006)	VD3	To show IT contributes to business performance by considering IT support of business strategy and IT capability on business performance with both influential not competing.	Found that as with Andreu and Ciborra (1996) and Jarvenpaa and Leidner (1998), IT can achieve competitive advantage when it is used to leverage capability. IT alignment with competitive strategies can improve market performance. Suggested that strategic decisions about IT should look at its support for or improvement to key business resources.

balancing risk and return, best achieved when firms have synchronized IT with business needs (an argument for ITG), so there is coordination for value-related decisions (Jeffery and Leliveld 2004). Support for Board reviews (rather than management evaluation) of IT investment has been demonstrated (Govindarajan and Trimble 2004), with value in innovation achieved when learning rather than accountability is fostered and evaluation is achieved by focusing on trajectory, regular reviews, and contextual factors. Also, evidence suggests that unless accountability is linked to decision-making, ineffective IT investment occurs (Grover et al. 2007), and poor performance of projects and associated decisions about cancellations require complex, prompt, and difficult actions that should be linked to a review of existing practices—again suggesting that VD is strategic (Iacovou and Dexter 2005).

When an IT strategy (i.e., knowledge management) may take a firm beyond its traditional culture and focus (Gold et al. 2001), VD needs to be monitored at the level of those who instigated changes. Finally, to achieve value, analysis at the organizational level should be linked to the business-process level so that value and diagnosis can be linked (Elbashir et al. 2008). Such duality of focus is supported by Rivard et al. (2006), who suggested that value should be based upon consideration of effects of IT support on business strategy and of IT capability on business value. Such linkages require strategic oversight (Mitchell 2006).

VD: Conclusions and Directions for Future Research

Improved organizational economic performance is a key driver for ITG (PWC 2006). However, VD is difficult as CIOs have problems in defining the desired benefits at the outset of IT investments, thus making accurate evaluation difficult. Even more important is the suggestion that poor VD from certain IT investments reduces an organization's appreciation of IT business value and confidence in IT (Ward and Daniel 2006). While precise benefits may be difficult to clarify, increased regulatory demands have ensured more focus on accountability of people and processes. The 2008/2009 corporate collapses highlight the importance of research into VD approaches. For example, projects are commonly evaluated thoroughly at the end of implementation rather than throughout their lifecycle, so future research could identify VD benefits from ongoing appraisal and ways that VD is related to internal resources and the Board's role in delivering value through monitoring performance and conformance.

As Val IT's objective is to create business value, empirical studies could examine its ability to perform in different industry sectors, cultures and organizational sizes.¹² VD research that demonstrates how accurate, accessible, and timely knowledge delivers value is opportune, given its strategic value.

Performance Measurement (PM)

PM is recognized as an imperative to evaluate IT operational performance and value (Schwarz and Hirschheim 2003). It relates to project success (Bowen et al. 2007), with increased recognition of the need to measure not just tangible assets but also intangible assets that often defy financial measurement (Sveiby 1997). The Balanced Scorecard (BSC) provides a comprehensive framework to measure organizational performance across a series of dimensions including finance, customers, internal processes, and learning and growth. Like VD, PM has links to our other focus areas and is part of the three domains of both COBIT and Val IT.¹³ While the IS literature has been informative about ensuring business value, specifics of how to measure progress toward business value has received less attention. For example, one survey found only 30 percent formally reviewed the benefits delivered from IT investment (Lin and Pervan 2003). Another, ITGI's survey (2009) of CEOs, showed half of the respondents did not measure value created by IT investments. Most perceived the benefits to be reduced cost and intangibles like more efficient processes, competitive advantage, and knowledge. Our review (see Table 6) highlighted four key considerations:

- PM1. How are tangible and intangible aspects of value measured?
- PM2. How relevant is the Balanced Scorecard (BSC)?
- PM3. What other approaches are available?
- PM4. What are the problems associated with PM?

PM1. How are Tangible and Intangible Aspects of Value Measured?

Many IT benefits relate to generating intangible assets (Wang and Alam 2007). Improved customer service, technical and managerial skills, knowledge-based assets, and unique or competitive advantage are intangible outcomes for IT investment that are difficult to quantify (Santhanam and Hartono 2003). Customer service can be measured by the well-known SERVQUAL instrument (Kang and Bradley 2002), but evaluation of other intangibles is less straightforward. Any approach to IT appraisal should include performance appraisal of personnel, with insights that contribute to improved performance and job satisfaction (Burney and Matherly 2007). Research reports that task characteristics and an uncertain working environment directly affect job satisfaction (Karimi et al. 2004) with consequences for employee retention and knowledge. Performance evaluations of top management and the Board are another necessary tool. There is evidence of deficiency here with CEO performance not evaluated by 22 percent of Fortune 1000 companies in 2003. Forty-four percent did not have a process of Board evaluation, 64 percent had no process for evaluation of individual Board members, and 50 percent of evaluations were self-assessment (Lawler and Finegold 2005).

Regarding measurement of tangible assets, the literature is again limited. Davamanirajan et al. (2006) proposed process-level analysis to determine how system characteristics relate to the output and quality of a process, linking results to an economic performance model that captures how process performance relates to economic performance.

¹² The relevant Val IT domains are VG2–VG6, PM5–PM6, IM1–IM6, and IM8–IM10, which could be comparatively assessed with COBIT's PO5, PO8, AII, and ME4.

¹³ COBIT's domains include PO5, PO8, DS3, DS6, and ME1–ME4 and Val IT's VG5, PM5–PM6, and IM9.

TABLE 6
Selected Papers Related to the Performance Measurement (PM) Focus Area

Reference	Relevant Research Question	Purpose	Key Result
Lawler and Finegold (2005)	PM1	To review issues of leadership, directors and evaluation.	Found that in 2003, 20% of Boards had no formal evaluation of the CEO, 44% did not evaluate Board performance, 74% did not evaluate individual directors with evaluations related to self-assessment; written reports and reports to the Board. Boards using evaluations tended to be more effective. Boards that evaluated CEO performance were found to be stronger on strategic performance.
Wang and Alam (2007)	PM1, PM3	To look at IT intangible value.	Intangible value adds to firm valuation beyond traditional accounting information. Examined how IT capability adds to a firm's market valuation and found IT capability related to increased variability of future earnings.
van der Zee and de Jong (1999)	PM2	To investigate the role of the Balanced Business Scorecard in managing IT.	Found that the BSC was valuable in achieving integrated business and IT planning and evaluation.
Im et al. (2001)	PM3	To re-examine IT investment and market value.	Accounting measures of IT investment benefits are inadequate indicators of performance. Stock price changes are better estimates of firm's effectiveness and reflect rapid change in the business environment.
Thatcher and Pingry (2007)	PM3	To discuss methods for valuing IT investment.	IT is regarded as a commodity rather than a capital cost.
Lin and Pervan (2003)	PM4	To review management of IT benefits in large firms.	Most firms had some method to evaluate managing IT and its benefits but few formal methods. Most had one during the implementation phase and used it to revise approaches but did not continue it.
Ben-Menachem and Gavius (2007)	PM4	Developed a quantitative valuation model for measuring IT value.	Showed capitalization costs are principally development costs and do not include system evolution. Found costs for ongoing systems are 5 to 20 times the cost of the first release. Their model allowed for the automatic collection of costs.

PM2. How Relevant is the Balanced Scorecard (BSC)?

In recommending the BSC, ITGI (2003) focuses on four perspectives:

- The contribution of IT including evaluation of ITG effectiveness, as evaluated by top management;
- Assessment of users' expectations about the functional usefulness of IT departments;
- Evaluation of excellence in operational performance of IT processes; and
- The extent of IT capability to address future needs including learning and growth.

Despite BSC being a highly regarded aggregate tool for measurement of organizational performance and for ITG (Van Grembergen 2000, 2002), our review revealed disparity between the MA and IS literature. Half the case studies by Schwarz and Hirschheim (2003) used the BSC to evaluate performance within the oil and gas industry, focusing in each case on the company's central IT department. Another study saw the BSC as helpful in facilitating Board-level acknowledgment of success in integrating strategies, improving dynamics in decision-making, and creating an improved appreciation of IT for business solutions (van der Zee and de Jong 1999). Proponents of the BSC, including Kaplan and Norton (1996), see limitations to the application of the BSC in IT settings, with IT strategies being hard to implement, unconnected to business unit goals, not resourced properly, and lacking other than operational feedback.

PM3. What other Approaches are Available?

Difficulties in applying conventional BSCs has generated interest in developing alternatives. As the BSC acknowledges, it is hard to identify one measure of output. Thus, aggregate measures are common. Recognizing the need to include intangible assets (a problem for business/accounting approaches) and to include IT's interactive role across firms, Bajaj et al. (2008) used a framework similar to the BSC to link IT outcomes, and enable accountants and business managers to analyze IT, accounting, and strategy. Other approaches linking strategy, effectiveness and IT value were proposed by Chan-Jan Chang and King (2005) and Oh and Pinsonneault (2007).

PM based on productivity from IT investment is one approach to evaluating IT effectiveness but conventional measures of productivity do not always accommodate this (Im et al. 2001). Some studies have used stock market returns as a measure of the performance effects of enhancement of firm flexibility (Im et al. 2001) or the Black-Scholes option pricing models (Benaroch and Kauffman 1999). Similarly, stock market returns have been used as a means to value intangible assets with a firm's IT capability added to its market valuation above the book value of equity (Wang and Alam 2007). Yu (2004) looked at the stock market responses to evaluate what corporate governance outcomes were regarded positively, indicating areas of importance that should be emphasized and measured.

Another approach is to regard IT as a commodity rather than a capital cost (Thatcher and Pingry 2007), because IT costs vary depending on product type. Traditional products carry fixed and variable IT costs across design and production. Digital products have fixed IT costs, almost entirely incurred in the design phase. Hence risks of market failure are greater, heightening the value of performance monitoring.

PM4. What are the Problems Associated with PM?

Problems arise because capitalizing IT costs rather than allowing for ongoing development does not reflect the true nature of IT expenditure (Ben-Menachem and Gavius 2007). Their quantitative IT-enabled evaluation model collects and stores costs, apportioning them according to each section's significance. Similarly, Activity-Based Costing (ABC) proposes IT investment costs be allocated to where the IT activity takes place, which may be different from where benefits arise (Peacock and Tanniru 2005). Arguments for this approach include more practical knowledge to inform future decisions, more knowledge about how to incrementally stage investments, better appreciation of costs, and better appreciation of IT investment as an overhead or fixed cost. This was theoretically justified in a study showing most IT benefits were achieved when application was managed to individual processes rather than entire strategies (Tallon 2007b).

PM: Conclusions and Directions for Future Research

The AIS/IS literature includes a range of approaches to PM. As diversity can hinder comparative evaluation of performance, it would be useful to investigate what approaches are most relevant to what scenarios. While the relevance of BSC was investigated by a number of MA

TABLE 7
Summary of ITG Literature across the Five Focus Areas

Literature	Strategic Alignment	Resource Management	Risk Management	Value Delivery	Performance Measurement
Sarker and Lee (1999)	Y	Y	Y	Y	—
Schwarz and Hirschheim (2003)	Y	Y	—	Y	Y
Read (2004)	Y	Y	Y	Y	—
Trites (2004)	Y	Y	Y	Y	Y
Weill and Ross (2005)	Y	Y	Y	Y	Y
Bieberstein et al. (2005)	Y	Y	Y	Y	Y
Bowen et al. (2007)	Y	Y	Y	Y	Y
Vayghan et al. (2007)	Y	Y	Y	Y	Y
Bernroider (2008)	Y	Y	—	Y	—
Pan et al. (2008)	Y	Y	—	Y	Y
Xue et al. (2008)	Y	Y	—	—	—

researchers (Ax and Bjørnenak 2005; Speckbacher et al. 2003), an AIS/IS focus on these issues would be equally relevant. The scope of the literature suggests merit in comparisons like ABC costing (Kallunki and Silvola 2008; Anderson et al. 2002) with BSC.¹⁴ Moreover, the value of an IT-BSC to not only measure but also to define cause-and-effect relationships between goals and such metrics would be strategically valuable (Van Grembergen and De Haes 2009).

The MA literature is more informative than AIS/IS, particularly regarding linkages between PM and other focus areas. For example, a significant number of MA papers have reported how measurement could inform strategic effectiveness (Wong-On-Wing et al. 2007; Chenhall 2005), how PM enhances strategy (Tuomela 2005; Malina and Selto 2004), the importance of financial and non-financial information in formulating strategy (Bhimani and Langfield-Smith 2007), and how PM of individuals leads to improved RM (Mahama 2006; Widener 2006). Given our findings show inconsistent evaluation of CEO and Board performance, IS research here is overdue too.

In summary, given the ubiquity of IT investment and its integration into organizational function, the need for balanced, accurate, and timely assessment is self-evident. Comparative performance assessment at two or more levels (managerial, user, unit, and board) via a variety of methods (quantitative and qualitative) and evaluation at various levels of analysis is required to develop a richer understanding and more balanced appraisal. This need is still as current as when highlighted by Chan (2000).

ITG

Holistic coverage of ITG was identified in only 11 papers, most being in the later part of the survey time frame (see Table 7). Besides establishing the importance of addressing all focus areas

¹⁴ ITGI's COBIT (PO5, PO8, DS3–DS6, and ME1–ME4) and Val IT (VG5, PM5–PM6, IM6, and IM9) provide a starting point.

they highlighted the need to tailor ITG to individual organizational environments because no single approach to ITG ensures success (Xue et al. 2008; Schwarz and Hirschheim 2003; Bowen et al. 2007).

In discussing effective ITG, these papers showed the requirement for strategic planning, change management, VD, and regulatory compliance (the research themes mentioned in Section I as having contributed to ITG).

The papers generally reported SA as pivotal, because shared understanding of business/IT objectives was associated with better ITG performance (Bowen et al. 2007). It requires development of a unified vision for business and IT (Bieberstein et al. 2005) with formal policies and directives (Vayghan et al. 2007; Trites 2004). ITG is a process of change management (Pan et al. 2008) with success required in order to generate confidence in future exercises (Vayghan et al. 2007). Herein, careful planning is essential requiring consideration of existing organizational cultures and contexts (Xue et al. 2008). To prevent failure (Sarker and Lee 1999) this formal planning must enable top management's ownership of the initiative (Read 2004). Several papers emphasize the responsibilities of Boards (and directors) at this strategic level. Such responsibilities include (but extend beyond) the establishment of investment strategies, parameters for VD, and consequent policies for RK, RM, and PM. Here, the Board's overarching governance must concern supervision of responsibilities delegated to management and legal compliance (Read 2004; Trites 2004). Consequently, understanding regulatory compliance and its relationship to directors' due diligence is evolving (Read 2004; Trites 2004). This links to recommendations for *a priori* evaluation of IT investment as a mechanism to enhance IT investment transparently delivering its claimed value (Bowen et al. 2007).

Further, these papers address the crucial role of the IT steering committee (Weill and Ross 2005; Vayghan et al. 2007; Read 2004), linking its effectiveness to balanced representation of business and IT people and attention to building positive interaction (Bowen et al. 2007). Trites (2004) regards the ITG steering committee as accountable to the Board or its delegated committee, Read (2004) sees it as a CSF, and Bowen et al. (2007) see it as pivotal with the right balance of senior business and IT people needed to ensure that it serves its primary purpose, namely to resolve the different needs of business units.

Despite the agreed relevance of all focus areas, there was consensus that effective ITG lay less in its structures and more in how the whole comes together through the dynamics of human behavior (Schwarz and Hirschheim 2003). Strong leadership (Vayghan et al. 2007; Bernroider 2008), gaining cooperation (Pan et al. 2008) with sound relationship building (Schwarz and Hirschheim 2003), careful choice of skill sets on committees (Bieberstein et al. 2005), effective Board governance, and communication were recommended as imperatives for effective ITG. Sarker and Lee (1999) reported a failed case study that ignored such concerns. Commitment of people to change was crucial and incentives like valuing feedback (Pan et al. 2008; Bowen et al. 2007), team building (Bieberstein et al. 2005), and appreciation of acquiring new skills all helped. These approaches fostered bottom-up communication, recognizing that communication strategies needed more than management communiqués and intranets (Bowen et al. 2007). In essence, there is agreement that people are the linkage between ITG's focus areas and success.

ITG: Conclusions and Directions for Future Research

The papers reviewed mapped well onto our five focus areas and strongly support understanding that ITG effectiveness is closely related to commitment by all stakeholders. The identified dearth of research highlights imbalance between the wealth of guidance for practitioners and the paucity of literature that critiques undertakings. Here, several recent initiatives, including creation

of a research institute and targeted journal should address these concerns.¹⁵ Avenues for future research include interpretive case studies involving COBIT, Val IT, and other frameworks, organizational case studies of ITG in dynamic environments, critical appraisal of the extent of ITG in selected industry and public sectors, ITG in inter-organizational environments, the value of ITG to the audit process and in regulatory compliance, validation of ITG as a means to improve the poor track record of IT investment, comparative studies of ITG using bottom-up and top-down approaches, governance issues and strategies, and longitudinal studies investigating sustained ITG performance.

IV. DISCUSSION AND CONCLUSION

Having used our taxonomy to review relevant IS/AIS/MIS/MA literature related to ITG, we now draw the components together and indicate interdisciplinary opportunities to progress this field. An obvious concern is the identified lack of literature that deals with ITG holistically and the possible impacts this may have on engendering value delivery.

Lack of Linkages between Focus Areas

What are the reasons for this molecular approach to ITG? Some insight can be gained from an IS review by [Sidorova et al. \(2008\)](#) who noted a shift in IS research from a technological focus to more business-process/management issues including people's interaction with IT. Hence, "the IT artifact may not be at the center of IS research but instead is an equal partner, interacting with humans and their collectives in an organizational context" ([Sidorova et al. 2008](#), 477). This means ITG should fit within their identified research areas. While governance was not identified as a key term, vocabulary related to its component focus areas was and included terms like planning, strategy, resources, investment, value decision, method, structure, and evaluation.

Similarly, [Weill and Ross' \(2005\)](#) matrixed approach, while more complex, contains similar components to those identified in our review. It showed no single best model for ITG, with options being dependent upon archetypal approaches to decision-making affecting choice of strategic drivers, key metrics, key ITG mechanisms, IT infrastructure, and key IT principles.

Overall, it would seem that IT research has continued to progress much as [Galliers \(1991\)](#) observed, with disparate approaches in the literature. While research has appreciated the importance of ITG's focus areas, knowledge is still largely being garnered into what [Vayghan et al. \(2007, 670\)](#) call "information silos." In contrast, the MA literature has come to value understanding about linkages with initiatives such as strategic management accounting, strategic performance management, and activity-based-cost management taking a holistic and integrative approach.

Inter-Disciplinary Opportunities to Progress ITG

The synergies between AIS and MIS are considerable and their respective research outputs provide cross-functional relevance. Both are concerned with information, AIS with aspects of information as it is entered into, managed, or produced by IS ([Murthy and Wiggins 1999](#)), and MIS with a more technological focus on system, information, and service quality ([DeLone and McLean 2003](#)). ITG is essential to the well-being of both AIS and MIS practices, and in this sense ITG research needs to draw from practitioner and research expertise in both fields. ITG and its focus areas ensure that IT value is measured and delivered through SA, RK, and RM that use

¹⁵ One initiative is The Information Technology Alignment and Governance Research Institute in Antwerp (that has ITGI, The University of Antwerp, and ISACA as partners) whose core objectives are to foster research into Enterprise Governance of IT, Strategic Alignment, and Value Creation. Another is a new journal, called the International Journal on IT/Business Alignment and Governance, which is dedicated to ITG research.

appropriate change management strategies. Herein, PM and VD are critical, both to demonstrate that IT can produce better returns on investment (see Section II) and to justify the ITG exercise. IS, MIS, AIS, and MA all inform this.

Vasarhelyi and Alles (2008) foreshadowed such interdependency when they predicted the transition from the “new” economy to the “now” economy, wherein accurate information is essential in immediate time, not merely real time. For the accounting profession, this demands reliance upon IT systems to produce information as demanded and upon the integrity of controls that manage these information systems. This is the purpose of ITG with its structured strategic approach that harmonizes needs for information with strategic decision-making that enables provision of investment, structures, people, and relational mechanisms. The practical interdependence of AIS and MIS are encapsulated in their joint role in ITG and investigation that explores these interdependencies is a research opportunity.

Technological aspects of the focus areas SA, RK, and RM are where one would expect ITG research to inform AIS. Yet, our taxonomy of ITG research reveals some deficiencies, particularly regarding policies and procedures and their relationship to strategy, together with measurement of both business value and performance. Change management and accounting research can inform ITG here.

Finally, there is IS control that goes to the heart of information integrity. Security of data and systems are increasingly troublesome for organizational management. Current trends toward global alliances exacerbate risks associated with database accessibility, which necessitate technical solutions. ITG certainly provides structure. However, IS control and auditing are areas where AIS, ITG, and MIS research could together provide important input (O'Connor and Martinsons 2006).

In essence, AIS needs to be informed about:

- The extent, types and implications of this problem;
- Best practice for ITG to minimize errors in implementation, management and associated governance;
- Intangible IT benefits, their nature, contribution and need for measurement; and
- New technologies that offer promise to deal with the demands of the “now” economy.

MIS needs to be informed about:

- The controls AIS needs for inter- and intra-organizational structures including where data is shared in real time;
- The complexities/difficulties/implications of compliance reporting, including global or inter-organizational environments; and
- New regulatory requirements looming after the corporate crashes of 2008–2009.

ITG has evolved from requirements for effective corporate governance of IT infrastructure including regulatory compliance, the significance of IT investment, the poor track record of IT investment, and globalization. Given that ITG's scope extends from SA, RK, and RM to VD and PM, the task is complex. Practitioners and researchers have responded by focusing on foundational focus areas. This is understandable, for encompassing the complexity of holistic ITG is daunting. Indeed, the confluence of opinion from both research and practitioners about CSFs for ITG being related principally to the first two structural focus areas (SA and RM) supports this orientation. An important direction for future research is for less atomistic research, more work that demonstrates the inter-relational nature of the ITG focus areas, and an emphasis on the contribution of each to the whole. The new [ISO/IEC 38500:2008](#)¹⁶ seeks to address how corporate

¹⁶ Based upon the Australian Standard AS8015, [ISO/IEC 38500:2008](#) is called Corporate Governance of Information Technology.

governance manages IT use and the operation of IT departments. Based upon six principles,¹⁷ ISO/IEC 38500:2008's key concepts include linking corporate governance, business systems and change, the business cycle of demand and supply, and systems for governing IT, with the three rigorous control activities with matrixed evaluation of performance. Being a high-level approach, ISO/IEC 38500:2008 offers fresh opportunities for research. Further opportunities arise with the yet-to-be-released, related AS8016.

Similarly, there are research opportunities in the RK and PM focus areas. Here, the surveyed MA literature demonstrates active interest including appreciation of linkages. These MA approaches offer direction for future AIS research that should be relevant to IT researchers and practitioners.

In conclusion, just as all complex organizational initiatives require time to discover and capture the interactional scope of their identity, so too has ITG. Our taxonomy, when linked with practitioner-focused contributions,¹⁸ provides guidance. Through examination of a wide array of published work related to ITG, we have attempted to clarify existing and potential new directions for research and practice with the aim of encouraging renewed vigor for active debate about how to accomplish best practice for ITG.

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¹⁷ The six principles are responsibility, strategy, acquisition, performance, conformance, and human behavior.

¹⁸ e.g., ITGI, COBIT, Risk IT, Val IT, ITIL, and ISO/IEC 38500:2008.

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