Rapid business and IT change: Drivers for strategic information systems planning?

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Rapid business and IT change: drivers for strategic information systems planning?

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Abstract
Today's organizations increasingly plan new information systems (IS) to better compete. Through such planning, they attempt to align their IS strategy and their business strategy. This study tested the impact of business and information technology (IT) change on strategic information systems planning (SISP) horizon, of horizon on the planning itself, and of the planning on the alignment of IS strategy and business strategy. A questionnaire defined business change, IT change, and alignment as multi-item scaled questions, and planning horizon as a single, nonscaled one. It defined a multi-item scaled SISP measure as both a second-order construct and as single-order constructs for its individual phases. A postal survey collected data from 161 IS executives. Constructs were extensively validated. The analysis used structural equation modeling, and surprisingly found that business change predicted *longer* SISP horizons, but IT change predicted neither longer nor shorter ones. Planning horizon predicted SISP itself (as a second-order construct and as all of its phases), and such planning (as a second-order construct, and as strategic awareness and strategy conception phases) predicted alignment of IS strategy and business strategy. These findings suggest that practitioners more carefully assess their own degree of caution in setting planning horizons in response to business and IT change. In fact, the findings suggest it may not be necessary for practitioners to shorten planning horizons in a rapidly changing environment.
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Keywords: strategic information systems planning; business change; information technology change; planning horizon; alignment of business strategy and information systems strategy

Introduction

In an increasingly dynamic economy, the introduction of new products, services and information technologies is raising organizational competitiveness (Drucker, 2002). In doing so, such business and technology change is creating a shift in managerial thinking. Managers are increasingly assuming that risks are less predictable, less measurable, and more transient (Baskerville, 2005). The resulting uncertainty is reducing business performance, challenging information systems (IS) management, and making the selection of new IS all the more critical (Raymond *et al.*, 1995; Choe *et al.*, 1998). The selection of such systems does not happen by chance. Instead, it requires visions of various possible futures (Miles & Snow, 1978) and efforts to select new IS that will help management realize its objectives by aligning its IS strategy and its business strategy.

The process of choosing the portfolio of those new IS (as well as the rationale for their choice and the groundwork for implementing them) is known as strategic information systems planning (SISP) (Mentzas, 1997).

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Such planning thus formulates the information technology (IT) strategy, that is, the plan of action for employing IS to accomplish the goals and objectives of the organization. It is a challenging endeavor that has long been the source of concern for senior business and IS executives alike (Brancheau & Wetherbe, 1987; Luftman & McLean, 2004; Luftman, 2005).

One omnipresent but too often overlooked factor in planning is time (Ewing, 1972; Das, 1991). A planning horizon is a key temporal dimension of planning (Camillus, 1982). It is the period of time for which the plan is developed (Das, 1991). IS planners using a shorter horizon (perhaps a year or two) would envision the new systems to be designed, developed, and implemented during that time period, whereas such planners using a longer horizon (perhaps five or even more years) would envisage the new systems for that period. Research about planning horizons in strategic management, however, has lacked both scope and depth (Das, 2004).

Change is another critical factor in planning where research has been sparse. Predicting the new business products and services that will be made available by competitors and purchased by customers over the planning horizon is rife with uncertainty (Miller & Friesen, 1980, 1982, 1983; Salmela & Spil, 2002). Because IT changes rapidly, predicting the IT that will become available during the horizon is also uncertain (Benamati & Lederer, 2000). The potential impact of change in both business and IT demonstrates that the future can be quite incongruent with the past (Butler, 1995). Although experience may teach caution, the potential impact of change confirms philosopher Edmund Burke's proclamation: 'You can never plan the future by the past.'

The current study asks this research question: How do business and IT change affect the alignment of IS strategy and business strategy via the SISP horizon and the planning process? The research thus tests the effect of business change and IT change on the SISP horizon, the effect of the horizon on the planning itself, and the effect of the planning on the alignment of IS strategy and business strategy. It uses a postal survey of IS executives for the data collection method, and it employs partial least squares (PLS)-based structural equation modeling (SEM) data analysis as the analytical method for testing hypotheses. Although rapid business and IT change would be expected to lead to shorter SISP horizons, and whereas shorter SISP horizons would be expected to lead to less planning (and conversely, of course, longer horizons to more planning), the authors' extensive literature review failed to identify studies confirming these expectations. Moreover, the review identified many studies showing attributes of SISP leading to alignment, but did not identify empirically based studies confirming that SISP, as a multi-phased process, leads to such an outcome. A better understanding of the role of change, planning horizon, and planning itself may help managers better choose the new IS that will align with their organizations' business strategies (and also help them adjust their strategies to capitalize on new information technologies), and thus help those organizations better realize their objectives. Figure 1 shows the research model of the study.

The next section defines the constructs in this study. Subsequent sections describe hypotheses, the methodology, and data analysis. After a discussion of the findings, the paper concludes with implications for future researchers and managers.

Constructs

Strategic IS planning

SISP is the process of identifying a portfolio of computer-based applications to help an organization achieve its business goals (Lederer & Sethi, 1988). It is an intricate and complex group of specific, interrelated tasks that require extensive input from both senior business executives and senior IS managers. It precedes the actual detailed, project planning that takes place for each

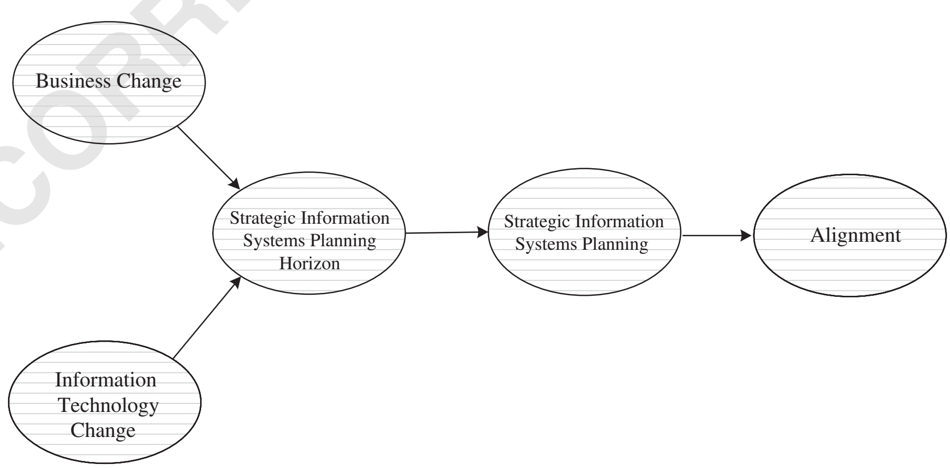

Figure 1 Research model.

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Table 1 Information systems planning phases and tasks (Mentzas, 1997)

Strategic awareness	Determining key planning issues Defining planning objectives Organizing the planning team(s) Obtaining top management commitment
Situation analysis	Analyzing current business systems Analyzing current organizational systems Analyzing current information systems Analyzing the current external business environment Analyzing the current external IT environment
Strategy conception	Identifying major IT objectives Identifying opportunities for improvement Evaluating opportunities for improvement Identifying high-level IT strategies
Strategy formulation	Identifying new business processes Identifying new IT architectures Identifying specific new projects Identifying priorities for new projects
Strategy implementation planning	Defining change management approach Defining action plan Evaluating action plan Defining follow-up and control procedure

project itself much later during systems development and that probably has a greater impact on budget, deadline, and quality objectives than on alignment objectives.

It is, moreover, tightly connected to strategic business planning. That is, senior business executives typically produce a business strategy (Chan *et al*., 1997) which IS planning is then employed to realize. Typically a business strategy is produced first, but in those cases where an IS strategy is produced first or simultaneously (e.g., when a new technology is believed to be able to provide a significant advantage), a business strategy may need to be changed to realize alignment. The alignment between the business and IS strategies, although a function of SISP, thus depends on business planning (as well as on many other variables).

The current research examines SISP in terms of the practice of its activities. Prior research has often studied it in terms of its broad characteristics or general behavior, but the current study decomposes it into its component tasks.

Mentzas (1997) described SISP in terms of phases and the specific tasks within them. He grounded them in Thompson's (1993) well-accepted framework in the field of strategic management. The phases and tasks thus represent the components of the planning process. Each component has its own objectives, participants, preconditions, products, and techniques. The phases and tasks can be used to describe such planning within an organization. For example, the strategic awareness phase initiates a planning project by determining the issues currently critical to the organization, defining the goals and objectives of the planning effort, identifying the intended participants in the planning and organizing them into teams, and most importantly, laying the groundwork for IT governance approval by informing top management and inspiring its commitment to the planning. As another example, the strategy formulation phase includes major decisions about the IT initiatives; in this phase, planners identify the newly proposed business processes, IT architectures, specific projects, and priorities for those projects for management approval.

Table 1 shows the phases and tasks. They can form the basis for the assessment of SISP both because they reflect specific actions and because they represent the full range of the planning effort.

Business change

Business change has been defined in terms of the rate of product/services obsolescence and the rate of product/services technology change (Miller & Friesen, 1983). Teo & King (1997) derived and validated a construct for business change from Miller and Friesen's research on environmental dynamism for application in their IS research. In a dynamic economy, the introduction of new products and services is essential for a company's survival as existing products and services become obsolete (Kagioglou *et al*., 2002). New technologies (e.g., new manufacturing machinery) and the modernizing of existing ones for creating those products and services can likewise occur rapidly.

Business change is very critical in SISP. Researchers have suggested that business change makes it more difficult for managers to use such planning to accomplish their objectives (Salmela *et al*., 2000; Salmela & Spil, 2002; Newkirk & Lederer, 2006). Substantial changes over short periods of time in an industry's products, services, and technologies can make the establishment of business objectives and priorities difficult. They can force businesses to modify objectives and priorities as managers learn more about those changes. Shifting business objectives and priorities can produce unexpected changes in IS objectives and priorities. These changes can make managers leery about the organizational value of proposed IS projects (Clemons & Weber, 1990), and reduce their commitment to approving and implementing them. With insufficient managerial commitment, organizations may start and stop projects so frequently that they complete few and realize little value from them.

IT change

IT is the computer software and hardware used to capture, store, and process data for management decision making. Change in IT in this study refers to the differences over time in commercially available software and hardware. Because organizations make individual choices in the adoption of new IT, one organization might interpret and experience IT change differently from another organization.

IT has in general been changing at a rapid pace (Day & Q1 Shoemaker, 2000; Bayus *et al.*, 2001; Benamati & Lederer, Q2 2001; Cegielski *et al.*, 2005; May, 2005). Due to the electronic commerce revolution, it may be changing faster today than ever. In fact, 'The only thing that is constant in this industry is change,' a human resources manager at an IT provider reported in describing the situation (Garud & Kumaraswamy, 2005, p. 18). Bluetooth wireless, virtual retinal display (a technology that enables the user to see what appears as a conventional display floating in space), and XML (a technology that enables data sharing across different systems, particularly via the internet) are recent examples (Cegielski *et al.*, 2005). Such change provides benefits to organizations in terms of increasing their competitiveness (Cash & McLeod, 1985), but it also challenges them. They must decide, based on their unique critical success factors (Rockart, 1979), whether and when to adopt the newly emerging IT for usage in redesigning their business processes (Davenport & Short, 1990).

The lengthy duration of acquisition and implementation may coincide with the emergence of newer and better IT products making an organization's choices obsolete even before they are implemented (Benamati & Lederer, 2000). New IT might be rushed into commercial markets before being fully debugged (Thibodeau, 2002), and might either cause its adopters exorbitant debugging costs or even be unusable.

Managers cannot be experts on all emerging IT, and their mistakes in selecting new IT either too early or too late can be costly (Carey, 1992). Selection too early can result in failed projects or in time- and labor-consuming debugging while letting close – following competitors gain significant advantage from similar or even enhanced IT without such cost. Selection too late can result in competitors gaining an advantage that is impossible or very expensive to overcome. In summation, IT change seriously challenges strategic IS planners.

SISP horizon

A planning horizon, in general, represents the time period from the commencement of the execution of a plan until the conclusion of that execution (McLean & Soden, 1977). It can be seen as a resource for attaining objectives (Das, 1991) and hence as an independent variable. It can also be seen as the result of management decisions and thus as a dependent variable (Lee & Liebenau, 1999).

An IS planning horizon, in particular, can vary depending on business planning horizons, management styles, and other organizational factors (Martin, 1982).[1]

[1]The current study concerns the effects of business and IT change on IS planning horizons, rather than on IT planning horizons that could depend on different factors.

The formulation of the IS strategy typically follows the formulation of the business strategy, and business and IS management work together to set the horizon for the IS strategy, to some extent, as fitted within the horizon of the business strategy. They also work together to develop the initiatives defined in the strategy.

Individuals have their own conceptualization of time in setting planning horizons (Das, 1991; Mosakowski & Earley, 2000). For example, some managers may plan more by interpreting time as the occurrence of events (i.e., they may set their planning horizon more as a response to competitor's actions or new IT releases) while others may view time more in terms of the passage of days, months or years (i.e., they set a clock-like duration after which they will take action). Some managers may set their planning horizons based more on objective standards than do others who might set them based more on a social interpretation of time dependent on feelings, beliefs, and experiences. (To illustrate a social interpretation: A month of vacation passes much faster than a month awaiting a medical diagnosis.) Some managers might have a cyclic perspective on time, thus seeing their jobs more as repetitive cycles in which they do the same things over and over, whereas others might take a novel perspective, seeing their jobs as influenced by unexpected events. Finally, some managers might take a short-term perspective on time while others a long-term orientation (Mosakowski & Earley, 2000).

Effective users of IS have long relied on such time frames as planning horizons (McFarlan, 1971). They have done so because a planning horizon serves as a control mechanism. It demands the creation of and adherence to a schedule. It forces plan implementers to confront and resolve problems so they can meet their milestones. As a result, problems are less severe when planning horizons are specified (Lederer & Sethi, 1988). The importance of a planning horizon has thus not diminished, although increasing business and IT change may have made it more difficult to use (Sullivan, 1987).

SISP horizons were found in one study to range from one to five years (Premkumar & King, 1994a). Another study found an average horizon of 3.7 years (Lederer & Sethi, 1988).

Alignment

Strategic IS alignment (referred to as alignment for succinctness in this paper) is the correspondence between the IS plan and the business plan such that the content of the business plan reflects the content of the IS plan, and the content of the IS plan reflects the content of the business plan (Kearns & Lederer, 2003). It has thus likewise been described as the linkage between business strategy and IS strategy (King, 1978; Henderson *et al.*, 1987; Baets, 1992; Henderson & Venkatraman, 1993) as well as the fit between the business unit strategic orientation and its IS strategic orientation (Chan *et al.*, 1997). Alignment is the most important construct in the current study because it represents the achievement of

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the objective of the planning, and hence the planning effectiveness.

Achieving and sustaining alignment has been shown to require maximizing the enablers and minimizing the inhibitors who cultivate it (Luftman & Brier, 1999; Luftman *et al.*, 1999; Luftman, 2000). An assessment of alignment maturity can enable organizations to evaluate the activities that management performs to achieve cohesive goals across IT and other functional areas. It can thus identify opportunities for enhancing the harmonious relationship of business and IT (Papp, 2001).

Alignment has also been assessed based on strategic fit and functional integration (Henderson *et al.*, 1992; Henderson & Venkatraman, 1993, Papp & Luftman, 1999; Papp & Fox, 2002). Strategic fit encompasses both the external domain (i.e., where the organization competes) and the internal domain (i.e., where management administers the organization). Functional integration recognizes the link between business strategy and IT strategy as well as the link between business infrastructure and IT infrastructure.

Both senior business executives and IT managers have ranked alignment as one of their top management concerns (Brancheau & Wetherbe, 1987; Luftman & McLean, 2004; Luftman, 2005). As a result, considerably more research has perhaps been conducted about alignment than about the other constructs in this study.

Alignment is important because IS that are consonant with strategy are expected to contribute more to effective management than do systems that are not consonant (Camillus & Lederer, 1985). Research has shown that the benefits of alignment include organizational effectiveness and efficiency improvement, and greater utilization of IT (Karimi, 1988). Higher levels of alignment are associated with higher levels of business value (Tallon *et al.*, 2000) and the use of IT for competitive advantage (Kearns & Lederer, 2003).

Alignment facilitates top management's understanding of the importance of IS, and improves IS management's understanding of business objectives (Teo & Ang, 1999; Kearns & Lederer, 2003). It is a key predictor of IT investment profitability, facilitates both perceived IT success and organizational performance, and is thus, not surprisingly, supported by more sophisticated IT management (Sabherwal & Kirs, 1994; Henderson & Venkatraman, 1999).

Research has shown that many actions and conditions can lead to the achievement of alignment. For example, deliberately formulating the IS plan after the business plan, developing both plans simultaneously, or using the IS plan as a basis for creating the business plan can lead to alignment (Chan & Huff, 1993). Involvement in IT strategic development, IT business understanding, meeting IT commitments, senior executive support for IT, well-prioritized IT projects, and business–IT partnerships also appear to produce it (Luftman *et al.*, 1999). The CIO's perception of mutual understanding between the CIO and top management team about the role of IT in the organization is likewise a predictor (Preston & Karahanna, 2004).

Table 2 Alignment success (Segars and Grover, 1998)

Understanding the strategic priorities of top management
Aligning information systems strategies with the strategic plan of the organization
Adapting the goals/objectives of information systems to changing goals/objectives of the organization
Maintaining a mutual understanding with top management on the role of information systems in supporting strategy
Identifying IT-related opportunities to support the strategic direction of the firm
Educating top management on the importance of IT
Adapting technology to strategic change
Assessing the strategic importance of emerging technologies

Previous research has identified numerous other predictors of alignment. They include shared domain knowledge and prior IS success (Chan *et al.*, 2006); environmental stability, organizational integration, and IS management sophistication (Sabherwal & Kirs, 1994); shared domain knowledge, successful IT history, connection between business and IT planning, and communication between business and IT executives (Reich & Benbasat, 1996); CEO commitment to IT, IT sophistication, and external IT expertise (Hussin *et al.*, 2002); information intensity of the value chain (Kearns & Lederer, 2003); and cognitive commonality between IS and business executives (Tan & Gallupe, 2006). Thus, although research has shown that various aspects of planning lead to alignment, the authors could not identify research showing that planning as a whole or as its individual phases – in terms of the express actions of planners – do so either within or outside a model including IT change, business change, and SISP horizon.

Segars & Grover (1998) identified eight objectives of alignment that, when fulfilled by the organization from its SISP efforts, reflect successful alignment of IS and business strategy (King, 1978; Henderson *et al.*, 1987; Baets, 1992; Henderson & Venkatraman, 1993). Subjects indicated the extent to which the organization fulfilled each of the objectives of alignment from its SISP efforts. Segars and Grover rigorously validated the objectives with data from 253 IS executives, and used the objectives as the basis of an instrument for measuring alignment success. The authors of the current study used the objectives as the basis of an instrument for measuring alignment success as a reflection of the effectiveness of the SISP. Segars & Grover (1999), Kunnathur & Shi (2001), Papke-Sheilds *et al.* (2002), Lee & Pai (2003), Lee *et al.* Q3 (2005), Lin (2006), Pai (2006), and Segars *et al.* (1998) Q4 have used the instrument in full or adapted it. Table 2 shows the objectives.

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Hypotheses

Impact of business change on SISP horizon

Rapid business change creates uncertainty and complexity (Miller & Friesen, 1980, 1982, 1983). Uncertainty refers to the rate of change and innovation as well as to the unpredictability of competitors and customers, whereas complexity refers to the variations among the firm's markets that require diversity in production and marketing orientations. Products and services become obsolete very quickly during periods of such change or within industries of such change, leaving managers uncertain about their preemptive moves in adopting new products and services or about their responses to competitors' adoption of such products and services. The technologies used to create new products and services during periods or within industries of change likewise evolve quickly, leaving managers uncertain about whether to adopt the technologies or how to respond when their competitors adopt them.

This greater uncertainty and complexity associated with more rapid business change thus leave the organization more vulnerable to outside influences (Daft *et al.*, 1987). The resulting vulnerability might make managers feel pressed to react more rapidly in some areas of the organization. Managers thus would plan more quickly in smaller steps with ongoing reviews to permit flexibility in adjusting the plan while still attempting to facilitate satisfactory choices (Lindblom, 1959; Mintzberg, 1979, Q5 1994; Quinn, 1980; Pyburn, 1983; Vitale *et al.*, 1986; Earl, 1993; Sambamurthy *et al.*, 1994; Mintzberg & Quinn, Q6 1996). Simplicity in planning would facilitate such flexibility in adapting to the uncertainty and complexity of the environment while responding to its changeability. Shorter horizons would enable managers to change quickly as they resolve some uncertainty. Shorter horizons would also enable them to resolve new uncertainty as it occurs.

In contrast, projects with longer planning horizons would require so much time that the unexpected changes taking place in the uncertain and complex environment could render a plan obsolete. Any such planning would be expected to fail due to unavailable data, obscure relationships, and the unpredictable future. Such planning would simply be so inflexible that it could not succeed, and thus managers would not conduct it (Ciborra, 1994). Hence, we expect more rapid business change to result in shorter horizons. We thus hypothesize:

H1 *More rapid business change predicts shorter strategic information systems planning horizons.*

Impact of IT change on SISP horizon

Rapid IT change creates considerable uncertainty and complexity for the organization (Benamati & Lederer, 2000). Vendors market new IT prematurely and create unrealistic expectations. Managers have difficulty staying informed about IT as it emerges, and then difficulty choosing what to adopt and what not to adopt. Even when organizations do adopt new IT, they discover that the vendors themselves may have insufficient experience and knowledge about their own products, and thus cannot help customers solve problems with the prematurely released products. Documentation of the new IT may be lacking. In general, lack of expertise about new IT exists not only within the organization, but also among potential outside consultants. Managers thus know that long learning curves may delay new IT implementation.

The greater uncertainty and complexity associated with such vendor IT change thus leave the end-user organization more vulnerable, and inspire its managers to caution (Arrow & Fischer, 1974; Epstein, 1980; Gollier *et al.*, 2000). Managers thus would refrain from projects with longer planning horizons because the uncertainty and complexity of such IT change could render new IT obsolete during project implementation. During a longer horizon, one vendor might produce a new IT, and shortly afterward, another might leapfrog ahead. On the other hand, a shorter horizon would enable greater agility in making and changing shorter-term decisions in response to the new IT. Hence:

H2 *More rapid IT change predicts shorter strategic information systems planning horizons.*

Impact of SISP horizon on the planning itself

A shorter planning horizon (the H1 and H2 dependent variable) demands that planners conduct less planning while a longer one would thus demand they conduct more (Das, 2004). A longer horizon, the independent variable in next hypothesis (for consistency with the desirable alignment outcome in the subsequent hypothesis), demands that they do more planning to produce a plan that accounts for the alternative scenarios and additional, possible changes during that longer horizon. In other words, the longer horizon would press planners to devote more attention to identifying a portfolio of computer-based applications to help the organization achieve its business goals than would a shorter horizon. It would press them to devote more attention to SISP's intricate and complex group of specific, interrelated tasks that can demand much time and energy from business executives, managers, professionals, and others throughout the organization.

A longer planning horizon would not only demand such planning, but thus also enable planners to respond to the uncertainty around them by applying the Precautionary Principle – the principle that an action potentially causing harm (such as financial waste or missed opportunities resulting from poor planning) places the burden of proof on the advocates of the change reflected in the plan (Arrow & Fischer, 1974; Epstein, 1980; Gollier

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et al., 2000). In fact, 'A longer planning time horizon would be a hollow development if it were not based firmly upon an improved subjective "grasp" of the future' (Das, 1991, p. 53), a grasp expected to be more effective at realizing organization goals than one produced by a more superficial planning effort.

To illustrate, an organization planning to install a small, popular pre-written package for a few users, to be implemented over a 1-month planning horizon, would most likely require much less planning than would an organization intending to install a large-scale ERP system with full organization impact, to be implemented over a 5-year horizon. To illustrate further at a more micro-level, grandmaster chess players plan ahead to a depth of six or seven moves (a longer horizon) in contrast to novices who may consider only one or two moves ahead (a shorter horizon), the presumption being that grandmasters do more planning – more analysis of alternative competitor moves and their responses – than do novices (de Groot, 1978).

Hence, we hypothesize:

H3 *A longer strategic information systems planning horizon predicts more strategic information systems planning.*

Such planning comprises the five SISP phases of strategic awareness, situation analysis, strategy conception, strategy formulation, and strategy implementation planning. Because the reasoning for H3 would apply to each, we propose five additional corollary hypotheses.

For example, the development of a plan with a longer horizon of more, alternative scenarios and possible changes would demand planners devote more effort to the strategic awareness tasks of determining key planning issues, defining planning objectives, organizing the planning team(s), and obtaining top management commitment not only to deal with the scenarios and changes
Q7 (Das, 2001), but also to avoid the possible financial waste or missed opportunities of poor planning as suggested by the Precautionary Principle (Arrow & Fischer, 1974; Epstein, 1980; Gollier *et al.*, 2000). Hence, we hypothesize:

H3a *A longer strategic information systems planning horizon predicts more strategic awareness.*

With analogous reasoning, the development of a plan with a longer horizon would likewise demand planners devote more effort to the tasks of situation analysis, namely analyzing current business systems, organizational systems, and IS, as well as to analyzing the current external business and IT environments. Hence:

H3b *A longer strategic information systems planning horizon predicts more situation analysis.*

The development of a plan with a longer horizon would demand planners devote more effort to identifying major IT objectives, identifying opportunities for improvement, evaluating those opportunities, and identifying high-level IT strategies. Hence:

H3c *A longer strategic information systems planning horizon predicts more strategy conception.*

Strategy formulation – identifying new business processes, new IT architectures, specific new projects, and priorities for new projects – is, in effect, the actual choosing of the new IS strategy. The development of a plan with a longer horizon would demand planners devote more effort to this critical phase. Hence:

H3d *A longer strategic information systems planning horizon predicts more strategy formulation.*

Finally, the development of a plan with a longer horizon would demand planners devote more efforts to defining a change management approach, defining an action plan, evaluating the action plan, and defining follow-up and control procedures. Hence:

H3e *A longer strategic information systems planning horizon predicts more strategy implementation planning.*

The impact of SISP on alignment

SISP would reasonably be expected to produce greater knowledge about competitors, resources, regulators, customers, vendors, and any other business partners. This knowledge would provide greater ability to understand those stakeholders, and thus greater ability to develop plans that are less vulnerable to their competitive moves. Such knowledge and ability would result in greater top management confidence and commitment, and that commitment would result in a better plan with higher quality and greater likelihood of implementation (Basu *et al.*, 2003). Higher quality and greater likelihood of implementation would result in greater alignment of IS with business strategy. Thus, SISP, by producing and using greater knowledge about stakeholders to develop a plan, would result in greater alignment, the measure of the effectiveness of the SISP in this study. Hence:

H4 *More strategic information systems planning predicts greater alignment.*

The effects of more meticulous planning would be expected in all five SISP phases. Strategic awareness, for example, with a more careful determination of planning issues and objectives, would better focus the planning process on obtaining the appropriate knowledge about competitors, resources, customers, and regulators. More careful organizing of the planning teams would result in members more capable of obtaining and understanding that knowledge. Top management commitment would result in greater organizational confidence in the knowledge and thus in continued financial support for the planning process. Better focus, more capable members, and continued financial support would, in effect, likely enable the actions that produce greater alignment whereas poorer focus, less capable team members, and discontinued financial support would more likely impede alignment. Hence:

H4a *More strategic awareness predicts greater alignment.*

Situation analysis, with a more careful study of the current business, organizational, and IS, would produce better knowledge about the organization's requirements. Study of the current external business and IT environments would help the organization produce better knowledge about the impact of possible changes. Such knowledge would provide a better foundation on which to base the plan, and enable the plan to produce more alignment. Hence:

H4b *More situation analysis predicts greater alignment.*

Strategy conception, with a more meticulous identification and evaluation of opportunities, would provide more realistic alternatives. The identification of major IT objectives would enable the organization to better align future IT objectives and business objectives. The identification of high-level IT strategies would permit a basis for better choices in the final plan. Better alternatives and choices (i.e., more knowledgeable ones) would enable the plan to produce better results, meaning more alignment. Hence:

H4c *More strategy conception predicts greater alignment.*

Strategy formulation, with a more careful identification of the plan itself (i.e., its processes, architectures, and new projects) would provide a plan more likely to meet planning objectives. Better prioritization would result in greater likelihood of implementation and thus greater chances of meeting the planning objective of alignment. Hence:

H4d *More strategy formulation predicts greater alignment.*

Strategy implementation planning, with more knowledgeable attention to change management and a better action plan, would result in a greater likelihood of plan implementation. Better follow-up and control would result in a greater portion of the plan being implemented. Greater implementation would produce better delivery of the planning objective of alignment. Hence:

H4e *More strategy implementation planning predicts greater alignment.*

Methodology

This section describes the methodology used in the study. Its individual subsections elucidate the survey construction, pilot test, data collection, demographics, non-response bias testing, and common method variance testing.

Survey construction

The research used a field survey of IS executives because such managers are typically viewed as the most knowledgeable person in the organization to assess SISP (Premkumar & King, 1992).The instrument operationalized the five constructs: business change, IT change, SISP horizon and process, and alignment. With the exception of planning horizon, which simply asked the number of years, each construct used items of five-point Likert scales where higher values represented more of each. Appendix A shows all items as they appeared in the survey.

The business change construct used two items to measure the extent that subjects agreed that products, services, and their technologies become obsolete or change very quickly. The items were based on Teo & King (1997) as derived from Miller & Friesen (1980, 1982, 1983) and Sabherwal & King (1992).

The IT change construct used three items to measure the extent that subjects agreed that their organization's current IT differed from its past IT and would differ from its future IT. They had been developed and used by Benamati (1997).

The planning process construct measured the extent to which the organization conducted the five planning phases and their tasks (as in Table 1). The items were derived from Mentzas (1997) and previously used in a study of the SISP autonomy of the subsidiaries of multinational corporations (Mirchandani & Lederer, 2008).

The alignment construct measured the extent the organization fulfilled its IS alignment objectives (see Table 2). It used eight items from Segars & Grover (1998) for measuring that construct.

Pilot test

Five IS executives were invited to participate in pilot testing, and all agreed to do so. Four had the title of Chief Information Officer (CIO), and one was Director of Information Services. Their experience ranged from 17 to 38 years, and they worked for large organizations including a university medical center, a computer manufacturer, a nationwide restaurant chain, a petroleum company, and a sports information company.

Each completed the survey in the presence of the senior author in about 17 min, and after doing so, was asked to identify anything unclear or confusing. A few minor concerns about the content, length, and overall appearance of the instrument were raised. Changes from each executive were integrated into the survey before the subsequent one began filling it out. The interview with the fifth resulted in no changes.

Data collection and demographics

The distribution of the survey followed the approach conventionally recommended for mail out surveys (Dillman, 2000) and frequently applied in IS planning research using such instruments (Premkumar & King, 1994b; Segars & Grover, 1998; Gottschalk, 1999b; Basu *et al.*, 2003). A sample of IS executives was randomly selected from Applied Computer Research, Inc.'s (Phoenix, AZ) *Directory of Top Computer Executives* in the United States. The survey was mailed to 1,200 executives, 220 (or 18%) of whom returned the survey. Of these, 59 returned only demographic data, saying they had not taken part in an organization's SISP. The data analysis thus used the remaining 161 surveys, a usable response rate of 13.4%. (This rate was comparable to many other studies of IS executives and others (Bhattacherjee, 2001; Lewis *et al.*,
Q8 2003; Gattiker & Goodhue, 2005), although possibly deemed somewhat less than desired.)

Respondents worked in various industries, and were well educated and experienced. Fifteen percent of them worked in manufacturing, 12% in finance, 11% in insurance, and the remainder in other industries. Ninety-three percent had earned a 4-year college degree while 68% had completed some postgraduate school and 50% had finished an advanced degree. The respondents averaged 21 years of IS experience and 14 years with their current employer. Such education, IS experience, and current employer experience suggests that they were qualified to answer the research questions.

The most common planning horizons were 2 years (12%), 3 years (47%), and 5 years (21%) with an overall average of 3.5 years. Seventeen respondents did not provide a planning horizon. The planning scope was the entire enterprise for 81% of the subjects and a division for 16%. (Because of potential differences, only enterprise planners were used in the analysis.)

Organizations in the study averaged about 20,321 employees in total, and about 853 IS employees. Their average annual gross revenue, gross assets, and IS budgets were $4.5 billion, $56.2 billion, and $131 million, respectively. Tables 3, 4, 5, and 6 show the means and standard deviations for the business change construct and items, the IT change construct and items, the planning phases and items, and the alignment construct and items, respectively.

Nonresponse bias

Nonrespondents may answer survey questions differently than do respondents, and thus can bias survey research results. Nonresponse bias was examined using a time-trend extrapolation test (Armstrong & Overton, 1977). The test assumes that nonrespondents resemble late respondents more than they resemble early ones. With the first 25% as early respondents and the last 25% as surrogates for nonrespondents, a multivariate analysis of variance of the 34 scaled variables indicated no significant differences (Wilks' lambda = 0.45; $P = 0.56$). This finding is consistent with the absence of nonresponse bias.

Common method variance

Common method variance (i.e., variance attributable to measurement method rather than the constructs represented by the measures) is a survey research problem where individual subjects rate two or more constructs and are suspected of giving socially acceptable answers. Although the CIO is typically viewed as the most knowledgeable person in the organization to assess SISP (Premkumar & King, 1992), and most research has thus used a single subject to assess it (Raghunathan & Raghunathan, 1991; Lederer & Sethi, 1996; Segars *et al.*, 1998; Sabherwal, 1999; Gottschalk, 1999a, b, c; Kunnathur & Shi, 2001; Lee & Pai, 2003; Lin, 2006), the Q9
current study employed Harman's single-factor test to check for common method variance (Schriesheim, 1979; Podsakoff & Organ, 1986).

The test assumes that if a substantial amount of such variance exists in the data, a single factor will emerge from an exploratory factor analysis of all the variables and will account for most of the variance. However, the analysis in the current study identified 10 factors with an

Table 3 Business change and items

	Item	Mean	SD
Business change (BC)		3.32	1.07
Products and services in our industry become obsolete very quickly	BC1	3.05	1.24
The product/services technologies in our industry change very quickly	BC2	3.60	1.08

Table 4 Information technology change and items

	Item	Mean	SD
Information technology change (TC)		4.27	0.65
IT is rapidly changing in our organization	TC1	3.95	0.94
Our organization's IT today differs from its IT 3 years ago	TC2	4.40	0.81
Our organization's IT 3 years from now will differ from its IT today	TC2	4.45	0.71

Table 5 Strategic information systems planning phases and items

Variable	*Item*	*Mean*	*SD*
Strategic awareness (SAwa)		3.86	0.74
Determining key planning issues	SAwa1	3.91	0.88
Defining planning objectives	SAwa2	3.86	0.83
Organizing the planning team(s)	SAwa3	3.80	0.90
Obtaining top management commitment	SAwa4	3.84	0.98
Situation analysis (SitA)		3.59	0.77
Analyzing current business systems	SitA1	3.75	0.93
Analyzing current organizational systems	SitA2	3.52	1.06
Analyzing current information systems	SitA3	3.79	0.88
Analyzing the current external business environment	SitA4	3.35	0.99
Analyzing the current external IT environment	SitA5	3.52	1.04
Strategy conception (SCon)		3.91	0.71
Identifying major IT objectives	SCon1	4.08	0.78
Identifying opportunities for improvement	SCon2	3.95	0.78
Evaluating opportunities for improvement	SCon3	3.64	0.83
Identifying high-level IT strategies	SCon4	3.99	0.88
Strategy formulation (SFor)		3.77	0.67
Identifying new business processes	SFor1	3.46	0.88
Identifying new IT architectures	SFor2	3.77	0.94
Identifying specific new projects	SFor3	4.02	0.82
Identifying priorities for new projects	SFor4	3.83	0.97
Strategy implementation planning (SImp)		3.37	0.78
Defining change management approach	SImp1	3.30	1.01
Defining action plan	SImp2	3.68	0.87
Evaluating action plan	SImp3	3.35	0.89
Defining follow-up and control procedures	SImp4	3.16	0.95

Table 6 Alignment and items

	Item	*Mean*	*SD*
Alignment (Al)		3.75	0.54
Understanding the strategic priorities of top management	Al1	3.99	0.80
Aligning information systems strategies with the strategic plan of the organization	Al2	3.83	0.78
Adapting the goals/objectives of information systems to changing goals/objectives of the organization	Al3	3.87	0.83
Maintaining a mutual understanding with top management on the role of information systems in supporting strategy	Al4	3.72	0.81
Identifying IT-related opportunities to support the strategic direction of the firm	Al5	3.80	0.77
Educating top management on the importance of IT	Al6	3.61	0.84
Adapting technology to strategic change	Al7	3.71	0.73
Assessing the strategic importance of emerging technologies	Al8	3.49	0.82

eigenvalue greater than one, with no single factor explaining most of the variance (i.e., they ranged from 3.06 to 30.38%). These results are consistent with the absence of common method variance. (Nevertheless, socially desirable answers remain a possibility, and other managers might have more detailed knowledge about the constructs. The use of multiple respondents per organization is, of course, always preferable.)

A second test for common method variance was conducted using a marker variable (Lindell & Whitney, 2001; Podsakoff *et al.*, 2003; Malhotra *et al.*, 2006). A marker variable is assumed to have no relationship with one or more variables in the study. Common method variance can thus be assessed based on the correlation between the marker variable and a study variable theoretically unrelated to it. If a marker variable was not designated before the research was conducted (as in the current study), then it can be estimated in a *post hoc* fashion using 'the smallest correlation among the manifest variables' (Lindell & Whitney, 2001, p. 115) or Q10

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the second-smallest as a more conservative estimate (Lindell & Whitney, 2001). The current study used Malhotra *et al.*'s (2006) equations for adjusting the correlations (thus to 'partial out' the common method variance) and for testing the statistical significance for H1, H2, H3, and H4. The resulting, adjusted correlations that had been significant prior to the adjustment remained significant while the previously nonsignificant did not become significant. These findings are also consistent with the absence of common method variance.

Statistical analysis

After an overview of the statistical analysis, this section describes the validation of the measurement model and the hypothesis testing.

Overview of statistical analysis

PLS Graph version 3.0, a SEM tool that takes a component-based approach to estimation, was used for both the validation of the measurement model and Q11 for testing the hypotheses (Chin, 2001). PLS employs a least-squares estimation procedure that places minimal demands on measurement scales, distributional assumptions, and sample size (Fornell & Bookstein, 1982; Wold, 1982; Falk *et al.*, 1992; Chin, 1998). (A strong rule of thumb, for example, suggests sample size be 10 times the largest number of structural paths directed at a particular construct in the structural model.) Such covariance-based SEM tools as LISREL and EQS, in contrast, use a maximum likelihood function to obtain parameter estimates, and they make greater demands on the scales, assumptions, and sample. In addition, statistical significance with PLS can be assessed using a bootstrap re-sampling procedure. The current study applied such a procedure with 500 re-samples, and it also used the PLS default for computing missing values as described by Tenenhaus *et al.* (2005).

Validation of the measurement model

The psychometric properties of the measurement model were assessed to examine internal consistency reliability (ICR), convergent validity, and discriminant validity (Chin, 1998). ICR values, also known as composite reliabilities, resemble Cronbach's alpha. Values of 0.70 or higher are considered adequate (Fornell & Larcker, 1981).

Convergent and discriminant validity were assessed via two criteria. First, the square root of the average variance extracted (AVE) by a construct from its indicators should be at least 0.707 (i.e., AVE $>$ 0.50) and should exceed that construct's correlation with other constructs (Fornell & Larcker, 1981). Second, standardized item loadings should generally be at least 0.707, and items should load more highly on their own constructs than on others (Carmines & Zeller, 1979).

After dropping two alignment items (Al6: Educating top management on the importance of IT, and Al8: Assessing the strategic importance of emerging technologies) because their factor loadings of 0.56 and 0.55, respectively, fell below the recommended 0.707 (Carmines & Zeller, 1979; Compeau *et al.*, 1999; Agarwal & Karahanna, 2000), the remaining loadings generally exceeded that minimum and all exceeded their cross loadings. (Appendix B shows the final factor loadings and cross loadings.) All ICR values exceeded 0.70. Each correlation between latent constructs was less than the square root of its AVE. (Appendix C shows the reliabilities, the correlations, and AVE square roots.) Thus the analysis supported the reliability, and the convergent and discriminant validity of the constructs.

Hypothesis testing

Business change and IT change were the independent variables predicting planning horizon which in turn predicted the SISP process. Alignment was the final dependent variable. To test H3 and H4, the planning process was a second-order factor comprising its five phases whereas to test H3a–e and H4a–e, the five phases served as first-order constructs. Table 7 and Figure 2 show the results of the testing of H1, H2, H3, and H4. Table 8 and Figure 3 include H1 and H2 for completeness, and show the results of H3a–e and H4a–e.

Discussion

The impact of rapid business change on planning horizon

Contrary to expectations, more rapid business change actually predicted longer planning horizons (H1, $P<0.05$). This finding is *not* consistent with the expectation that rapid business change creates uncertainty and complexity, leaving the organization more vulnerable to outside influences, and hence making managers more cautious and more inclined to use shorter planning

Table 7 Path coefficients and *T*-statistics

Construct	*Path*	*T*
H1: Business change predicts horizon	0.22	2.13*
H2: IT change predicts horizon	−0.09	0.63
H3: Horizon predicts strategic information systems planning (2nd order)	0.30	3.16*
H4: Strategic information systems planning (2nd order) predicts alignment	0.63	11.23***

*$P<0.05$, ***$P<0.001$; $R^2=0.37$.

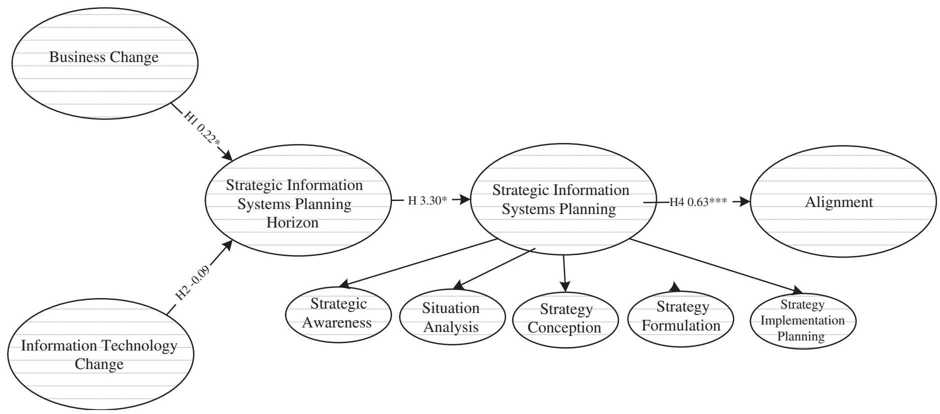

Figure 2

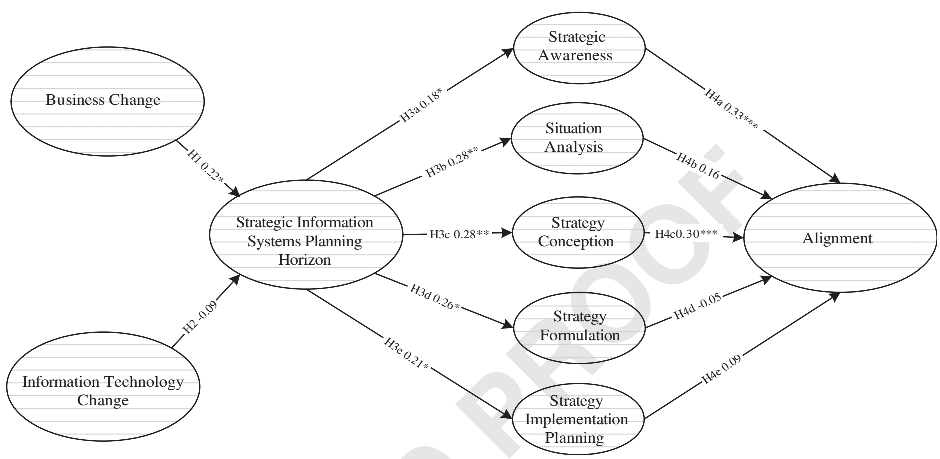

Figure 3

Table 8 Path coefficients and *T*-statistics

Construct	*Path*	*T*
H1: Business change predicts horizon	0.22	2.06*
H2: IT change predicts horizon	−0.09	0.63
H3a: Horizon predicts strategic awareness	0.18	2.01*
H3b: Horizon predicts situation analysis	0.28	2.88**
H3c: Horizon predicts strategy conception	0.28	2.96**
H3d: Horizon predicts strategy formulation	0.26	2.43*
H3e: Horizon predicts strategy implementation planning	0.21	2.26*
H4a: Strategic awareness predicts alignment	0.33	3.35***
H4b: Situation analysis predicts alignment	0.16	1.65
H4c: Strategy conception predicts alignment	0.30	3.41***
H4d: Strategy formulation predicts alignment	−0.05	0.44
H4e: Strategy implementation planning predicts alignment	0.09	0.90

*$P<0.05$, **$P<0.01$, ***$P<0.001$.

horizons. Perhaps rapid business change still does create the uncertainty and complexity leaving their organizations more vulnerable, but managers express their caution by delaying the implementation of new IS through longer planning horizons. In other words, managers express their caution by implementing fewer needed systems in their nearer futures. This explanation of H1 results coincides with the notion that during rapid

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business change, IS budgets and staff sizes might grow less rapidly if at all due to the stretched planning horizons.

Whereas one might expect managers to act more quickly and more flexibly with regard to new IS during rapid business change (and managers should perhaps behave in such a manner), instead they appear to act more slowly. Although the data do not support it, we speculate that probably their discomfort with IS decisions is especially prevalent during such business change.

The impact of rapid IT change on planning horizon

More rapid IT change failed to predict shorter planning horizons (H2). This finding was inconsistent with the expectation that rapid IT change creates considerable uncertainty and complexity, leaving the organization more vulnerable, more cautious, and more inclined to implement new IT quickly and flexibly via shorter planning horizons. Although the data do not support it, we speculate that perhaps that chain of reasoning failed because managers do not generally express their caution with quicker moves using a shorter horizon (nor with slower such moves as they do with business change), but instead mix their reactions to IT change more in relationship to the particular technology or vendor, or to some other moderating variable.

The impact of planning horizon on SISP

A longer planning horizon predicted more SISP, both for the second-order construct (H3) and for each of the specific planning phases (H3a–e). This finding is strong support for the expectation that a longer planning horizon demands that planners do more planning to produce a plan that accounts for the alternative scenarios and additional, possible changes during that longer horizon.

Perhaps most interesting is that the effect was stronger for the situation analysis (H3b) and strategy conception (H3c) phases than for the strategic awareness (H3a), strategy formulation (H3d), and strategy implementation planning (H3e) phases (with $P<0.01$ for the former two *vs* $P<0.05$ for the latter three). Perhaps situation analysis (with its analyzing current business systems, organizational systems, IS, the external business environment, and the external IT environment) takes advantage of the longer planning horizon by receiving more attention than its predecessor of strategic awareness because the analysis serves as a foundation for the more important strategy conception phase that ensues.

Perhaps strategy conception (with its identifying major IT objectives and opportunities for improvement, evaluating opportunities for improvement, and identifying high-level IT strategies) takes advantage of the longer planning horizon by receiving more attention than the selection of the strategy in the next phase because it serves as the foundation for that strategy selection. The actual choice of the strategy may have been implicitly decided in the strategy conception phase by the manner in which the planners presented the new strategy alternatives.

The impact of SISP on alignment

SISP predicted alignment for the second-order construct (H4) as well as for the strategic awareness (H4a) and strategy conception (H4c) phases (all at $P<0.001$), but not for the situation analysis (H4b), strategy formulation (H4d), and strategy implementation planning (H4e) phases. The strong support for the two phases perhaps suggests the enduring effect of wisely beginning the planning efforts (strategic awareness in H4a) and the favorable effect of cleverly envisioning the alternatives (strategy conception in H4c).

The situation analysis (H4b) tasks (i.e., the study of current business systems, organizational systems, and IS, as well as the current external business and IT environments) seem quite appropriate targets of investigation in SISP. However, alignment is the linkage between business strategy and IS strategy, and perhaps because the phase does not sufficiently study the current business strategy itself, it does not predict the linkage of that strategy with IS strategy.

Strategy formulation (H4d) tasks (i.e., identifying new business processes, new IT architectures, specific new projects, and priorities for new projects) are, in effect, the choosing of the new IS strategy and thus the prioritization of the new projects from the previous phase. It is perhaps ironic that strategy conception (the thinking up of alternative strategies) does predict alignment whereas the actual prioritization does not. Perhaps the strategy formulation phase does not predict alignment because any of the conceived new projects would equally align (or not align) with business strategy, and the prioritization does not matter from the alignment perspective.

Failures at strategy implementation are common (Earl, 1993; Ward & Griffiths, 1996), and have perhaps attracted more attention than any other SISP problem (Gottschalk, 1999a, b, c). The failure to implement the systems in the strategic plan often leaves firms quite dissatisfied with their planning efforts (Galliers, 1994; Premkumar & King, 1994b). The failure of the strategy implementation planning phase to predict strategic alignment (H4e) is thus especially interesting. Strategy implementation was operationalized in this study via such tasks as defining the change management approach, defining and evaluating the action plan for implementing, and defining follow-up and control procedures for ensuring implementation. Perhaps the failure takes place because those particular tasks are insufficient to enable implementation. For example, perhaps the change management approach does not address the key reasons for resistance to the new systems, or perhaps the action plan does not specify the most appropriate implementation actions.

Implications for future research

The current study found that business change predicted the formulation of IT strategies with longer planning horizons, but that IT change predicted neither shorter nor longer ones (perhaps, as we speculated above,

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because managers are more risk averse with business change than IT change). It further found that planning horizon predicted SISP itself (and all of its phases), and that planning (as a second-order construct but also only in strategic awareness and strategy conception phases) predicted the alignment of business strategy and IS strategy. Support for the impact of horizon on planning was consistent with the conceptualization of time as a resource for accomplishing tasks. Support for the impact of planning on alignment was consistent with the expectation that knowledge could provide greater ability to understand competitors and stakeholders, and thus greater ability to develop plans that are less vulnerable to competitive moves and have greater likelihood of implementation.

We speculated about reasons for the failure to find the expected effects of change on planning horizon and those of situation analysis, strategy formulation, and strategy implementation planning on alignment. However, future researchers should test those speculations and perhaps other explanations for the failure to find that support. That is, future researchers should compare IS planners' new IT risk averseness (for H2) to their risk averseness for otherwise dealing with business change. Researchers should assess the extent of the study of the current business strategy (H4b), whether high and low priority new projects equally align (H4d), and whether change management misses the key reasons for resistance and the action plan fails to specify the most appropriate actions (H4e).

The current study used constructs of multiple-scaled items. Perhaps a closer examination of the constructs would explain such failure to find support. Perhaps qualitative case research, where investigators can ask more detailed and probing questions about the constructs, would help.

Although the CIO is typically viewed as the most knowledgeable person in the organization to assess SISP (Premkumar & King, 1992), future research might seek the business perspective. Future researchers might thus survey CEOs or other high-ranking executives, and use their data alone or in conjunction with data from CIOs.

The current study defined change in IT as the differences over time in commercially available software and hardware. Change in IT can also include changes in IT processes, staff, or organizational structure. Future research might consider such changes.

Great interest has recently emerged concerning the impact of individual differences in the conceptualization of time (Das, 1991; Mosakowski & Earley, 2000). Some planners might be inherently long-term oriented and others might be short-term oriented. The current research did not include hypotheses with individual differences within its scope, and thus did not measure any psychological dimensions of the planners. However, future research might control for such differences or investigate their moderating effects on the creation of SISP horizons.

This research primarily used medium to large rather than small companies in a variety of industries to investigate the relationships among the constructs. That is, it collected data from only six organizations with 10 or fewer IS employees. Thus, like the multitude of mail-out SISP surveys of medium to large companies across industries (Raghunathan & Raghunathan, 1991; Sabherwal & King, 1992; Premkumar & King, 1994a; Chan *et al.*, 1997; Teo & King, 1997; Lederer & Sethi, 1988; Q12 Segars & Grover, 1998; Sabherwal, 1999; Teo & Ang, 1999; Gottschalk, 1999b; Tallon *et al.*,2000; Basu *et al.*, 2003; Kearns & Lederer, 2003; Mirchandani & Lederer, 2008), its findings are generalizable only to similar samples. Future research should validate its finding with such samples, but also investigate the relationships separately by gathering data specifically from small companies. Perhaps change affects smaller companies differently than larger ones.

An assumption underlying this study was that IS managers across the sample were equally aware of changes in business direction in dynamic environments. In some organizations, however, top executives might share their plans more readily with their IS managers. Future research might thus measure such IS management awareness, and use it as a control variable on alignment.

The current study used a meticulously validated and popular instrument for measuring alignment. However, a more recent instrument for measuring alignment maturity might serve as an alterative dependent variable (Luftman, 2000). The instrument incorporates nearly 200 items including those for IT governance, demonstrating the value of IT, and IT skills. It also draws input from multiple IT and business executives from an individual organization to ensure a broader perspective (thus addressing a limitation discussed below).

The study examined planning in firms from a variety of industries. Future researchers might explore specific industries. SISP in companies from the more information-intensive finance industry, for example, might differ from such planning in the less information-intensive manufacturing sector. The current study had only 19 subjects in the former industry and 24 in the latter, and structural equation modeling sample size requirements prevent separate analyses for each, but future researchers might collect larger samples from individual industries. In the current study, the finance and manufacturing industry item means differed on only two of the final 33 study items (i.e., one alignment and one planning task). Nevertheless, perhaps industry differences in the hypotheses might exist.

Finally, the current study defined planning horizon as the time period from the commencement of the execution of a plan until the conclusion of that execution under the assumption that planners could identify a single, organization-accepted horizon for their SISP study. However, plans are updated during their execution, and horizons do change. Future research should investigate SISP horizons by taking into account such horizon change.

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Implications for practice

The current study hypothesized that IS planners react to rapid business and IT change by creating IT strategies with shorter planning horizons. Instead, it found exactly the opposite for business change and no effect for IT change. Therefore, if planners believe that they *should* respond to rapid business and IT change with shorter horizons, this study suggests they look more closely at how they do actually respond and attempt to modify their behavior as best they can.

The current study suggested that business change may make managers cautious by inspiring them to set longer IS planning horizons (H1), but that IT change does not inspire such circumspection (H2). This interpretation implies that individual managers may want to assess their own degree of caution in response to business and IT change, and ensure that it is consistent with their intentions and desires. Individuals have, after all, their own conceptualization of time in setting planning horizons (Das, 1991; Mosakowski & Earley, 2000). Individual managers may thus want to assess if their interpretation of time is appropriately or excessively action *vs* clock, objective *vs* social, cyclic *vs* novel, or short- *vs* long-term, and whether that interpretation facilitates the achievement of objectives and whether the interpretation should be modified to better do so.

Some managers may thus feel that they should continue to respond to business change more cautiously with longer planning horizons. Some may feel they should respond to IT change more so with longer ones too. On the other hand, other managers might feel they should respond more quickly to both business and IT change to capitalize on the change before their competitors can do so.

Support for the impact of horizon on planning was consistent with the conceptualization of time as a resource for accomplishing tasks (H3). Perhaps this finding can reinforce managers the opportunity to use a planning horizon as a resource for attaining objectives by making better thought-out planning decisions (Das, 1991).

Support for the impact of strategic awareness (H4a) and strategy conception (H4c) on alignment reassures managers of the significance of those two phases. The failure to find the expected effects of situation analysis (H4b), strategy formulation (H4d), and strategy implementation planning (H4e) on alignment may suggest to managers that they rethink the tasks in those phases. Situation analysis may fail to devote the appropriate effort to the study of the current business strategy itself (i.e., the first task in situation analysis as seen in Table 1), and hence planners might want to re-evaluate how they study that strategy. Strategy formulation may simply endorse strategy conception, and hence planners might want to more critically evaluate their strategy when finally choosing it and rejecting alternatives.

The failure of strategy implementation planning to predict alignment is perhaps especially worrisome not only because it implies a lack of understanding of the most critical tasks for the phase, but also because implementation failure can be viewed as having caused the entire planning effort to be for naught. Hence, planners might want to more carefully consider how they define their change management approach and action plan, evaluate the action plan, and define their follow-up and control procedure (the strategy implementation planning tasks in Table 1) to assure implementation success.

Conclusion

Time has been referred to as the hidden factor in strategic planning, omnipresent but inadequately considered in research (Ewing, 1972; Das, 1991; Mosakowski & Earley, 2000). Time is also significant in SISP, and this paper operationalizes it as the objective variable of planning horizon. Q13

Changes in IT and in the business environment are also key factors in planning and especially in SISP (Benamati & Lederer, 2000; Salmela & Spil, 2002), but research about them has been sparse too. The current paper recognizes the significance of such change in SISP.

Change and time are fundamental to SISP and alignment is a key measure of planning effectiveness. The research showed that greater business change predicts longer planning horizons while greater IT change does not. Its further findings were consistent with expectations that longer planning horizons result in more planning (for all phases of planning), and more planning (but only for strategic awareness and strategy conception) results in a greater alignment. It thus demonstrates differential results depending on specific planning activities, and reinforces the notion that planning is a complex, multi-activity function.

It contributes to future research by encouraging investigators to discover an explanation for the lack of impact of IT change on planning horizon and to discover one for the lack of effect of situation analysis, strategy formulation, and strategy implementation planning on alignment.

Finally, it contributes to the practice of IS planning by encouraging planners to develop a greater awareness of how they react to IT change and business change, and to how their planning horizons affect planning itself and alignment, the ultimate goal of that planning.

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Appendix A: Relevant items from the instrument

Business change

Please mark the number to indicate the extent to which you agree or disagree with the following statements about environmental uncertainty in the organization's industry:

	Disagree			*Agree*	
Products and services in our industry become obsolete very quickly	1	2	3	4	5
The product/services technologies in our industry change very quickly	1	2	3	4	5

Information technology change

Please mark the number to indicate the extent to which you agree or disagree with the following statements about IT change in the organization:

	Disagree			*Agree*	
IT is rapidly changing in our organization	1	2	3	4	5
Our organization's IT today differs from its IT three years ago	1	2	3	4	5
Our organization's IT three years from now will differ from its IT today	1	2	3	4	5

Strategic IS planning horizon

Please identify the organization's SISP planning horizon. ___Years ___None specified

Strategic IS planning process

Please mark the number to indicate the extent to which the organization conducted each of the following five phases and their related tasks during its SISP efforts:

	No extent		*Great extent*		
1 *Planning the IS planning process*	1	2	3	4	5
Determining key planning issues	1	2	3	4	5
Defining planning objectives	1	2	3	4	5
Organizing the planning team(s)	1	2	3	4	5
Obtaining top management commitment	1	2	3	4	5
2 *Analyzing the current environment*	1	2	3	4	5
Analyzing current business systems	1	2	3	4	5
Analyzing current organizational systems	1	2	3	4	5
Analyzing current information systems	1	2	3	4	5
Analyzing the current external business environment	1	2	3	4	5
Analyzing the current external IT environment	1	2	3	4	5
3 *Conceiving strategy alternatives*	1	2	3	4	5
Identifying major IT objectives	1	2	3	4	5
Identifying opportunities for improvement	1	2	3	4	5
Evaluating opportunities for improvement	1	2	3	4	5
Identifying high-level IT strategies	1	2	3	4	5

Continued

	No extent			*Great extent*	
4 *Selecting strategy*	1	2	3	4	5
Identifying new business processes	1	2	3	4	5
Identifying new IT architectures	1	2	3	4	5
Identifying specific new projects	1	2	3	4	5
Identifying priorities for new projects	1	2	3	4	5
5 *Planning the strategy implementation*	1	2	3	4	5
Defining change management approach	1	2	3	4	5
Defining action plan	1	2	3	4	5
Evaluating action plan	1	2	3	4	5
Defining follow-up and control procedures	1	2	3	4	5

Alignment

Please mark the number to indicate the extent to which the organization fulfilled each of the following objectives of alignment from its SISP efforts:

	Entirely unfulfilled		*Entirely fulfilled*		
Understanding the strategic priorities of top management	1	2	3	4	5
Aligning IS strategies with the strategic plan of the organization	1	2	3	4	5
Adapting the goals/objectives of IS to changing goals/objectives of the organization	1	2	3	4	5
Maintaining a mutual understanding with top management on the role of IS in supporting strategy	1	2	3	4	5
Identifying IT-related opportunities to support the strategic direction of the firm	1	2	3	4	5
Educating top management on the importance of IT	1	2	3	4	5
Adapting technology to strategic change	1	2	3	4	5
Assessing the strategic importance of emerging technologies	1	2	3	4	5

Appendix B

See Table B1.

Table B1 Factor loadings

Items	*Factors*								
	BC	*TC*	*Hor*	*SAwa*	*SitA*	*SCon*	*SFor*	*SImp*	*Al*
BC1	**0.991**	0.198	−0.045	0.185	0.079	0.053	0.015	0.243	0.121
BC2	**0.801**	0.261	−0.006	0.127	0.019	0.017	−0.010	0.188	0.055
TC1	0.190	**0.783**	−0.053	0.136	0.076	0.137	0.131	0.114	−0.032
TC2	0.100	**0.779**	−0.010	0.070	0.152	0.164	0.225	0.148	0.030
TC3	0.206	**0.815**	0.077	0.036	0.073	0.147	0.148	0.145	0.007
Hor	0.147	−0.062	**1.000**	0.181	0.230	0.240	0.156	0.070	0.179
SAwa1	0.164	0.167	0.048	**0.849**	0.420	0.451	0.411	0.235	0.439
SAwa2	0.108	0.084	0.104	**0.867**	0.447	0.503	0.422	0.362	0.478
SAwa3	0.176	0.125	0.054	**0.833**	0.448	0.533	0.500	0.361	0.520
SAwa4	0.315	0.179	0.027	**0.748**	0.445	0.425	0.405	0.400	0.520
SitA1	0.215	0.146	0.049	0.387	**0.842**	0.362	0.411	0.371	0.351
SitA2	0.237	0.210	0.046	0.408	**0.790**	0.465	0.455	0.443	0.418
SitA3	0.152	0.176	0.079	0.414	**0.790**	0.369	0.425	0.281	0.328
SitA4	0.121	0.187	0.009	0.466	**0.761**	0.461	0.428	0.260	0.434
SitA5	0.097	0.237	−0.031	0.446	**0.775**	0.451	0.473	0.287	0.447

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Table B1 Continued

Items	*Factors*								
	BC	*TC*	*Hor*	*SAwa*	*SitA*	*SCon*	*SFor*	*SImp*	*AI*
Scon1	0.160	0.237	0.138	0.610	0.451	**0.843**	0.552	0.412	0.563
Scon2	0.221	0.324	0.155	0.449	0.487	**0.860**	0.516	0.390	0.416
Scon3	0.244	0.274	0.095	0.449	0.457	**0.869**	0.586	0.473	0.506
Scon4	0.148	0.262	0.180	0.504	0.453	**0.884**	0.579	0.423	0.527
Sfor1	0.197	0.307	0.098	0.370	0.462	0.548	**0.670**	0.404	0.387
Sfor2	0.150	0.203	0.191	0.404	0.486	0.534	**0.728**	0.394	0.289
Sfor3	0.027	0.098	0.249	0.413	0.369	0.448	**0.802**	0.408	0.329
Sfor4	−0.010	0.179	0.206	0.388	0.323	0.386	**0.778**	0.497	0.358
Simp1	0.302	0.272	−0.113	0.275	0.338	0.325	0.339	**0.714**	0.242
Simp2	0.159	0.130	0.094	0.340	0.370	0.458	0.500	**0.879**	0.363
Simp3	0.237	0.170	0.126	0.370	0.368	0.456	0.543	**0.890**	0.402
Simp4	0.276	0.204	0.048	0.403	0.333	0.405	0.502	**0.871**	0.345
AI1	0.186	0.087	0.012	0.475	0.395	0.427	0.295	0.221	**0.697**
AI2	0.164	0.006	0.076	0.440	0.305	0.404	0.409	0.335	**0.789**
AI3	0.243	0.243	0.079	0.378	0.343	0.414	0.334	0.348	**0.789**
AI4	0.162	0.140	−0.073	0.453	0.358	0.477	0.342	0.358	**0.738**
AI5	0.042	0.107	0.134	0.399	0.431	0.403	0.318	0.215	**0.693**
AI7	0.183	−0.012	0.079	0.440	0.344	0.413	0.280	0.288	**0.650**

Appendix C

See Table C1.

Table C1 Reliabilities and convergent and discriminant validities[a]

Factor	*Correlations and AVE square roots*									
	ICR	*BC*	*TC*	*Hor*	*SAwa*	*SitA*	*SCon*	*SFor*	*SImp*	*AI*
BC	0.90	**0.90**								
TC	0.84	0.21	**0.79**							
Hor	1.00	0.20	−0.05	**1.00**						
SAwa	0.90	0.19	0.11	0.18	**0.83**					
SitA	0.89	0.07	0.12	0.28	0.53	**0.79**				
SCon	0.92	0.06	0.19	0.27	0.58	0.53	**0.86**			
SFor	0.83	0.02	0.21	0.25	0.53	0.55	0.65	**0.75**		
SImp	0.91	0.25	0.17	0.18	0.41	0.42	0.49	0.57	**0.84**	
AI	0.87	0.12	0.00	0.24	0.59	0.50	0.58	0.46	0.41	**0.76**

[a]Internal consistency reliabilities (in ICR column), average variance extracted square roots (on diagonal), and correlations (below diagonal).

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