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Renewal Through Reorganization: The Value of Inconsistencies Between Formal and Informal Organization

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We develop a theoretical perspective on how inconsistencies between formal and informal organization arising from reorganization can help create ambidextrous organizations. We argue that under some conditions, the informal organization can compensate for the formal organization by motivating a distinct but valuable form of employee behavior that the formal organization does not emphasize, and vice versa—an effect we label compensatory fit. We illustrate the concept of compensatory fit by drawing on qualitative data from a reorganization at Cisco Systems. We also derive formal boundary conditions for compensatory fit using a simple game theoretic representation. We show that compensatory fit can only work when there is a powerful informal organization already in existence, and when the gains from ambidexterity are substantial. Further, depending on the strength of the informal organization, breakdown in the conditions necessary for compensatory fit may lead to performance declines and further reorganizations.

Key words: organization structure; formal and informal organization; interunit coordination

Reorganization is an important mechanism by which corporations can renew alignment between strategy and organization (Chandler 1962). In principle, the dissolution and reformation of internal organizational boundaries allows for improved partitioning and re-integration of activity within the firm. Yet there is little doubt that reorganizations also create significant stresses and strains within organizations (Nadler and Tushman 1998, Romanelli and Tushman 1994, Tushman and Romanelli 1985). While the formal organization—the normative social system designed by managers—can be changed relatively rapidly, the informal organization—the emergent pattern of social interactions within organizations—may be subject to limits and lags in its adjustment to the new formal organization (Lamont and Williams 1994, Miller and Friesen 1984, Nickerson and Zenger 2002). The resulting inconsistencies between formal and informal organization are widely viewed as unavoidable and significant costs of reorganization (Amburgey et al. 1993, Oxman and Smith 2003) that can even enhance the hazards of organizational mortality (Hannan et al. 2003a, b).

A common premise underlies the negative assessments of post-reorganization inconsistencies: that inconsistency detracts from internal fit between organizational elements. Internal fit refers to a pattern of reinforcing interactions between organizational elements such that one element enhances the impact on organizational performance of another element (Drazin and van de Ven 1985; Milgrom and Roberts 1995; Miller 1992; Nadler and Tushman 1997; Siggelkow, 2001, 2002).[1] If reorganizations inevitably result in inconsistencies, and inconsistencies inevitably detract from internal fit, then one must simply accept this as the price of corporate renewal through reorganization. But what if the crucial premise—that reinforcing effects between organizational elements can only arise when they are consistent—is untrue?[2] In this paper, we present a theory that outlines how the very inconsistencies that arise between the formal and informal organization after reorganizations can be the basis for corporate renewal through the pursuit of "dualities"—jointly desirable, but organizationally incompatible objectives (Evans and Doz 1989). Instances of dualities abound in the literature on organizations and strategy—exploration-exploitation, cost reduction-product differentiation, organizational differentiation-integration, and static–dynamic efficiency (Ghemawat and Costa 1993, Lawrence and Lorsch 1967, March 1991), to note a few. Even when they are jointly desirable, the organizational attributes that underlie one pole of the duality are typically seen as being incompatible with those that underlie the other (Evans and Doz 1989). For instance, the incentive and coordination mechanisms needed to support opportunity exploration differ significantly from those needed for exploitation (Brown and Eisenhardt 1997, Burns and Stalker 1961, Ghemawat and Costa 1993, Levinthal and

March 1993). Similarly, it is often argued that differences in the way production, marketing, and HR should be organized for cost focus and differentiation-based strategies (Porter 1985) constrains their simultaneous pursuit (Besanko et al. 2000, Ebben and Johnson 2005, Ghemawat and Costa 1993).

We propose that reorganizations can help solve the problem of organizational incompatibility and allow the pursuit of jointly desirable dualities when the resulting formal organization and the informal organization each emphasize opposing poles of a duality. We term this an instance of "compensatory" fit between the formal and informal organization, in which they compensate for each other by motivating dissimilar but jointly valuable employee behaviors. This is distinct from what one might call "supplementary fit," the more familiar instance of superior performance through the formal and informal organization emphasizing the same set of employee behaviors. Of course, not all inconsistency is valuable—it is only so in the specific case when the formal and informal organization are inconsistent because they support different poles of a duality. Our argument is that reorganizations can create such a situation under some boundary conditions. Both supplementary and compensatory fits belong to the broad category of complementarities between organizational elements (or synergies), such that the level of one enhances the marginal value of the other (Kogut and Zander 1996, Milgrom and Roberts 1990, Milgrom and Roberts 1995, Siggelkow 2002). However, achieving supplementary fit relies on one element augmenting the other by "pushing in the same direction," while compensatory fit relies on one element "pushing in a different direction" in order to make up for the weakness of the other.

We illustrate the notion of compensatory fit through an in depth discussion of a reorganization that occurred in 2001 at Cisco Systems, which appeared to have helped this company renew its capability base to pursue the cost-differentiation duality. We then revisit the ideas described in the illustration of the Cisco reorganization in a more rigorous and general theoretical framework. We draw on a simple game theoretic representation to state precisely the conditions under which compensatory fit through organizational inconsistencies can exist, as well as the consequences if these conditions break down. We find that while it is an attractive means to exploit gains from ambidexterity, compensatory fit is not for every company. Our analysis indicates that it can only work when there is a powerful informal organization already in existence, and when the gains from ambidexterity are substantial, in order to avoid inefficiencies arising from having employees work in an inconsistent organizational architecture. Further, breakdown in the conditions necessary for compensatory fit may lead to performance declines and the need for more reorganizations, depending on the resulting strength of the informal organization. The formalization also serves to make our underlying assumptions transparent to other scholars for refining or developing further, and allows us to state our results with precision.

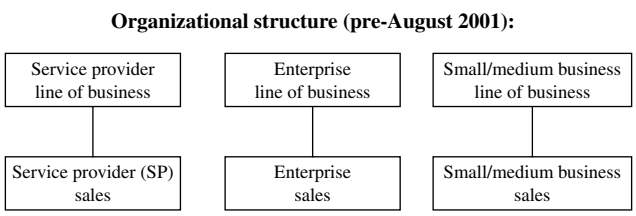
The approach we take extends the work of other authors who have analyzed the relationships between formal and informal organization after reorganizations, and their joint consequences for performance (e.g., Hannan et al. 2003a, b; Nickerson and Zenger 2002). Distinctively, our analysis proposes that the consequences of the post-reorganization relationship between formal and informal organization hinge on external conditions. Regardless of the internal difficulty of organizing to pursue dualities, there are external circumstances largely out of the control of the individual firm, when doing both improves performance—when there are "gains from ambidexterity" (Birkinshaw and Gibson 2004, Smith and Tushman 2005, Tushman et al. 2004), and others in which it is better to focus on one of the poles of the duality—when there are "gains from focus" (Porter 1985, Rust et al. 2002). We propose that reorganization provides one of the ways in which fit with the external environmental conditions (as represented by the gains from ambidexterity or focus) can be achieved—even while generating apparent inconsistency between the formal and informal organizations.

Reorganization at CISCO Systems

To preview the logic of our arguments (which we develop in greater detail in the next section), we describe briefly an instance of a reorganization that took place in 2001 at Cisco Systems. Cisco's products enable voice, video, and data to travel across computer networks and lie at the heart of the Internet and the intranets of most corporate, public, and educational institutions across the world. From 1997 to 2001, Cisco was organized along three semiautonomous lines of business (Figure 1), each focusing on a distinct customer type: Internet service providers (ISPs), enterprises (large companies), and small- and medium-sized businesses (SMBs). Within this structure, each of the three lines of business developed and marketed its own products to its specific customer groups, and a complete product line was built for each customer group. Each line of business had its own sales group, which mirrored the separate organizations. This structure enabled the company to build capabilities for being responsive to the idiosyncratic needs of different customer types. Justifying this structure, a senior manager said, "I think the market was expanding like a rocket ship, so I think the good part about that organization was to allow the various business units to really focus on their primary customers, who were really driving the requirements."[3]

By 2001, however, changes in the external environment led to a reassessment of the existing structure. The

Figure 1 Cisco Systems Before August 2001



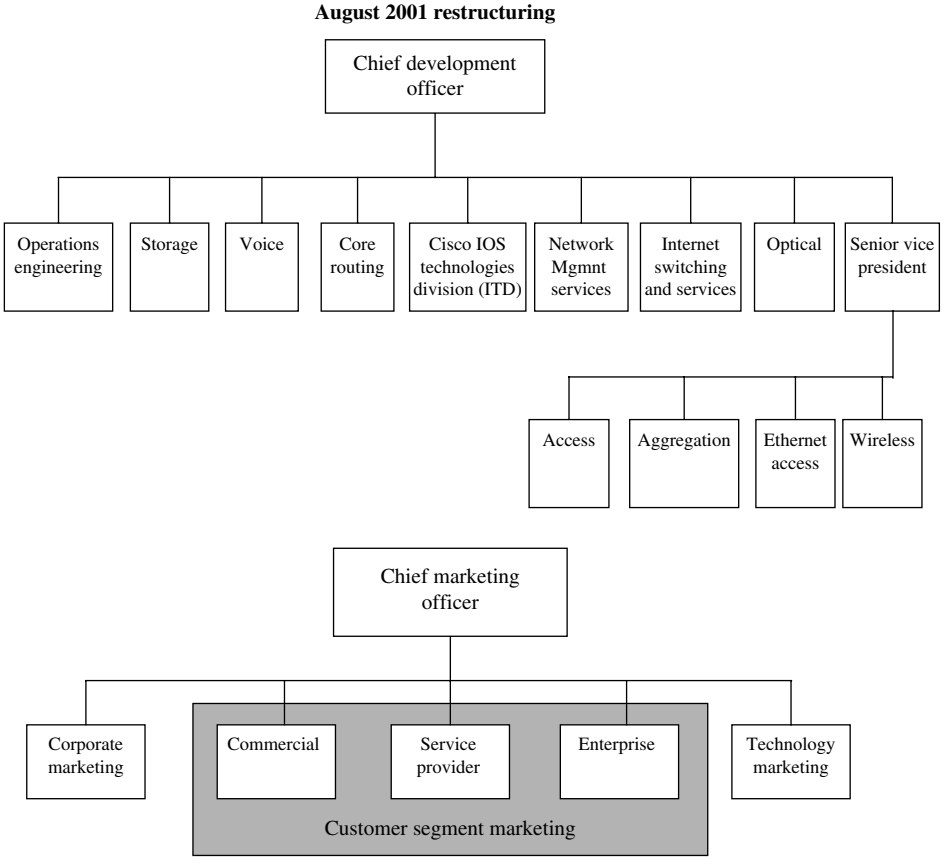
explosive growth in the sales of hardware supporting the Internet began to slow by 1999–2000. Startup companies' needs for technology had substantially contributed to the growth of networking equipment companies like Cisco, and their cutbacks were deeply felt across the industry. In addition, many telecom companies had overspent their IT budgets, and faced with significant excess capacity in their industry, their networking spending came to a halt. Cisco announced its first loss as a public company in the fiscal quarter that ended March 31, 2001 and cut 18% of its payroll (8,500 employees). By the end of the financial year 2001, it had totaled up a loss of about $1 billion.

With slowing demand and falling revenues, the negative aspects of the customer-centric grouping became conspicuous. Under a customer-oriented grouping, redundancies in technological development were common, and were perceived as the cost of being responsive to customers. One manager noted both the advantages (customer responsiveness) and the disadvantage (redundancy in development) in the older structure: "If there was a (customer) problem, we'd get whatever resources were required to fix it and then execute on it, quickly. But the problem was that ten people would be doing the same thing across the company ten times over, at ten times the cost. And they'd get it done quickly, probably in about one tenth the time that we do now, but it was just incredibly inefficient."

On August 23, 2001, the company announced a major reorganization. Cisco Systems was to be reorganized around 11 technology groups (Figure 2). It was expected that the new structure would promote more rapid and cost-effective technical innovation because engineers who formerly worked in separates silos could now exchange ideas, coordinate development, and generate economies through reuse of technological solutions. Although the products were grouped into these 11 technology units, the three sales groups based on customer segment were retained.[4] The reorganization was implemented relatively quickly over a period of three months (September–November 2001).

The stock markets reacted positively to the announcement of the reorganization. However, several analysts

Figure 2 Cisco Systems After August 2001



also noted the paradoxical aspect of reorganization towards a primary grouping by technology at a time when the ability to sell integrated solutions to customers was becoming increasingly valuable. "In a time when everyone seems to be so focused on the customer, reorganizing around product lines seems a bit strange," said one analyst at Forrester Research.[5] What accounted for these mixed reactions? Decline in demand (and therefore revenues) was not the only factor affecting Cisco's business; commoditization and the entry of low-cost competitors was also a source of margin pressure. Prominent among the new competitors was Huawei Technologies from China, which exploited lower labor costs to sell comparable products that were priced substantially lower than Cisco's equipment. Product commoditization was a problem for IT companies in general, which many (including Cisco) were attempting to combat by selling customized solutions through integration across different technologies (Johansson et al. 2003).

Yet, if Cisco pursued cost reduction only (at the expense of customer responsiveness), it would be at a disadvantage to companies like Huawei, whose cost structure would have been difficult to match. On the other hand, given increased price sensitivity, there were limited prospects of improving prices by increasing efforts to sell customized product solutions. Under these circumstances, the new mix of capabilities the company needed was to maintain customer responsiveness while pursuing cost reduction in order to protect margins—a classic instance of gains from ambidexterity in the context of the differentiation—cost focus duality.

However, the new formal structure, by itself, appeared unlikely to enable the development of this new mix of capabilities. While conducive to eliminating redundancies in technology development, it also placed organizational boundaries between engineers who worked on different technologies that would need to be assembled into a solution, as well as between engineers and marketing personnel who would need to work together to customize solutions based on customer requirements. Indeed, many senior managers recognized that the new structure made integration across technologies (horizontally) and with customers (vertically) a specialist's job, whereas it was "everyone's job" in the older structure. As one senior manager put it, "We moved the inflection point back towards engineering. This allows the technology to be used in multiple customer segments but it does put engineers farther away from the customers . . ." and explicitly recognized the challenges of maintaining customer responsiveness within the new structure, while realizing the benefit of improved cost efficiency.

Compensating Effects of Informal Organization

The informal organization of Cisco Systems—specifically, a deeply entrenched culture of customer advocacy, as well as a pattern of unofficial relationships that survived the change in the formal organization—appeared to have helped Cisco Systems maintain customer responsiveness despite the emphasis of the new formal organization on cost effective technology development.

In operational terms, the impact of the culture of customer advocacy was that employees undertook activities that improved collaboration across the various organizational units responsible for collectively meeting particular customer requirements, even when such activities were not explicitly in the formal scope of their work (Gulati 2007, Kohli and Jaworski 1990). Describing such collaboration efforts, one marketing manager noted:

> Earlier we were in the LOB; of course we had no problem getting engineering to listen, we were part of the same LOB with common P&L and reporting, right? Now we are not . . . they are no longer obligated to be talking to us, and (*they*) could say, let the bosses deal with issues. But typically that doesn't happen. Everybody (i.e. engineering) knows that by talking to us they could improve the customer comfort with the product, so we still talk. It's not just with us, if people need to talk to each other across technologies to put together something that's important for the customer, they will. Because ultimately its about meeting the customer's needs.

The second manner in which the informal organization helped to compensate for the weakness of the formal organization was that ties between individuals formerly in the same organizational unit persisted even though these individuals now functioned within different units. These ties that persisted from the older organization were typically those that originated in the formal structure—relationships between engineers and customers formed during design and support stages, between leads of engineering teams working on different technologies, and between product marketing and engineering managers. These relationships were primarily work related to begin with. After the reorganization, the work related aspect of these relationships no longer existed—and yet, individuals used these relationships for advice, information, and even gossip. Respondents described to us the benefits of these ties in terms of the ability to create new projects, solve customer's problems and write more effective responses to requests for proposals). As one manager in the voice technology group said,

"We have been working together for a lot of years, the engineers and the marketers know each other really well . . . this helps now, and there are a fair number of collaborations that go on across the business unit, even across technology groups. You can always pick up the phone and find someone on a certain project that you might have had a relationship with in the past." Another stated, "Accountability has changed . . . under the new structure I ought to have been keeping track of every hour I spend helping [*employee in other technology group*]. Well, he's still my friend."

It is important to note that the behaviors motivated by the customer advocacy culture and supported by the informal relationships were inconsistent with the new formal organization—the actions thus emphasized were distinct from the actions emphasized by the formal organization. For instance, direct cross-technology interactions by the team leads were inconsistent with the new formal organization, which had created formal integrating mechanisms and specialized roles for vertical and horizontal coordination, such as the solutions engineering group. If the purpose of organizational boundaries is to structure and limit interactions between members (March and Simon 1958, Nadler and Tushman 1997, Thompson 1967), they did not appear to fully meet these objectives in Cisco Systems. Put differently, the informal organization at Cisco Systems appeared to have made organizational boundaries more permeable.

While it is not possible to establish a causal link between the reorganization and the performance of the firm in this simple illustration featuring one case, it is worth noting that the data is consistent with the hypothesis that the company appeared to have achieved significant cost efficiencies while staying "close to customers." Post-reorganization, Cisco's profitability improved significantly through a combination of stable revenue in a market with declining demand and improved cost efficiency (Table 1). Annual sales per employee at Cisco had fallen from $700,000 in 2000 to about $450,000 in 2001 but increased to $534,000 as of April 2002 and was close to $590,000 in mid-2003. Internal data from the company indicates that it also saw improvements in customer satisfaction scores as well as profitability from its hundred largest clients in the same period.[6]

Yet, these beneficial consequences of inconsistencies appeared to have a definite shelf life. Tellingly, formal process overlays to achieve cross-technology integration as well as integration with customers were introduced in 2004 in response to a growing recognition of increasing difficulties in cross-functional collaboration. A set of "business councils"—cross-functional leadership teams—replicated the older grouping by different customer types at least at the senior management level. One of the council chairs explained:

> We have the Commercial Business Council, the Enterprise Business Council, and Service Provider Council. So surprise-surprise, it sounds a lot like the old (*pre-reorganization*) LOB structure and essentially what it is, is a cross functional group of people, the VP, SVP, and some directors, that are tasked with being the voice of the customer and essentially providing, in a fairly formal and structured manner, feedback from customer advisory councils where we bring in our lead customers to provide strategic direction to product road maps, service road maps, and business capabilities. So they are really the voice of the customer.

While the membership of these business councils was restricted to relatively senior managers and so did not truly replicate the older grouping by customer groups, it nevertheless maintained some degree of coherence across technologies in order to ensure that they collectively met the needs of each type of customer.

In sum, there are five points that we wish to highlight in this account of reorganization at Cisco Systems: (1) Changes in market conditions made the existing structure of the company inappropriate. In particular, in the changed environment Cisco needed to pursue both cost reduction and customer responsiveness, rather than focus on one alone; (2) the new formal structure alone would have been inadequate to support both a capability for cost reduction as well as customer responsiveness; (3) the informal organization was inconsistent with the formal organization for a noticeable period after the reorganization; (4) this inconsistency was viewed by many managers as beneficial in compensating for the weaknesses of the new formal organization—thus allowing a renewed strategy of pursuing both cost focus and customer responsiveness; and (5) over time, the shadow of the older informal organization began to disappear, exposing the limits of the formal structure.

Table 1 Cisco Systems: Revenue, Size, Profitability, and Organizational Form Over Time

Year	Revenue ($ millions)	Total employees	Net income ($ millions)	Formal organization
1997	6,440	10,728	1,048.7	Grouping by customer group
1998	8,459	14,623	1,350.1	
1999	12,154	20,657	2,096.0	
2000	18,928	34,617	2,668.0	
2001	22,293	38,000	(1,014)	Grouping by technology
2002	18,915	35,790	1,893.0	
2003	18,878	34,000	3,578.0	

Source. Hoovers online.

Origins and Consequences of Organizational Inconsistencies After Reorganizations

The example of the reorganization at Cisco Systems raises the intriguing prospect that post-reorganization inconsistencies between formal and informal organization can enable the pursuit of dualities (by emphasizing distinct poles of the duality). This can create a form of internal fit where organizational elements compensate for each other, creating compensatory fit, instead of supplementing each other (supplementary fit). However, several questions immediately surface: Will organizational inconsistencies always arise after reorganizations? Given the pressures towards conformity between the formal and informal organization, how stable are organizational inconsistencies, and what are the consequences of instability? To what extent are the performance benefits of

achieving compensatory fit offset by the costs incurred by the individuals working in an inconsistent organization?

We answer these questions in two steps. First, we first draw on existing literature on the link between formal and informal organization to explain why inconsistencies arise after reorganizations. Once we establish the theoretical basis for the occurrence of such inconsistencies, we then explain how inconsistencies can help pursue dualities. We draw on a game theoretic representation to explore the boundary conditions under which inconsistencies remain stable and have beneficial consequences, as well as the directions in which the organization is likely to change when the boundary conditions are no longer valid.

Why Do Reorganizations Result in Inconsistencies?

Formal organization comprises a set of prescribed roles and linkages between roles, for instance as set forth in job descriptions and reporting relationships (Scott 1998). Informal organization refers to the emergent patterns of individual behavior and interactions between individuals, as well as the norms, values, and beliefs that underlie such behaviors and interactions (Roethlisberger and Dickson 1939, Smith-Doerr and Powell 2005). However, there is a close link between formal and informal organization—formal organization affects informal organization via its effects on who interacts with whom.

Formal organization, by definition emphasizes some interactions over others. Consider two basic mechanisms of organization design—grouping and linking, which occur at all levels within organizations (Nadler and Tushman 1997). Grouping is a basic organization design mechanism that collects formal roles together within organizational boundaries, on the basis of either similarity or complementarity of the knowledge underlying those roles. The purpose of grouping is to optimize coordination by structuring and limiting interactions between members (March and Simon 1958, Thompson 1967, Nadler and Tushman 1997). For instance, pre-2001, Cisco was organized by groupings around customer segments served (enterprise, SMB, and ISP), which brought together complementary roles in technology and marketing that were linked in their efforts to meet the needs of each segment. Post-2001, the primary grouping was around similar technologies. Linking mechanisms specify vertical and horizontal interactions between (groupings of) roles. These include reporting and workflow related relationships and mandated periodic communication. Grouping and linking mechanisms may often be reinforced by collocation and interdependent rewards (Wageman 1995).

By emphasizing some interactions over others, grouping and linking mechanisms can strongly influence the shape of the emergent informal organization. This is because the likelihood of informal tie formation between individuals increases with propinquity and the frequency of contact (Smith-Doerr and Powell 2005).[7] One might say that the formal organization defines the social (and often the physical) spaces within which individuals search locally for opportunities to form ties. Further, because formal groupings and linking mechanisms are organizational structures with their own identifiable boundaries, membership within such boundaries results in internalization of values, norms, and beliefs specific to that membership (Lawrence and Lorsch 1967). Thus, members of a product development unit may be socialized into an informal engineering subculture with its own values (e.g., technical novelty), beliefs (e.g., about the relative effectiveness of technical solutions), and norms (e.g., assisting colleagues with technical problems) as a consequence of their membership in a unit that engages in product development activity.

Despite the existence of these forces towards consistency, there may be significant lags and even permanent limits to the adjustment of informal organization to the formal organization. Prescribed roles may be changed instantaneously by administrative sanction, but the surrounding web of informal organizational elements that comes to be associated with the role may persist for some time.[8] For instance, as individuals adjust to the new formal organization they find themselves in, preexisting informal networks weaken with lack of investments of time and energy by individuals building new relationships and adjusting to new roles, but not instantaneously. Culture, defined by a set of values, norms, and beliefs changes through exposure to new organizational members and organizational tasks, but again, not instantaneously (Becker and Geer 1960). The instances of past relationships (between development team leaders and between team leaders and product marketing managers) persisting into the new organization at Cisco Systems, as well as the persistence of the culture of customer advocacy illustrate these points quite well.

The adjustment of the informal organization to the new formal organization may be subject not only to lags (as described above) but also to permanent limits. In particular, the founder's articulation of the values and mission of the organization is likely to "lock-in" key informal elements such as the values and premises that guide future decision making (Baron et al. 2001). For instance senior managers who had been with Cisco Systems since its founding believed that the culture of customer advocacy was "imprinted" on the organization during its founding years (Stinchcombe 1965).

In sum, reorganizations, which involve a near instantaneous change in the formal organization, are likely to be followed by periods in which the informal organization emphasizes a set of employee behaviors that were the same as the ones emphasized by the older formal organization, but not the new one. It is certainly possible that an informal organization that is inconsistent with the new formal organization can hamper the achievement of the

espoused goals of the formal organization by distracting employees towards actions that do not improve organizational performance, or even detract from it through sabotage (Homans 1950, Roethsliberger and Dickson 1939). However, this is by no means the only possible outcome of inconsistency. Inconsistencies imply that informal and formal organizations encourage distinct employee behaviors, but these dissimilar behaviors may in fact be jointly more valuable than either alone. We develop this argument in the next section.

Compensatory Fit Through Inconsistency: Boundary Conditions

To analyze the boundary conditions for compensatory fit, we follow in the tradition of other scholars who have formally modeled the dynamics of organization design (Hannan et al. 2003a, b; Nickerson and Zenger 2002; Rivkin and Siggelkow 2003; Siggelkow and Levinthal 2003). We develop a simple game theoretic representation of how formal design choices and employee's choices interact. Our goal is to state general boundary conditions under which instances of compensatory fit like the one we noted at Cisco Systems can exist in a stable manner, and do not extract too high a penalty from the employees who work amidst organizational inconsistencies. We also explore the manner in which organizations are likely to change when the conditions supporting compensatory fit break down. Relying on a formal representation helps us state these conditions and consequences with a high degree of precision, and also exposes our underlying assumptions for critique and further refinement by other scholars (Lave and March 1993). We present a verbal and graphic account of the model and results in the text of the paper in a self-contained manner—the technically minded reader may like to refer to the appendix for a formal version.

We conceptualize a stylized organization consisting of two actors—a set of employees, and an organization designer who could represent senior management or the CEO. There are two distinct types of activities that the employees can undertake, which support one each of the dualities A and B. For instance, these could represent activities relating to "being cost efficient" and "being customer responsive" respectively.[9] Employees decide their mix of activities (the split between A and B type efforts) based on what activities are being supported by the formal and informal organization. When we say that the formal organization "supports" a particular type of activity, we refer to the creation of formal coordination mechanisms (grouping of activities into administrative units, reporting relationships, cross-unit teams, and processes) and incentives (salary, bonus, stock options, career advancement, and job security) that enable and motivate employees to undertake that set of activities (Nadler and Tushman 1997). The rewards from behaving consistently with the formal organization thus include salary, bonus, career advancement, job security, and freedom from managerial sanctions by superiors.

It is important to note that while incentives are a part of this formal organization, we are conceptualizing the formal organization more broadly to represent everything that the designer does to encourage certain behaviors. For instance, in Cisco Systems post-2001, the reorganization created a formal organization that encouraged cost efficiency-seeking behaviors by grouping all related technology developments within common organizational units, at the expense of customer responsiveness.

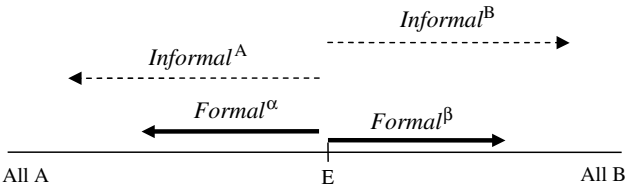
The informal organization also influences the mix of activities chosen by the employees by "rewarding" employees for behaving in consonance with it—through utility from relationships, influence, conformance to an identity category, and belonging to a cohesive group (Barnard 1938). In Cisco Systems, the informal organization post-2001 continued to encourage behaviors that supported customer responsiveness in this way, even though this was no longer the focus of the formal organization.

We depict the above arguments visually in Figure 3. The x-axis shows the mix of A and B type activities. The left end of the axis corresponds to a focus exclusively on A activities, and the right end corresponds to a focus exclusively on B type activities. Intermediate points represent some mix of A and B type activities, with the point E being an even split between the two. An "α" type formal (or "A" type informal organization) simply means one that encourages activity A over activity B, through the appropriate combination of grouping and linking mechanisms.

An "organizational architecture" denotes the combination of choices made by the designer and the employee. Thus, the architecture (α, A) is consistent since the employees emphasize A type activity and so does the formal organization. In contrast the architecture $(\alpha,\ \mathrm{B})$ is inconsistent, as the employees emphasize B while the formal organization emphasizes A. We can also speak of the formal and informal organization being consistent with each other when both encourage the same type of activity; else, they are inconsistent with each other.

We assume that the designer chooses the formal organization to enhance organizational performance net of the costs of implementing a formal organization, taking into account how the employees are likely to react to

Figure 3 Effects of Formal and Informal Organization on Mix of Activities

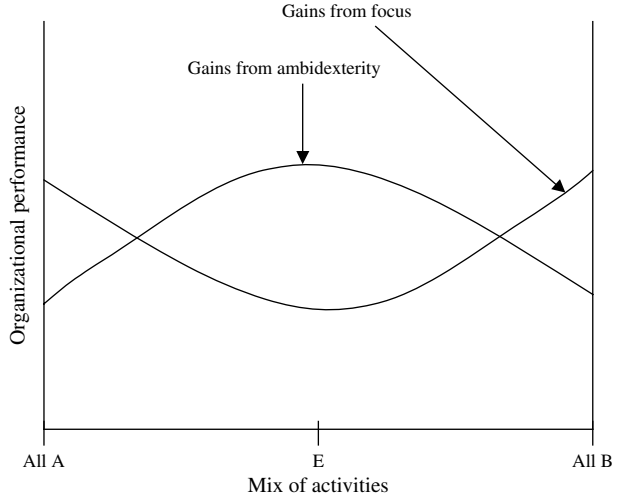


the chosen formal organization and the existing informal organization. Thus, we assume that the designer's payoff is organizational performance net of the costs of design and implementation (including wages paid out) of the chosen formal organization. Note that the designer cannot directly influence the informal organization in our model. Organizational performance may be understood in terms of profitability, market capitalization, operating efficiency, or market share—measures that the designer/top management of the organization may be reasonably assumed to care about.

Organizational performance depends on the mix of activities that the employees engage in, as well as the manner in which the two kinds of effort interact. Figure 4 illustrates the two basic types of interactions between the activity types. In this figure, the performance of the organization is plotted on the vertical axis as a function of the mix of Types A and B activities that the employees engage in. For instance, when employees choose a mix of mostly A type activities, then the performance of the organization corresponds to the height of the performance curve at points to the left of E on the horizontal axis. Between points A and B lie various combinations of the two activity types.

We can distinguish two situations. First, consider the case when the performance of the organization is *higher* at point A or B than at any intermediate point between them. This means that any combination of the two activities underperforms "pure A" or "pure B" type activity. This describes a case of "gains from focus"—it arises because the two activity types have strong substitution effects (doing more of one activity *decreases* the marginal product of the other activity) between them so that the greater the extent of activity A, the less valuable it is to engage in activity B (and vice versa) (Milgrom and Roberts 1990, 1995).

Figure 4 Interactions Between Activity-Types and Organizational Performance



In contrast, the second situation is one in which the performance of the organization is *lower* at points A and B than at any other point along the line ACB. This means that any combination of the two activities always dominates "pure A" or "pure B" type activity. This is a case of "gains from ambidexterity"—it arises because the two activity types are strongly complementary (doing more of one activity *increases* the marginal product of the other activity), so that the greater the extent of activity A, the more valuable it is to engage in activity B (and vice versa) (Milgrom and Roberts 1990, 1995).[10] Through Figure 4, we wish to emphasize that irrespective of the organizational costs and complexities associated with the simultaneous pursuit of both poles of a duality, there are situations when it is potentially valuable to do so (i.e. when there are gains from ambidexterity) and others when it is not (i.e. when there are gains from focus)

In Table 2, we list three well-known dualities—cost differentiation, exploration-exploitation, differentiation-integration—as well as conditions under which efforts aimed at pursuing the two poles of each duality are preferable to a focus on one of the poles alone. For instance, consider the duality that was at the heart of the reorganization at Cisco—cost focus versus differentiation (in this case, customer responsiveness). On an efficiency frontier, dividing efforts between enhancing cost efficiency and differentiation is never sensible, because improvements in one can only come at the expense of the other. This is the case of "gains from focus" popularized by Porter through his warning to companies to avoid getting "stuck in the middle" (Porter 1985). In contrast, when moving towards an efficiency frontier, it is better to spread efforts towards both cost reduction and differentiation. This is because the shortest path is typically likely to involve some movement along both cost and differentiation dimensions, so that in this case there are "gain from ambidexterity."[11] Some of the early influential work on quality management implicitly espoused such a logic when arguing for the possibility of simultaneously pursuing quality improvements and cost reductions. Which

Table 2 Dualities: When Is It Better to Be Ambidextrous?

Duality	Gains from ambidexterity when	Gains from focus when
Cost vs. differentiation	Firms are far from the efficiency frontier	Firms are on the efficiency frontier
Exploration vs. exploitation	Moderate levels of change (i.e., some change and some stability in the search environment)	Extremes of stability or change in the search environment
Differentiation vs. integration	Heterogeneity in unit-level environments coupled with interunit interdependence	Heterogeneity without interdependence, or interdependence without heterogeneity.

condition—gains from ambidexterity or gains from focus better describes a setting, we believe, is dependent on contingencies such as those set out in Table 2, rather than necessarily being one or the other (He and Wong 2004, Katila and Ahuja 2002).

Given this representation, (for a technical version of the model described above, please see Appendix §A1) we can now ask under what conditions an inconsistent organizational architecture can exist stably, so that neither the employees nor the designer would seek to alter their choices, given the other's choices. Put differently, given an informal organization, when would the designer optimally choose a formal organization that would result in the employees acting inconsistently with it? The answer could help to understand how the compensatory fit we observed at Cisco Systems worked.

Stability. We outline the intuition for the conditions under which inconsistent architectures can be stable graphically here, though a complete technical presentation may be found in the appendix.

Figure 5 makes it clear that the impact of choosing a formal organization inconsistent with the informal organization is to move the mix of employee activities away from the edges towards the center (E). Further, such a course of action is beneficial when there are gains from ambidexterity—i.e., when organizational performance is higher under some mix of activities than under just activity A or B alone. For instance, given an informal organization that encourages primarily "B" type behavior, as in Figure 5, under gains from ambidexterity, the designer is better off choosing the formal organization α, which keeps the distribution of employee efforts near the center (and therefore at a higher value) rather than formal organization β that would push the mix of activities towards the corner. In contrast, as Figure 6 shows, under gains from focus, given an informal organization (emphasizing B), the designer would pick β in order to push the mix of activities towards the corner (and therefore attain higher organizational performance).[12]

However, this only covers the designer's motivations; we also need to understand why the employees would not

Figure 5 Compensatory Fit Through Inconsistent Architecture

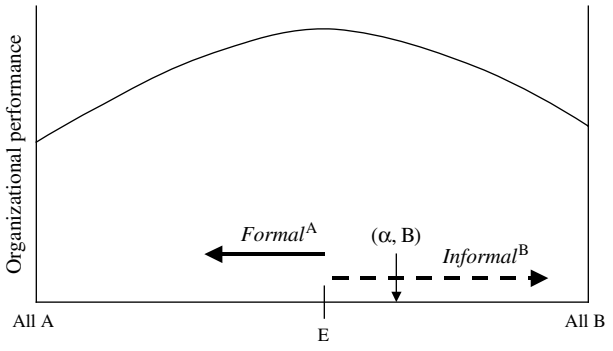
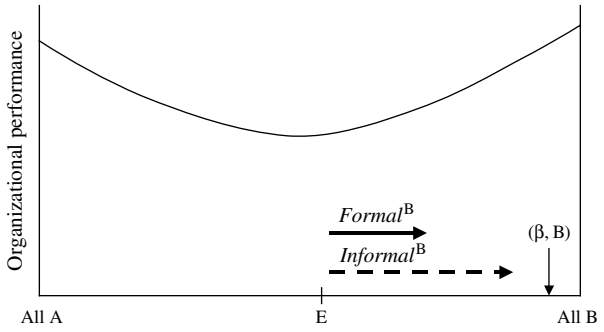


Figure 6 Supplementary Fit Through Consistent Architecture



adjust their mix of activities to attain consistency with the formal organization, since the rewards from the formal organization increase by doing so. If employees prefer to choose a mix of activities that is inconsistent with the formal organization, it must be because the rewards for acting consistently with the informal organization must be large enough to outweigh the gains to employees from acting consistently with the formal organization.

Thus, a stable inconsistent organizational architecture can exist under the conjunction of two circumstances: a powerful informal organization and contingencies that create gains from ambidexterity (see Appendix §A2.1). Further, the informal organization must be "powerful" in the precise sense that it motivates employees to select a mix of activities that is predominantly skewed towards one pole of the duality. Because the resulting inconsistent architecture generates superior performance, it represents a state of fit between the formal and informal organization. We label this as compensatory fit, as the formal and informal organizations motivate inconsistent (distinct) but complementary (jointly value creating) activities. This captures the post-reorganization situation at Cisco Systems—a state of compensatory fit between the formal organization (which emphasized cost efficiency) and the informal organization (which emphasized customer responsiveness) given external conditions that made achieving a balance between the two valuable. We state this result formally as our first proposition.

Proposition 1 (P1). *A state of compensatory fit through an inconsistent organizational architecture can exist under the conjunction of two conditions*: (i) *gains from ambidexterity and* (ii) *an informal organization that strongly motivates behavior consistent with one of the poles of the relevant duality.*

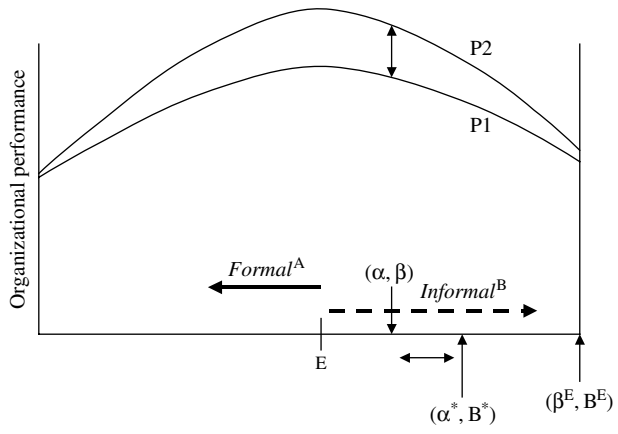
Efficiency. In any inconsistent architecture, the employees incur some opportunity costs, because given the emphasis of the informal organization (say B) they would be better off if the designer had chosen a formal organization that was consistent with it (β). Put differently, with an inconsistent architecture, employees miss out on the chance of being rewarded by the formal organization for doing what they would (largely) do

anyway in response to the pressures of the informal organization. Thus the employees would always prefer a formal organization that is consistent with the informal organization. For instance, in post-reorganization Cisco Systems, the employees would very likely have preferred a formal organization that continued to encourage customer responsiveness, given the strong emphasis of the informal organization—both in terms of culture and the existing pattern of relationships—on encouraging such activities (through the customer advocacy culture and the pattern of informal relationships, for instance).

We depict this graphically in Figure 7, where the realized organizational architecture is (α, B) but employees would in fact prefer (β^e, B^e). The designer, however, prefers to choose an inconsistent formal organization, resulting in (α, B) if the conditions for compensatory fit we outlined in (P1) are met. Thus, due to gains from ambidexterity, while the designer's payoff is maximised by pulling the allocation towards the center, the employee's payoff is maximized under a formal organization that pushes the allocation towards the edge. Since the designer does not take into account the employee's payoffs from the informal organization, there is a tendency to pull the allocation towards the center to an extent that is more than warranted by joint surplus maximization. This creates a source of inefficiency whenever compensatory fit exists. The value maximization principle (Milgrom and Roberts 1992, p. 36) states that a set of choices is efficient only if it maximizes the total value to all participants. Inefficiencies can eventually lead to lower performance (for instance, through lowered employee motivation or turnover), so it is important to assess the conditions under which the inefficiencies created by compensatory fit are minimized.

In Figure 7, the efficient architecture denoted by (α^*, B^*) will lie somewhere between (α, B) and (β^e, B^e). Our key result about the efficiency of compensatory fit is that (α^*, B^*) and (α, B) converge to each other (i.e., the inefficiency reduces) as the magnitude of the gains from ambidexterity increase. The intuition for this result can be explained in terms of Figure 7 (for a technical discussion, please see Appendix §A2.2). The relative distance between (α^*, B^*) and (α, B) versus between (α^*, B^*) and (β^e, B^e) indicates the relative emphasis placed on the employee's and designer's payoffs in joint value maximization (the shorter the distance, the greater the weight). By definition, the point (α^*, B^*) places exactly the right weight on the designer's and employee's payoffs for total value maximization. Now, the greater the gains from ambidexterity (i.e. the higher the peak in the organizational performance curve—compare (P1) and (P2), the greater the designer's payoff at (α, B) while the employee's payoff is unaffected. Therefore, the greater the magnitude of the gains from ambidexterity, the more the emphasis on the designer's payoff relative to the employee's in joint value maximization, so that the efficient choice and the designer's actual choice draw closer.

Figure 7 Efficiency of Compensatory Fit



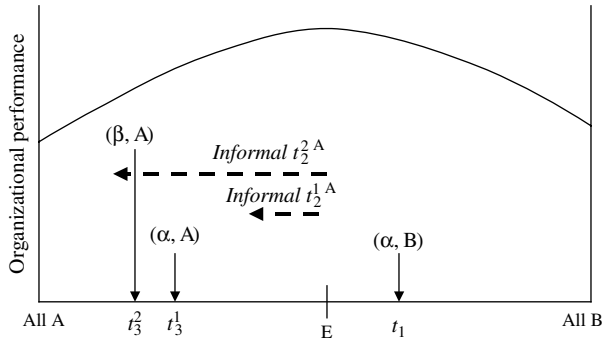
Proposition 2 (P2). *The inefficiencies associated with employees working in an inconsistent architecture in situations of compensatory fit decline with the magnitude of gains from ambidexterity.*

Change. To explore how the inconsistent architectures supporting compensatory fit can change when the necessary conditions outlined in (P1) break down, we now assume that there are two periods to consider in our model—a design period (t_1) in which the designer makes his choice of formal organization, and an adjustment period (t_2) in which the informal organization or external contingencies (such as gains from ambidexterity) change. The designer cannot revise choices in the second period (if he could, this would be equivalent to the simple one period model discussed so far), but we assume that a foresighted designer can anticipate the impact of the changes when making decisions about the formal organization in the first period. In other words, the designer optimizes the present value of organizational performance (net of any design costs) over the two periods when making his choice in the first period. In contrast a "myopic" designer would ignore the adjustments taking place in the second period (see Appendix §A3).

We first consider the case when beginning with an inconsistent architecture, the informal organization adjusts to the formal organization over time. For instance, as we observed at Cisco Systems, the informal organization supporting customer responsiveness seemed to weaken over time and become increasingly aligned with the formal organization and its emphasis on cost efficiency—so much so that new formal organizational structures (the business councils) had to be put in place to create additional pressures toward customer responsiveness.

Figure 8 illustrates the possible consequences of such changes to the informal organization. A designer with foresight would factor in this change (appropriately discounted) into the first period decision making. As a consequence, the conditions for compensatory fit become

Figure 8 Dynamics of Compensatory Fit



more stringent in the first period—the informal organization would have to be even "stronger" than in the case with no adjustment for the designer to select a formal organization inconsistent with the informal one (see Appendix §A3.1).

Interestingly, what happens in the next design period (period 3) depends on the magnitude of the adjustment that takes place in period 2. With moderate adjustment of the informal organization in period 2 (e.g., to the levels marked t_2^1), there is no incentive for reorganization in period 3, as the new optimal architecture in period 3 (t_3^1) is consistent—despite the gains from ambidexterity. With strong adjustment (e.g., to the levels marked t_2^2), we get a second period that clearly displays misfit (despite consistency between the formal and informal organization, because the designer would have preferred to set the formal organization inconsistent with the informal organization, if that were possible in this period). This is followed by reorganization towards an inconsistent architecture in period 3 (t_3^2). The intuition is similar to that for (P1), which states the conditions necessary for a stable inconsistent architecture; unless the informal organization becomes strong in the opposite direction, one cannot have an inconsistent architecture again (please see Appendix §A3.1.1 for technical details).

Adjustment of the informal organization to the formal organization thus undermines the stability of inconsistent architectures—if the adjustment is moderate, we would expect consistency between formal and informal organization and no further reorganization; if the adjustment is substantial, a period of misfit is followed by a reorganization to a new inconsistent architecture (and compensatory fit). Thus, assuming unchanging conditions of gains from ambidexterity, adjustment of the informal organization to the formal organization could provide an endogenous explanation for repeated reorganization (Nickerson and Zenger 2002), though this depends critically on the rate of adjustment of the informal organization (i.e., the extent of adjustment in period 2).

We next consider how an inconsistent architecture would be affected if the contingencies change so that the gains from ambidexterity give way to gains from focus (see Table 2). We find that an inconsistent architecture in the first period implies that there is a limit to the adjustment anticipated by the designer between periods—if there were very large gains from focus in the second period, a foresighted designer will effectively ignore gains from ambidexterity in the first period and select a consistent architecture in the first period itself (see Appendix §A3.2).

We also find that although the informal organization remains unchanged (by assumption), it still plays a critical role in determining what happens in periods 2 and 3. If the strength of the informal organization is above a critical threshold value, we find that the designer has no incentives to reorganize in period 3—an inconsistent architecture then prevails *despite* gains from focus. However, if the informal organization is weaker than this threshold, then the second period clearly displays misfit (because the designer would have preferred to set the formal organization consistent with the informal organization, if that were possible in this period), and in period 3 the designer will reorganize towards a formal organization consistent with the informal organization (for instance, compare the difference in organizational performance that would be achieved with (α, B) and (β, B) in Figures 5 and 6). Therefore, a strong informal organization also protects against misfit and the need for reorganization when there is a change from gains from ambidexterity to focus (see Appendix §A3.2.1).We summarize the key insights from this analysis of change as follows.

Proposition 3 (P3). *The need for reorganization following the breakdown of conditions for compensatory fit depends on the strength of the informal organization*: *When gains from ambidexterity prevail, there is no incentive to reorganize if the informal organization adjusts only moderately to the formal organization*; *when gains from focus replace gains from ambidexterity, there is no incentive to reorganize in the presence of a strong informal organization.*

Discussion

It has, of course, been well-known since the work of Chester Barnard (1939, p. 169) and Herbert Simon (1957) that the informal organization can augment the formal organization by legitimizing its authority and enabling the performance of tasks that can be only partially specified through formal organizations (Child and McGrath 2001, Mintzberg 1990, Nadler and Tushman 1998). Our study adds crucial texture to this general insight: the informal organization can enhance the effectiveness of the formal organization either by supplementing it—in effect acting as "the last mile" that connects the formal organization to employee actions—or by compensating for it, by motivating behaviors that are valuable

but not adequately emphasized by the formal organization. As Nadler and Tushman (1997) note, while informal processes may be outside the direct purview of formal design, "... managers should be looking for ways to provide for designs and roles that are consistent with—and that capitalize on these informal processes" (p. 111). Our analysis shows that consistency may not be necessary in order to capitalize on the informal organization.

We also contribute to the literature on ambidextrous organizations (Brown and Eisenhardt 1997, Tushman et al. 2004, Tushman and O'Reilly 1996) in two specific ways. First, we note that gains from ambidexterity may not be ubiquitous—in some cases gains from focus may dominate. We also outline possible contingencies that distinguish between the two situations for some common dualities (Table 2). Put differently, ambidextrous organizations may not always be desirable or needed.

Second, in this study we have explored the origins of combinations of formal and informal organization that enable ambidexterity. The classic solutions to achieve ambidexterity have relied on organizational separation—both spatial and temporal. For instance, the common principle underlying "skunkworks" (Christensen 1997) and ambidextrous organizational forms (Tushman and O'Reilly 1996) is the spatial separation of exploration and exploitation processes across different organizational units. The principle of temporal separation is best known in the context of innovation and involves exploration and exploitation in the same organizational unit, but at different times (Brown and Eisenhardt 1997, Puranam et al. 2006).

An alternative approach to balancing the conflicting organizational demands of dualities lies in combinations of elements of formal and informal organization into a hybrid arrangement. For instance, Gibson and Birkinshaw (2004) point to such combinations that create contextual ambidexterity, and Brown and Eisenhardt (1997) describe "semistructures," which combine a few key elements that promote exploitation with features that support exploration. However, we know little about how these unusual combinations of formal and informal organizational elements arise, apart from the fact that they "must be grown, not assembled at a single point in time" (Brown and Eisenhardt 1997, p. 31), and that there is equifinality—"depending on the administrative heritage of a given business and the values of its leaders, equally valid but slightly different organizational context solutions can be created" (Gibson and Birkinshaw 2004, p. 223). This paper suggests that reorganizations, and the resulting organizational inconsistencies they create, can be a means of building such a solution.

There are specific ways in which our distinction between supplementary and compensatory fit extends and generalizes results from recent studies on the link between organizational change and performance. Nickerson and Zenger (2002), for instance, used a dynamic simulation model to explain why companies seem to undergo frequent reorganizations and move in a pendulum-like fashion between discrete organizational structures that embody centralization and decentralization. In an insightful analysis, they show that under the assumptions that the formal organization is discrete (it can only support all A or all B, for instance) but the informal organization is continuous and adjusts gradually to changes in the formal organization, then modulating between centralized and decentralized formal organization may be an efficient way to overcome the discreteness of formal organization choices.

Whereas the Nickerson and Zenger argument pertains to the value of a "continuous" informal organization overcoming the "discreteness" of formal organization, our argument is about how *inconsistencies* between the formal and informal organization can help achieve complementary dualities. In our model, we treat the formal and informal organization symmetrically, in that both affect employee behavior, so that the focus is on how they jointly serve to adjust the mix of employee behaviors (Figure 3).[13] Further, since we conceptualize the formal organization more broadly than discrete grouping decisions to include linking structures as well (Nadler and Tushman 1997), we do not need to impose a discreteness assumption on the formal organization. As a consequence, we argue that the inertial nature of the informal organization, which slows adjustment between the formal and informal organization, is only likely to be beneficial under gains from ambidexterity; if gains from focus are dominant, then inconsistency can be harmful.

A related study by Hannan et al. (2003a) presents a formal theory to elucidate why changes to single organizational elements are sometimes observed to increase the hazard of organizational mortality. They argue that change to a single element (such as a division-level incentive system) can set off a cascade of changes leading to a full-blown reorganization, if the initial element being changed is tightly linked (central) to other elements. These cascades of changes arise because each element must achieve consistency with the elements it is connected to. Hannan et al. argue that during the periods when consistency is being attained, the organization is unable to function effectively. This leads to their conclusion that the more central the element that experiences the initial change, the longer the cascade of changes and consequently, the greater the increase in the hazards of mortality.

Our analysis suggests that the logic of Hannan et al. applies most strongly to situations of gains from focus, when organizational inconsistencies can lower performance, and the direct costs of achieving consistency as well as the opportunity costs incurred during the period of achieving consistency can doubtless increase the hazards of mortality. However, our framework suggests that

in the presence of gains from ambidexterity, inconsistencies can enhance rather than detract from performance if the formal and informal organizations emphasize the two poles of an underlying duality. Therefore, we expect that the impact of changes to central elements on the hazards of organizational mortality is strongest in the presence of gains from focus; with gains from ambidexterity this effect may be weaker.

Since our contribution is primarily conceptual, we recognize that further research is needed to establish a causal link between organizational inconsistency and performance, something that neither a model nor a single case alone can achieve. Despite this, we believe that our study is valuable because it provides a novel and precise way of thinking about the relationships between organizational elements in general, and formal and informal organization in particular. Further, we foresee some specific avenues for research that builds on this study. For instance, our analysis shows that the stability of inconsistent organizational forms depends on continued limits to the adjustment of the informal organization, as well as a continued state of gains from ambidexterity. We believe this proposition will prove to be a fruitful line of research, as it appears amenable to cross-sectional analysis. For instance, our theory would predict that among a population of firms facing similar conditions of gains from ambidexterity, the strength of the informal organization would predict the likelihood and shape of future reorganizations.

Our study is not without limitations, which arise partly from structural features of the research tools and design we employ—single case studies and formal analysis. The former enjoys the benefits of detailed observation but suffers from limits to generalization (Miles and Huberman 1994, Yin 1994), while the latter allows for theoretical generalization but involves unreal and stark assumptions about behavior in organizations (Lave and March 1993). However, each methodology also provided unique insights not possible with the other. We never could have reached the stage of developing a formal theory about compensatory fit without the initial insights gleaned from our fieldwork about how inconsistencies between formal and informal organization could be useful. However, the formalization added several new insights that the fieldwork and verbal theorizing alone may not have generated. For instance, while our research at Cisco certainly helped us see how the informal and formal organization could be inconsistent and yet create value under gains from ambidexterity, the condition that there should be a threshold level of the strength of the informal organization only became clear once we explicitly modeled the cost of implementing the formal organization, as well as the idea of different strengths of the informal organization (P1). The model also helped us to distinguish the concepts of "consistency" and "fit" from each other very sharply—it helped us see that an inconsistent architecture can arise even in the absence of gains from ambidexterity—and that gains from focus do not automatically lead to a consistent architecture (P3). The distinctions arise because of the costs of design and differences in the marginal product of the two kinds of efforts (see the appendix).

It was also fairly intuitive to us from the fieldwork that there could be winners and losers with compensatory fit—the designer gained while employees bore the opportunity costs of living and working in an inconsistent organization. Analyzing the model helped us see that while inefficiency appeared inevitable with compensatory fit, as the magnitude of the gains from ambidexterity increased, the designer's choices converged to the efficient outcome (P2). Finally, once it came to exploring the dynamics of what would happen when the conditions for compensatory fit broke down, we found the model even more indispensable. To keep track of the effects of changing over time, (a) the gains form ambidexterity, (b) adjustment to the informal organization, as well as (c) a rational designer's anticipation of these changes proved too complicated to do verbally—there were just too many "moving parts" to be able to reach a clear conclusion. Modeling this problem, however, made it easy to see what would happen (P3).[14] We hope that by combining the use of two very different methodologies (qualitative interview data and formal analysis), we have been able to achieve our own version of "compensatory fit."

We acknowledge that analysis of a formal model is one among many theory-building techniques, such as induction from field data, verbal explication, or integration across prior literatures (as opposed to empirical theory-testing techniques such as experiments or regression analysis). When working with a formal, as opposed to a verbal model, we are of course subject to the same trade-off between realism and rigor that applies to all models in the social sciences. Formal models such as the one we use in this paper merely highlight the trade-off more sharply—they accentuate the benefits of clearly stating assumptions and the value to using solution concepts (like the subgame perfect Nash equilibrium) that can generate nonintuitive insights (Lave and March 1993). However, the assumptions that underlie models such as ours also appear stark and unrealistic (two players, two poles of a duality, etc.). In our work, we have been guided by other students of organization who have demonstrated that the simplifying assumptions of mathematical models are justified as long as they provide a rigorous basis for improving our understanding of a complex phenomenon, and generate interesting and testable predictions (Abrahamson and Rosenkopf 1993, Bhattacharya et al. 1998, Bruderer and Singh 1996, Carroll and Harrison 1998, Lave and March 1993, Siggelkow 2002). We hope that we have met these criteria in this paper.

While we have focused on reorganization as a mechanism that achieves inconsistency in this study, it is clearly

not the only one. Rotation of employees across formal roles or "mandated subversion" of the formal organization by managers may be other mechanisms that deserve closer scholarly attention. Yet another direction for extension might be a study of the relative efficacy of formal linking mechanisms such as incentives, cross-functional teams and boundary spanners compared to the "residual" informal linkages created by personal ties and organizational culture in overcoming the discreteness of formal grouping choices. While all these mechanisms are well-known in theory, and also well-studied empirically in isolation, comparative analysis remains scarce.

Finally, we note that our study suggests some novel and subtle aspects of the intertemporal relationship between formal and informal organization, and the consequences for organizational change and renewal. (Also see Tripsas (2009) and Eggers and Kaplan (2009) for managerial cognition perspectives on organizational change and renewal.) Given lags and limits in the adjustment of the informal organization to the formal organization, under gains from ambidexterity, the optimal formal organization capitalizes on yesterday's informal organization and lays the ground for tomorrow's. An inconsistent formal organization (achieved through reorganization, for instance) leverages the existing informal organization to motivate the mix of behaviors needed to achieve compensating fit. The formal organization itself focuses on the behaviors that are not adequately encouraged by the informal organization. However, the choice of today's formal organization also shapes tomorrow's informal organization (within limits), due to the process of eventual adjustment between the two. Further investigation of these intertemporal links in organization design should prove fascinating.

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Appendix

A1. Model Specification

Employees (acting as a unitary agent) are assumed to choose how they will split their total efforts (normalized to 1) between the two kinds of activities. Let x represent B type effort; then $1-x$ represents the effort spent on A type efforts. The rewards to the employees (w) from choosing any particular mix of activities, depends on both the rewards from the formal (w_f) and the informal organization (w_i), as captured in the following equation:

$$w(x) = w_f(x) + w_i(x) \tag{1}$$

where

$$w_f(x) = \left(\tfrac{1}{2} + \theta\right)x + \left(\tfrac{1}{2} - \theta\right)(1-x) \quad \text{and}$$
$$w_i(x) = \left(\tfrac{1}{2} + \delta\right)x + \left(\tfrac{1}{2} - \delta\right)(1-x).$$

The parameter θ represents the formal organization chosen by the designer to support A or B type activities by employees to different extents. Thus, when the designer sets a positive (negative) value of θ, this corresponds to a behavior-based contract that encourages employees to do more B (A) than A (B). The parameter $\delta \in [-\frac{1}{2}, \frac{1}{2}]$ represents rewards to the employee from behaving in consonance with the informal organization. Thus, a positive value of δ indicates the existence of an informal organization that emphasizes B type efforts over A type efforts. To complete specifying the employee's optimization problem, we define a cost of effort function (c) for the employee:

$$c(x) = \frac{x^2}{2} + \frac{(1-x)^2}{2}. \tag{2}$$

The assumption of independent quadratic costs of effort is common in the literature on teams, and agency theory in general (Baker 2002, Cremer 1990, Gibbons 1998, Prendergast 1999, Siggelkow 2002) and simply captures the notion of increasing marginal disutility of an additional unit of effort for each kind of effort.

We assume that the designer chooses the formal organization to enhance organizational performance, taking into account the costs of creating and maintaining such a formal organization. Organizational performance arises as a function of the mix of activities that the employees engage in, as well as the manner in which the two kinds of effort interact. The output function (P) specified below allows us to explicitly capture these possible interactions between the two kinds of efforts as well as the magnitude of the interaction:

$$P(x) = ax + (1-x) + \gamma x(1-x) \tag{3}$$

where $\gamma \neq 0$ is a parameter that describes the nature of interaction between choices, and $a > 0$ is a parameter that sets the relative magnitude of the marginal contributions of each kind of effort to output. When the parameter $\gamma > 0$, this represents a situation of gains from ambidexterity; some split of activity between A and B type efforts is typically better than all A or all B (the exact split depends on a). Conversely there are gains from focus when $\gamma < 0$—all A or all B is usually better than a mix (which corner is better will depend on the value of a). Finally, to complete specification of the designer's optimization problem, we specify the cost of design incurred by the designer for choosing any given formal organization (θ).

$$D(\theta) = d\theta^2 \tag{4}$$

where $d > 0$. This corresponds to the cost of designing and implementing formal structures, information channels and incentives, which increases with the emphasis placed on encouraging either type of behavior. We will make the technical assumption that $d + \gamma > 0$ to ensure an interior maximum. This articulates the assumption that the cost of design is nontrivial.

A2. Static Model

The equilibrium concept we use is subgame perfect Nash equilibrium. We will assume that the designer moves first to choose the formal organization θ^* to maximize $P(x^*, \theta) - w_f(\theta) - D(\theta)$ by looking forward and anticipating the employee's action x^*. The employee chooses x^* to maximize $w(\theta^*, x) - c(x)$.

Solving the employee's optimization problem, and keeping in mind that $x \in [0, 1]$ we find:

$$x^*(\theta) = \begin{cases} \frac{1}{2} + \delta + \theta & \text{if } -\frac{1}{2} < \delta + \theta < \frac{1}{2} \\ 0 & \text{if } \delta + \theta \le -\frac{1}{2} \\ 1 & \text{if } \delta + \theta \ge \frac{1}{2}. \end{cases} \quad (5)$$

Solving the designer's optimization problem, for an internal solution for x^*, we find: $\theta^* = (a - 1 - 2\delta(1 + \gamma))/(2(2 + d + \gamma))$. We can therefore write:

If $\gamma > 0$

$$x^* = \frac{1}{2} + \frac{a - 1 + 2(1 + d)\delta}{2(2 + d + \gamma)} \quad \text{and}$$

$$\theta^* = \frac{a - 1 - 2\delta(1 + \gamma)}{2(2 + d + \gamma)} \quad \text{for } \delta \in \left[-\tfrac{1}{2}, \tfrac{1}{2}\right].$$

If $\gamma < 0$.

$$\text{If } \frac{-(a + 1 + d + \gamma)}{2(1 + d)} < \delta < \frac{(3 - a + d + \gamma)}{2(1 + d)},$$

$$x^* = \frac{1}{2} + \frac{a - 1 + 2(1 + d)\delta}{2(2 + d + \gamma)} \quad \text{and} \quad \theta^* = \frac{a - 1 - 2\delta(1 + \gamma)}{2(2 + d + \gamma)}.$$

$$\text{If } \delta \le \frac{-(a + 1 + d + \gamma)}{2(1 + d)},$$

$$x^* = 0 \quad \text{and} \quad \theta^* = -\tfrac{1}{2} - \delta. \quad (6)$$

$$\text{If } \delta \ge \frac{(3 - a + d + \gamma)}{2(1 + d)},$$

$$x^* = 1 \quad \text{and} \quad \theta^* = \tfrac{1}{2} - \delta.$$

Note that $\partial^2 P(\theta, \delta)/(\partial\delta\partial\theta) = -2\gamma$. Thus, when $\gamma < 0$ moving θ *in same direction* as the informal organization strengthens the marginal effect of the informal organization (supplementary fit). When $\gamma > 0$ moving θ *in a direction opposite* to the informal organization strengthens the marginal effect of the informal organization (compensatory fit) because $\partial^2 P(\theta)/(\partial\delta\partial(-\theta)) = 2\gamma$.

Definitions. An *inconsistent organizational architecture* is one in which the employee emphasizes the activity other than that emphasized by the formal organization. Thus (α, B) denotes the inconsistent organizational architecture in which $\theta^* < 0$, $x^* > \frac{1}{2}$ while (β, A) denotes the case where $\theta^* > 0$, $x^* < \frac{1}{2}$. A consistent organizational architecture is thus one in which the employee emphasizes the same activity as that emphasized by the formal organization eg. (α, A) or (β, B). Note that an inconsistent architecture can arise even in the absence of gains from ambidexterity, and that a consistent architecture is not automatic with gains from focus.

Compensatory fit arises when an inconsistent organizational architecture is used to harness the gains from ambidexterity ($\gamma > 0$). Supplementary fit arises when a consistent organizational architecture is used to exploit the gains from focus ($\gamma < 0$).

A2.1. Compensatory Fit

The condition for the architecture (α, B) to generate compensatory fit is equivalent to stating the condition when $\theta^* < 0$, $x^* > \frac{1}{2}$ given $\gamma > 0$, $\delta > 0$.

This is $\delta > \max\{(a - 1)/(2(1 + \gamma)), (1 - a)/(2(1 + d))\}$. By symmetry, the mirror image architecture (β, A) generates compensatory fit if $\delta < \min\{(a - 1)/(2(1 + \gamma)),\ (1 - a)/(2(1 + d))\}$.

The conditions for supplementary fit are $(a-1)/(2(1+\gamma)) > \delta > (1 - a)/(2(1 + d))$ for (β, B) and $(a - 1)/(2(1 + \gamma)) < \delta < (1 - a)/(2(1 + d))$ for (α, A), given $\gamma < 0$.

The restrictions $a \in [-\gamma, 2 + \gamma]$ and $a \in [-d, 2 + d]$ on the marginal rate of technical substitution between A and B type efforts ensure that $-\frac{1}{2} \le (a - 1)/(2(1 + \gamma)) \le \frac{1}{2}$ and $-\frac{1}{2} \le (1 - a)/(2(1 + d)) \le \frac{1}{2}$.

Thus, compensatory fit requires that the informal organization be above a threshold level of strength. Further, the marginal contributions of each type of effort to output should not be too different.

A2.2. Efficiency of Compensatory Fit

We denote the efficient choice of formal organization as θ^e

$$\theta^e = \arg\max_{\theta}[P(\theta) - w_f(\theta) - D(\theta) + w_f(\theta) + w_i(\theta) - c(x(\theta))]$$

$$\theta^e = \frac{a - 1 - 2\delta\gamma}{2(1 + d + \gamma)}$$

$$\theta^e - \theta^* = \frac{a - 1 + 2(1 + d)\delta}{2(1 + d + \gamma)(2 + d + \gamma)}$$

$$\Rightarrow\ |\theta^e - \theta^*| \text{ is strictly decreasing in } \gamma\ (\gamma > 0).$$

Thus, the difference between the efficient and actual (compensatory fit) formal organization decreases in the magnitude of the gains from ambidexterity.

A3. Dynamics

A3.1. Adjustment of Informal Organization

We now model a two-stage version of the problem. In the first stage, given an informal organization $\delta 1$ the designer chooses a formal organization θ and the employee chooses an allocation $x1^*$ given $(\theta, \delta 1)$. In the second stage, the informal organization adjusts and takes a new value $\delta 2$ and the employee chooses a new allocation $x2^*$ given $(\theta, \delta 2)$. A foresighted designer therefore sets θ taking into account both these stages, and we call his optimal choice θ_δ. We consider a simple adjustment mechanism for the informal organization.

$$\delta_{n+1}(\theta_n) = \left\{ \begin{array}{ll} k\theta_n & \text{if } \theta_n\delta_n < 0 \\ \delta_n & \text{if } \theta_n\delta_n \ge 0 \end{array} \right\} \quad 0 < k < 1. \quad (7)$$

The designer's problem is to choose θ_δ to maximize[15]

$$\pi_\delta(\theta, \delta) \equiv \pi_1(x1(\theta, \delta 1)) + \pi_2(x2(\theta, \delta 2))$$

given

$$x1(\theta, \delta 1) = \tfrac{1}{2} + \theta + \delta 1$$

$$\delta 2(\theta) = k\theta \ \Rightarrow\ x2(\theta, \delta 2(\theta)) = \tfrac{1}{2} + \theta + k\theta.$$

We find $\theta_\delta = \arg\max_\theta \pi_\delta = ((2+k)(a-1) - 2(1+\gamma)\delta 1)/(2(4+2(d+k)+\gamma[1+(1+k)^2]))$. By way of contrast, the formal organization selected by a "myopic" designer (who is blind to the second period adjustment of the informal organization) is $\theta^* = ((a-1) - 2(1+\gamma)\delta 1)/(2(2+d+\gamma))$.

We first analyze the conditions for compensatory fit in the first period.

A3.2. Compensatory Fit with Adjustment of the Informal Organization

As before, the condition for the architecture (α, B) to generate compensatory fit is the condition when $\theta_\delta < 0$, $x^* > \frac{1}{2}$ given $\gamma > 0$, $\delta 1 > 0$.

This is

$$\delta 1 > \max\left\{\frac{(a-1)(2+k)}{2(1+\gamma)}, \frac{(1-a)(2+k)}{2z}\right\}, \quad \text{where}$$
$$z = 1 + 2(1+d) + 2k + \gamma(1+k)^2 > 0.$$

By symmetry, the conditions for the architecture (β, A) to generate compensatory fit in period 1 is

$$\delta 1 < \min\left\{\frac{(a-1)(2+k)}{2(1+\gamma)}, \frac{(1-a)(2+k)}{2z}\right\}.$$

The restrictions $a \in \{1-(\gamma+1)/3, 1+(\gamma+1)/3\}$ and $a \in \{1-z/(2+k), 1+z/(2+k)\}$ on the marginal rate of technical substitution between A and B type efforts ensure that $\frac{1}{2} \geq (a-1)(2+k)/(2(\gamma+1)) \geq -\frac{1}{2}$ and $\frac{1}{2} \geq (1-a)(2+k)/z \geq -\frac{1}{2}$.

Proof. Suppose $\delta 1 > 0$, then $\theta_\delta < 0 \Rightarrow \delta 1 > (a-1)(2+k)/(2(1+\gamma))$. If $a \leq 1$, this condition always holds, since the right-hand side is nonpositive. Now consider $a > 1$.

If

$$a \leq \frac{4+\gamma}{3} \Rightarrow a \leq 1 + \frac{\gamma+1}{3}$$
$$\Rightarrow 3(a-1) \leq \gamma + 1$$
$$\Rightarrow (a-1)(2+k) \leq \gamma + 1$$
$$\Rightarrow \frac{(a-1)(2+k)}{2(1+\gamma)} \leq \frac{1}{2}.$$

Similarly,

$$a \geq 1 - \frac{\gamma+1}{3} \Rightarrow \frac{(a-1)(2+k)}{2(\gamma+1)} \geq -\frac{1}{2}.$$

Thus, given $a \in \{1-(\gamma+1)/3, 1+(1+\gamma)/3\}$ we can be sure that there are admissible values of $\delta 1$ such that $\frac{1}{2} \geq (a-1)(2+k)/(2(\gamma+1)) \geq -\frac{1}{2}$.

Similarly, $x1^* > \frac{1}{2}$ if $\delta 1 > (1-a)(2+k)/(2z)$ If $a > 1$, this condition always holds, since the right-hand side is nonpositive. Now consider $a \leq 1$. If

$$a > 1 - z/(2+k) \Rightarrow \frac{z}{(2+k)} \geq 1 - a$$
$$\Rightarrow \frac{1}{2} \geq \frac{(1-a)(2+k)}{2z}.$$

By symmetry,

$$a \leq 1 + \frac{z}{(2+k)} \Rightarrow -\frac{1}{2} \leq \frac{(1-a)(2+k)}{2z}.$$

Thus, given $a \in \{1-z/(2+k), 1+z/(2+k)\}$ we can be sure that there are admissible values of $\delta 1$ such that $\frac{1}{2} \geq (1-a)(2+k)/(2z) \geq -\frac{1}{2}$.

Note that the conditions for the formal and informal organization to be inconsistent with each other are more stringent when the adjustment of the informal organization is anticipated—both in terms of the strength of the informal organization, as well as the limit on the difference in marginal contribution of both types of effort. Therefore if θ_δ is inconsistent with the informal organization, so is θ^*

A3.1.1. What Happens in Period 3? Suppose we have architecture (α, B) in the first period, then

$$\Rightarrow \delta 1 = \delta > 0 \quad \text{and} \quad \theta_\delta^1 < 0$$
$$\Rightarrow \delta 2 = k\theta_\delta^1 < 0 \text{ (from } v\text{)}.$$

Given $\theta_\delta^1 < 0$, there is a misfit (in the sense that designer would ideally have preferred $\theta_\delta^1 > 0$ for the second period) if $\delta 2 < (a-1)(2+k)/(2(1+\gamma))$.

$$\delta 3 = \delta 2 < 0 \text{ (from } v\text{)}.$$

In period 3, θ will be set again as $\theta_\delta^3 = ((2+k)(a-1) - 2(1+\gamma)\delta 3)/(2(4+2(d+k)) + \gamma(1+(1+k)^2))$. This will result in an inconsistent organizational architecture (β, A) if

$$\delta 3 < \min\left\{\frac{(a-1)(2+k)}{2(1+\gamma)}, \frac{(1-a)(2+k)}{2z}\right\}.$$

Therefore, if the informal organization had adjusted strongly to the formal organization in period 2, there would be a misfit in period 2, and a reorganization in period 3 to a formal organization inconsistent with the informal organization. Else, there is a consistent architecture in period 3 despite gains from ambidexterity. Thus, whether there is a need for further reorganization after the adjustment of the informal organization depends critically on the rate of adjustment of the informal organization to the formal organization (i.e., the amount of adjustment in period 2).

A3.2.1. Switching Regimes: From Ambidexterity to Focus. Next, we analyze the case where starting from an inconsistent architecture, the informal organization remains unchanged, but γ changes sign from the first stage to the second—a switch from a regime of gains from ambidexterity to one of gains from focus. We will assume that the switch in γ occurs according to the following mechanism:

$$\gamma_2 = -j\gamma_1, \quad j > 0. \tag{8}$$

As before, the designer cannot change the formal organization in the second stage. Taking into account both these stages, a foresighted designer therefore sets θ and we call his optimal choice θ_γ. The designer's problem is to choose θ_γ to maximize

$$\pi_t(\theta, \gamma_1, \gamma_2) \equiv \pi_1(x1(\theta), \gamma_1) + \pi_2(x2(\theta), \gamma_2)$$

given

$$x1(\theta, \delta) = x2(\theta, \delta) = \tfrac{1}{2} + \theta + \delta.$$

The condition for internal solution is now $d + \gamma^t > 0$ where $\gamma^t = (\gamma_1 + \gamma_2)/2 = \gamma 1(1-j)/2$

We find $\theta_\gamma = \arg\max_\theta \pi_t = ((a-1) - \delta 2(1+\gamma^t))/(2(2+d+2\gamma^t))$. In contrast a myopic designer would choose: $\theta^* = ((a-1) - \delta 2(1+\gamma_1))/(2(2+d+2\gamma_1))$.

A3.3. Compensatory Fit with Switch in Ambidexterity/Focus Regimes

The condition for the architecture (α, B) to generate compensatory fit in period 1 ($\theta_\gamma < 0$, $x^* > \frac{1}{2}$ given $\gamma 1 > 0$, $\delta > 0$) is $\delta > \max\{(a-1)/(2(1+\gamma^t)), (1-a)/(2(1+d))\}$.

By symmetry, the mirror image architecture (β, A) generates compensatory fit if $\delta < \min\{(a-1)/(2(1+\gamma^t)), (1-a)/(2(1+d))\}$. The restrictions $a \in [-\gamma^t, 2+\gamma^t]$ and $a \in [-d, 2+d]$ on the marginal rate of technical substitution between A and B type efforts ensure that $-\frac{1}{2} \le (a-1)/(2(1+\gamma^t)) \le \frac{1}{2}$ and $-\frac{1}{2} \le (1-a)/(2(1+d)) \le w1/2$.

Note that the first part of the constraint for (α, B) can be rewritten as $j < (1 - a + (2+\gamma 1)\delta)/(\gamma 1 \delta)$ or as a constraint on the magnitude of the gains from focus in the second period. Thus, there is a limit to the adjustment that is possible between periods—if there are very large gains from focus in the second period, a foresighted designer will effectively ignore gains from ambidexterity in period 1 and select a consistent architecture.

A3.3.1. What Happens in Period 3? Suppose we have architecture (α, B) in the first period.

$$\Rightarrow \quad \delta > 0 \quad \text{and} \quad \theta_\gamma < 0.$$

If $\delta < (a-1)/(2(1-j\gamma 1))$, there is a misfit in the second period (in the sense that designer would ideally have preferred $\theta_\gamma > 0$ for the second period), and in period 3 the designer will reorganize towards a formal organization consistent with the informal organization. Therefore, a strong informal organization also protects against misfit and the need for reorganization when there is a change from gains from ambidexterity to focus. If $\delta > (a-1)/(2(1-j\gamma 1))$, then the inconsistent architecture continues in period 3.

Endnotes

[1]This is distinct from external fit, which refers to the optimal alignment of an organization's strategic choices with its environment. See Siggelkow (2001) and Miller (1992) for useful discussions of the distinction between the two notions of fit.

[2]For instance, the "McKinsey 7S" is a popular practitioner framework that embodies the belief in the importance of the formal and informal organization being consistent with each other in motivating the same kind of employee behavior.

[3]All quotes are drawn from our fieldwork involving interviews with 53 managers in various parts of the company, with the majority (36) drawn from the engineering groups, which was the locus of the reorganization. The interviews were conducted between December 2001 and March 2005.

[4]In a further refinement in May 2002, the company consolidated the 11 technology groups into 8, in order to put greater emphasis on routing and switching, the company's core business. However, the basic principle of grouping engineering by technology instead of customer segment did not change, but was reinforced through this refinement.

[5]Analyst reactions drawn from the following sources: Network Briefing Daily, August 24, 2001, "Cisco scraps corporate structure, centralizes engineering"; InfoWorld, George Chidi, August 24, 2001, "Cisco's reorganization cannot unpop the bubble"; InformationWeek, September 3, 2001, "Cisco reinvents itself to extend its market reach"; Tele.com, September 3, 2001, "Rejiggered Cisco targets the telecom market by way of the enterprise."

[6]Secondary data on post reorganization performance drawn from: Fortune, January 20, 2003, "The 100 best places to work in America"; Company Press Release, FY2002 Results; Mercury News, June 23, 2002, Jennifer Files, "Cisco leans to adjust to new reality"; see also the VAR satisfaction survey reported in VARBusines.com by Hailey Lynne McKeefry "Cisco Systems By a Nose" http://www.varbusiness.com/sections/98pages/204prod.asp.

[7]Empirical evidence on the emergence of social networks (and in particular on the effects of formal prescribed patterns of interaction on this emergence) is scarce. However, there is evidence that shows significant overlaps between formal authority relationships and informal networks of communication and influence (Ibarra 1993, Krackhardt 1990, Smith-Doerr and Powell 2005). It therefore appears plausible that formally specified roles lead to informal communication and influence ties and perhaps ultimately to friendship ties (in particular, see Smith-Doerr and Powell 2005, pp. 384–385).

[8]These gradual changes to the informal organization may be a consequence of the fact that the processes underlying the emergence of informal organization—socialization, tie formation, learning, and preference transformation—are themselves gradual.

[9]Though in our setting, employees do face two different kinds of tasks, we do not emphasize the multitasking problem familiar to agency theorists—our focus is not the optimal incentive contract between the designer and employees, but rather focus on how the choices of the two interact.

[10]Figure 5 can be generated by a number of production functions $y = f(\mathrm{A}, \mathrm{B})$ with budget constraints $\mathrm{A} + \mathrm{B} = k$ that share the properties (a) of an internal stationary point and (b) whether the stationary point is a maxima or minima determined by the sign of the cross-partial derivative $y_{\mathrm{A},\mathrm{B}}$.

[11]As an additional rationale, it is preferable to engage in a combination of both activities if the costs of efforts towards each activity are convex.

[12]To keep the graphical exposition simple, we ignore any differences in the marginal rate of technical substitution between the two efforts (so that E lies at the center), as well as the costs of design (so that the designer's actions are driven only by the shape of the performance function). The technical analysis in the appendix, of course, accounts for both these factors.

[13]Thus, in our model the informal organization plays no role in terms of creating variety that helps to adapt to changing circumstances—its function is primarily one of keeping the employee's allocation of effort closer to a point preferred by the organization designer.

[14]Having obtained the results, of course, we have worked hard to make them intuitive and accessible without the need for reverting to the formalization, but this should not underplay the value of the formalization in generating the insight in the first place.

[15]Note that we ignore any discounting of the second period—explicitly modeling discounting does not alter our results qualitatively.

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