Introduction

For nearly 30 years, the number one problem noted by senior IT executives has been the difficulty of aligning an organization’s information technology capabilities with the needs of the business (Chan and Reich 2007). Despite significant attention and resources, a recent survey of senior executives “found that despite devoting enormous resources and energy trying to align IT investments with their most important business needs, fewer than one in five believed that their efforts were succeeding” (Luftman and Derksen 2012, p. 210). Not surprisingly, then, IT alignment has been an issue of paramount importance to IS researchers since the inception of the field. In the past ten years, alone, IT and business alignment has been the #1 issue for IS executives six times, the #2 issue three times, and the #3 issue once (Luftman and Ben-Zvi 2011; Luftman and Derksen 2012). Further, “the practitioner community has referred to IS alignment as the “Holy Grail of IT” (Jahnke, 2003), reflecting the commonly-held belief that alignment of business and IS will result in better organizational performance” (Vessey and Ward 2013, p. 284).

Despite the volume of research already conducted into IT alignment, Chan and Reich (2007, p. 311) point out that “current alignment research is largely atheoretic” (p. 311), “the process view of alignment has been underrepresented … [and we still cannot explain] the essential difficulty in trying to match a relatively fixed set of IT assets to a fast-moving business strategy” (p. 310). We therefore seek to establish a fundamental theoretical foundation for alignment that describes how and why an organization’s IT responds to business needs as the organization changes over time; that is, we focus on operational rather than strategic alignment. To do so, we respond to Chan and Reich’s (2007, p. 311) call for “greater use of more established theories” in alignment research by proposing to study alignment in the context of three well-supported, overarching theories that have dominated organizational-level research over the past decade to provide perspectives for viewing alignment - institutional theory (Zucker 1987), punctuated equilibrium theory (Gersick 1991), and complexity theory (Benbya and McKelvey 2006). Although promising, these three theories provide inconsistent explanations of alignment and their relative performance and potential for complementarity has never been examined, either in IS research or in the broader social sciences. Resolving the tensions among these theories and identifying their potential synergy and relative explanatory performance would dramatically advance the field, offering clear direction for future work. Further, note that using an overarching theory to explain alignment leaves the way open for using compatible lower-level theories to explain aspects of alignment at more detailed levels of analysis. Our research question is: How do institutional, punctuated equilibrium, and complexity theory individually, or in combination, explain the process of business-IT alignment?

We propose studying alignment by conducting both retrospective and longitudinal case studies (Leonard-Barton 1990) in the positivist tradition (Eisenhardt 1989; Yin 1994). Our study will therefore foreground both the context and the process through which alignment is achieved, thereby responding to Henderson and Venkatraman’s (1993) call to study alignment as a dynamic process. At the same time, we plan to use the findings of our initial, exploratory case studies to conduct computer-based simulations of the alignment process. Simulations can often enable researchers to develop richer and more descriptively powerful theories (Davis, Eisenhardt, and Bingham 2007), as well as identifying issues for further examination. For an IS application of this approach, see Nan (2011). Findings from the longitudinal study and the simulations will, in turn, feed into a set of confirmatory case studies.

Our research seeks to make several contributions. First, our focus on business-IT alignment over time addresses one of the most vexing issues in IS: sustaining IT alignment. Second, our study hopes to contribute to research, in general, by providing the first concerted test of institutional theory, punctuated equilibrium theory, and complexity theory in a single context. Third, our research will provide insights into how to achieve alignment in practice. Fourth, improved IT alignment processes is important because alignment is a key driver of performance (Bergeron et al. 2004; Cragg et al. 2002), and our work will develop a better understanding of how the alignment-performance link evolves over time.

The paper proceeds as follows. The next section presents the major tenets of the three theories we use as explanators for business-IT alignment, and justifies their use in this context. In the following section, we examine the efficacy of each of our three theories in explaining IT alignment by focusing on how change takes place over time. We then present our research methods. Finally, we conclude with a discussion of the study we propose conducting and some expected contributions of our research.
Theoretical Background

We now introduce, in turn, the three theories that we examine as potential explanatory theories for IT alignment: institutional theory, punctuated equilibrium theory, and complexity theory.

Institutional theory explains how organizations maintain their existence and form due to their position in a web of taken-for-granted beliefs, values, and norms (Zucker 1987). From an institutional perspective, alignment occurs because the decisions made by the IT organization, and the organization as a whole, are driven by actors' tendency to seek legitimacy. For example, researchers have used institutional theory to explain how users misappropriate information systems in line with corporate norms (Berente et al. 2008) and how organizations adopt new systems to align with external market norms (Gosain 2004).

Punctuated equilibrium theory explains how organizations maintain their existence and form in the face of accumulating pressures until a crisis is reached after which the organization changes to a new order (Gersick 1991). From a punctuated equilibrium perspective, alignment occurs because a crisis leads an organization to make transformative decisions about IT and the business. The decisions made determine the degree of alignment for the next period of equilibrium until a new crisis point is reached and new decisions are made. For example, researchers have used punctuated equilibrium theory to explain how organizations discontinue old systems (Furneaux and Wade 2011) and install new ones (Silva and Hirschheim 2007) after a period of accumulating pressures in the environment (Sabherwal et al. 2001).

Complexity theory explains how organizations co-evolve with their environment (Anderson 1999). From a complexity theory perspective, alignment occurs because organizational actors—both IT personnel and users—adapt systems to meet the needs of their tasks and local contingencies. Co-evolution of business and IT emerges from the self-organizing behavior of these actors. Information systems researchers have drawn on such dynamics to explain how new ways of reusing IT assets emerge over time (Cecez-Kecmanovic and Kay 2001; Nan 2011) and how organizations and IT capabilities co-evolve (Benbya and McKelvey 2006; Vessey and Ward in press).

Theoretical Perspectives for Evaluating IT Alignment

Consistent with recent calls for research (Baker et al. 2011; Wagner and Weitzel 2012), we view alignment in terms of its enactment (i.e., operational/structural alignment) (Sabherwal et al. 2001). Table 1 shows the key phenomena we will study in our research. We address constructs that are common to all three theories and others that distinguish among them.

Common Constructs

Table 1 shows that alignment and performance are constructs that are relevant for all three theories because the basic assumption of IT alignment research is that alignment improves performance (Henderson and Venkatraman 1993). We view performance as an outcome and an “input to organizational processes” (Langley and Abdallah 2011 p. 211), in its role as performance feedback. We view both constructs objectively (as they are) and subjectively (as actors perceive them).

Distinguishing Constructs

Table 1 also shows the key factors that distinguish the three theories. Past research has not distinguished among these theories. Table 1 demonstrates, however, that these theories can be distinguished in terms of their differing views on temporal character, rationale, and use of resources.

Temporal Character of Stability and Change

Each theory has a different perspective on change over time. Maintenance of order is assumed in all three theories. It is the defining characteristic of institutional theory but punctuated equilibrium theory and
complexity theory also assume it. Order is maintained through the organization’s so-called “deep structure,” that is, the stable set of core “beliefs and values..., services and technology” (Silva and Hirschheim 2007 p. 331) and basic “rules... and ... logic” (Chiles et al. 2004, p. 502) that underlies both the organization and its information systems (Wand and Weber 1995).

### Table 1. Primary Phenomena Examined in our Research

<table>
<thead>
<tr>
<th>Key Variables and Processes</th>
<th>Relevance of Phenomena to Candidate Theories</th>
<th>References for Justification and Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Institutional Theory</td>
<td>Punctuated Equilibrium Theory</td>
</tr>
<tr>
<td>Constructs common to each theory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business-IT alignment</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Performance</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Constructs that distinguish the theories: Temporal character of stability and change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Maintenance of order (deep structure) over time</td>
<td>(coexists with ‘3’, not ‘2’)</td>
<td>(cannot coexist with ‘2’)</td>
</tr>
<tr>
<td>2. Discontinuous change from one order (deep structure) to another</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3. Continuous change over time</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Constructs that distinguish the theories: Rationale for stability and change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Actors’ bounded rationality</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Constructs that distinguish the theories: Use of resources after change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Recombination and reuse of resources</td>
<td>? (not specified in extant research)</td>
<td>? (not specified in extant research)</td>
</tr>
</tbody>
</table>
Discontinuous change is also assumed in all three theories. Institutional theory assumes that order will be maintained as long as the deep structure remains in line with institutional norms (Zucker 1987), but if norms change, actors may quickly conform, creating discontinuous change (Seo and Creed 2002). In complexity theory, deep structure also resists change and, in fact, “remains intact during major transformations” rather than changing (Chiles et al. 2004, p. 502). Finally, in punctuated equilibrium theory, deep structure is proposed to resist change up to the point of a crisis, after which a transformation serves to move an organization from one form of deep structure to another (Gersick 1991 p. 26).

Continuous change is assumed in institutional theory and complexity theory. In institutional theory, continuous superficial changes are an important means of maintaining order, as they serve to reproduce the status quo (Zucker 1987). Continuous change can be more material in complexity theory because the system is assumed to be in a constant state of flux (Chiles et al. 2004). Finally, punctuated equilibrium assumes that systems only change discontinuously; order is maintained as long as possible until a crisis occurs (Romanelli and Tushman 1994).

As Table 1 shows, the coexistence of temporal patterns is different in each theory. In institutional theory, order and continuous change coexist and reinforce each other, but discontinuous change reflects a change in order so logically cannot coexist with the other two (Zucker 1987). In punctuated equilibrium theory, a system is either in equilibrium (order) or revolution (discontinuous change) (Romanelli and Tushman 1994). Only in complexity theory can each temporal pattern coexist. It explains this by assuming that: (1) systems are constantly subject to small changes any one of which could lead to large effects, and (2) the order (deep structure) is nested such that fluctuations can change more superficial orders while deeper orders remain intact (Chiles et al. 2004, p. 502).

Rationale for Stability and Change

Each theory also has a different view on the reasons for temporal patterns. Blind variation, selection, and retention is assumed in punctuated equilibrium theory, per its roots in evolutionary theory (Gould 1982). In other words, aggregate patterns of change and stability in an organization are caused, at least in part, by random variation in the firm or the market and the environment’s selection and retention of variations that fit at that time (irrespective of any individual’s plans).

Actors’ bounded rationality is assumed in punctuated equilibrium theory and complexity theory. Both theories assume that agents act rationally, performing as best they can in their circumstances, bounded by their cognitive limitations. Patterns of stability and change emerge from the sum of such individual actions. Selection and retention and bounded rationality can work hand-in-hand in punctuated equilibrium theory, as senior managers select and retain variations that enhance firm performance (Romanelli and Tushman 1994).

Actors’ legitimacy seeking is a defining feature of institutional theory, as it assumes that agents act to remain legitimate in their community even if it contradicts rational choice (Zucker 1987). Punctuated equilibrium theory also supports such behavior. For instance, Romanelli and Tushman (1994) argue that a firm’s senior executive plays a key role in enforcing institutional norms during times of equilibrium.

Use of Resources After a Change

Finally, each theory also has a different view on the use of resources. Recombination and reuse is a defining feature of complexity theory. The theory assumes that when a complex system moves from one order to another, resources can be recombined and reused in the new order (Chiles et al. 2004, p. 502). Such innovations are self-organized, not requiring institutional mandate (as in institutional theory) or crises (as in punctuated equilibrium theory). Neither institutional theory nor punctuated equilibrium theory speak to such innovations, hence the question marks shown in Table 1.

Research Methods

We respond to Baker et al.’s (2011, p. 314) call for more “insights into the reality of developing and sustaining alignment in a dynamic real-world setting,” by using two research approaches to investigate and reconcile the ability of the three theories presented above to explain how alignment evolves.
Case Study Methodology

Case studies will be our primary source of data. Because our focus is how alignment is enacted and how it evolves in a particular context, the case study method is particularly appropriate (Pettigrew 1990; Yin 1994). Moreover, because we aim to reconcile existing theories, we adopt a positivist case study approach rather than an interpretive or critical theory one (per Sarker and Lee 2002).

Research Approach

Although past alignment research supports the utility of all three theories individually (Gosain 2004; Sabherwal et al. 2001; Vessey and Ward in press), Table 1 shows that it is not possible for all three theories to be true, as each one includes a condition that contradicts one of the others. That is, our case study data will yield one of two conclusions: (1) one of the theories can explain the observed process of alignment (the others cannot); or (2) none of the theories individually can explain the observed process of alignment. Either outcome will prove useful. We will test the relative strength of each theory by using an alternative templates strategy (Langley 1999), which involves examining each case from the perspective of each alternative theory, and pattern-matching (Yin 1994). Pattern-matching involves comparing the patterns we expect theoretically (in Table 1) with the patterns we observe in our data (discussed later). In this way, the patterns in Table 1 can be viewed as sets of necessary and sufficient conditions (see Ragin 1987). Each tick (\(\checkmark\)) in Table 1 reflects a necessary condition. Thus, evidence for all ticks for a given theory must be found to confirm the theory. For example, to confirm institutional theory, we need evidence of maintenance of order, continuous change, and actors’ legitimacy seeking. If evidence is lacking for any of them, institutional theory will not be confirmed. Each cross (\(\times\)) in Table 1 reflects a sufficient condition that can be used to refute a theory. For instance, evidence of continuous change over time is sufficient to refute punctuated equilibrium theory. We will initially view evidence for each tick/cross as binary, but we will use fuzzy set principles to control for borderline cases (Ragin 2000).

Case Study Design

We propose using Leonard-Barton’s (1990) dual methodology, which combines multiple retrospective cases with one longitudinal case. In each case, we will collect data on alignment, performance, and the factors noted above to help to differentiate each theory. Following Yin (1994), we will use a combination of theoretical (differentiating on information intensity) and literal sampling in conducting four exploratory retrospective case studies, which will both inform and complement the longitudinal case study, which, in turn, will complement and inform a further four confirmatory retrospective case studies (see Figure 1). This design yields nine cases in all (one longitudinal and eight retrospective), which creates a sufficient number of cases to afford a good comparison and yet also a small enough number of cases to make the research feasible (Pettigrew 1990 p. 276).

<table>
<thead>
<tr>
<th>Performance</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information intensity</td>
<td>High</td>
<td>Two cases for literal sampling</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Two cases for literal sampling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two cases for literal sampling</td>
</tr>
</tbody>
</table>

Figure 1. Case Study Design

Data Sources and Analysis

To achieve triangulation, we will assess the enactment of alignment from three points of view: the organization’s governance of its IT capabilities, its development and sourcing of IT capabilities, and how it
uses its IT capabilities. Table 2 shows our proposed data sources. As noted earlier, we will use pattern-matching to test each theory (Yin 1994). This will involve comparing the theoretically-expected patterns (per Table 1) with the patterns we observe in our data (per Table 2); we seek to confirm or refute each pattern. Drawing conclusions from our data requires us to judge both evidence and absence of evidence. The strength of our planned data sources in Table 2 is that while it can be difficult judge patterns of evidence and absence of evidence from limited data (Altman and Bland 1995; Stanford 2009), we will be drawing judgments from a substantial set of data collected from three perspectives on alignment and different data sources. We will then base our final judgments on the overall weight of evidence (see Gibbert and Ruigrok 2010). In the event that all three theories are refuted, we will develop a middle-range theory of alignment that draws on the elements of each of the theories that were supported.

<table>
<thead>
<tr>
<th>Key Variables and Processes (per Table 1)</th>
<th>Illustrative Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constructs common to each theory</strong></td>
<td></td>
</tr>
<tr>
<td>Business-IT alignment and performance (per Table 1)</td>
<td>C-suite executives’ perceptions; discussions in executive committee meeting minutes; financial reports</td>
</tr>
<tr>
<td>Maintenance of order (deep structure) over time; discontinuous change from one order (deep structure) to another; and continuous chance over time (per Table 1)</td>
<td>The organization’s enactment and response to change, as described in IT policies, interviews with C-suite executives, and as discussed in executive management committee meeting minutes (e.g., when reviewing or funding major change projects).</td>
</tr>
<tr>
<td><strong>Constructs that distinguish the theories: Temporal character of stability and change</strong></td>
<td></td>
</tr>
<tr>
<td>Blind variation, selection, and retention, actors’ bounded rationality, actors’ legitimacy seeking (per Table 1)</td>
<td>Senior management’s rationale regarding change versus order, as expressed in interviews with C-suite executives and meeting minutes.</td>
</tr>
<tr>
<td><strong>Constructs that distinguish the theories: Rationale for stability and change</strong></td>
<td></td>
</tr>
<tr>
<td>Recombination and reuse of resources (per Table 1)</td>
<td>The organization’s tendency and ability to recombine and reuse organizational resources, as expressed in decisions over restructuring units and in major changes in resource utilization.</td>
</tr>
</tbody>
</table>
Simulation

Simulation will be our secondary method. Computer-based simulations are used to model the operation of real-world processes, systems, or events (Law and Kelton 1991) and are “particularly useful when the theoretical focus is longitudinal, nonlinear, or processual” (Davis et al. 2007, p. 481), as is the case in our proposed research. Although simulations reflect simplified versions of the real world, they can often enable researchers to develop richer and more descriptively powerful theories (Davis et al. 2007). Further, simulation aids in overcoming the data limitations of traditional sources such as case studies (Davis et al. 2007, Harrison et al. 2007).

We propose simulating the findings of our exploratory, retrospective case studies based on our preliminary theoretical work in Table 1 to gain further insights into the efficacy of our three fundamental theories (see Nan 2011). We therefore position our use of simulation in what Davis et al. (2007, p. 480) refer to as “... in the ‘sweet spot’ between theory creating methods, such as multiple inductive case studies and formal modelling, and theory-testing methods.” The simulations will be used to identify issues to consider in a final round of four confirmatory retrospective case studies.

Simulation involves creating “a computational representation of the underlying theoretical logic that links constructs together” (Davis et al. 2007, p. 481). A number of types of simulation may be used to inform different types of issues (see Davis et al. 2007, Harrison et al. 2007). Among the most commonly used simulation approaches in social science research are agent-based modelling (Harrison et al. 2007; Nan 2011; Nissen and Jin 2007), systems dynamics modelling (Davis et al. 2007; Harrison et al. 2007; Sastry 1997), and NK fitness landscape modelling (Kauffman 1993). We will use a set of approaches that allows us to accurately model the phenomena in our study (alignment and performance, nature of change, rationality of actors, and use of resources).

Discussion and Conclusions

Our research addresses what has long been one of the most burning issues facing IT practitioners (Luftman and Derksen 2012): how to align IT with business needs. The research is timely as it responds directly to the recent call for “insights into the reality of developing and sustaining alignment in a dynamic real-world setting” (Baker et al. 2011 p. 314). Because research to date has been largely atheoretical and sometimes inconsistent, we address this issue by focusing on resolving competing explanations of IT alignment and performance to provide an internally consistent explanation of how alignment occurs. Specifically, we address IT alignment as a dynamic process by developing a robust and comprehensive framework based on three of the most promising theories of the past decade: institutional theory, punctuated equilibrium theory, and complexity theory.

Our study contributes to knowledge in that it seeks to conduct the first multi-theoretic study of how IT alignment evolves, provides the first comparison of institutional theory, punctuated equilibrium theory, and complexity theory, and also uses novel methodology in combining dual-case methods with simulations. From the viewpoint of practice, understanding how IT alignment is achieved will help organizations to get the most out of their IT investments and improve their organizational performance.

We hope that by informing the theoretical foundations for explaining how IT alignment takes place over time, our research will aid in moving forward both IS research and practice.

References


Organization and IS


Organization and IS


