Emergent by Design: Performance and Transformation at Infosys Technologies

Raghu Garud
Smeal College of Business, Pennsylvania State University, 430 Business Building, University Park, Pennsylvania 16802-3603, rgarud@psu.edu

Arun Kumaraswamy
Lee Kong Chian School of Business, Singapore Management University, 50 Stamford Road, Singapore 178899, arunkumar@smu.edu.sg

V. Sambamurthy
Department of Accounting and IS, Eli Broad College of Business, Michigan State University, East Lansing, Michigan 48824, sambamurthy@bus.msu.edu

We explore how organizations may be designed to transform themselves even as they continue to perform seamlessly on a day-to-day basis. Our inquiry frame recognizes that organizational designs comprise several elements—people, technologies, processes, and governance. Our study of an exemplary organization, Infosys Technologies, yields two insights. At Infosys, each design element is seeded with generative properties. As these design elements interact, reinforcing and balancing one another, an overall organizational platform of resources, capabilities, and options emerges. The company draws on this emergent platform to perform in real time even as it transforms itself to adapt to changing environments.

Key words: design; emergence; transformation; organizational platform

Organizations confront two primary demands in their quest for survival and growth. First, they have to perform seamlessly on a day-to-day basis to satisfy their customers, shareholders, partners, and other stakeholders. Simultaneously, they also have to transform themselves to navigate fundamental shifts in their environments—market, technological, or institutional.

How can organizations be designed to transform themselves even as they continue to perform seamlessly on a day-to-day basis? In addressing this question, we recognize the complementary roles that people, technologies, processes, and governance play in organization design. Our study of Infosys Technologies reveals that the company has seeded each design element with generative properties so that their routine application for day-to-day performance also generates new possibilities. These elements reinforce and dynamically balance one another resulting in the emergence of an overall organizational platform of resources, capabilities, and options. The company draws on this emergent organizational platform to ensure day-to-day performance even as it stitches together just-in-time responses to opportunities and threats. Thereby, it also transforms itself over time.

This paper is organized as follows. First, we expand on our inquiry frame and examine the organizational pathologies that can arise when design elements are deployed to ensure only day-to-day performance. After a description of our research methods, we offer a detailed case study on how Infosys has addressed these pathologies. We then draw on Infosys’s experiences to offer insights on how organizations may be designed for emergence.

Elements of Organizational Design
Organizations make it possible for individuals to accomplish more than they can on their own. The skills, motivation, and knowledge that individuals bring to their jobs are critical inputs to this overall value creation process. Designs harness these inputs by socializing and training individuals (March 1991), by encouraging them to fine tune their skills (Argote 1999), by grouping them into units for productive purposes (Thompson 1967), and by attempting to align the interests of people with different perspectives and goals (Jensen and Meckling 1976).

Accordingly, designs are not just about people, but also about mechanisms that induce coordination. Organizational processes play a critical role in this regard. Specifically, organizational rules and routines can tie disparate organizational units into one functioning whole (Nelson and Winter 1982). Indeed, they provide the administrative context within which individuals operate, and, in doing so, alleviate the demands placed on individuals (March and Simon 1993).

Yet, even with the best of efforts, processes can be indeterminate. As March and Simon (1993, pp. 12–13) noted, “Although organizational action is driven by matching appropriate behavior to situations, the action is not uniquely determined by such performance programs, professional codes, or expert intuitions. Participants follow rules, but it is not always clear precisely which rules
are appropriate. Different identities with different rules intrude on a single situation. Situations are unclear; they cannot always be recognized unambiguously."

It is here that technologies play a role. Coordination ensues as social rules built into technologies shape individuals’ behavior (Woodward 1965, DeSanctis and Poole 1994). For instance, bulky keychains dissuade hotel guests from walking off with their room keys (Latour 1991). Similarly, categorizing algorithms built into information technologies shape community knowledge (Orlikowski 1992).

Appropriate governance can also help in the coordination of individuals with different goals and perspectives. The principle of residual risk (Jensen and Meckling 1976, Fama and Jensen 1983) plays an important role in this regard. This principle suggests that those who bear residual risk should have residual decision rights. In modern corporations, this principle has led to a governance structure where residual decision rights are delegated from principals to agents within an overall hierarchy.

In sum, organizational design involves paying attention to people, processes, technologies, and governance. It is with such a framework that Hutchins (1995) illustrated the carefully orchestrated roles that multiple elements play in the seemingly straightforward act of bringing a ship into harbor. We also adopt such an inquiry frame for exploring designs.

Organizational Pathologies
Researchers have documented pathologies that arise when design elements support only day-to-day performance. For instance, employees may be prompted to specialize and refine their skills through learning-by-doing to enhance efficiencies (Argote 1999). Yet, too much specialization generates competency traps (Levitt and March 1988, Lant and Mezias 1990). Consequently, employees, and the organization itself, may become maladaptive, especially when a competency-destroying change occurs (Tushman and Anderson 1986).

When organizations optimize their technologies to perform well in a given context, they may also diminish their flexibility to evolve over time (Schumpeter 1975). Moreover, organizations may be reluctant to make upfront investments required to build flexibility into their technologies. This is because they employ discounted cash flows and net present value, financial techniques that do not recognize the real options value of building flexibility into technologies (Baldwin and Clark 2000).

Challenges also arise when organizational processes are designed to enhance efficiency (Nelson and Winter 1982). For instance, rules and routines designed to enhance efficiency typically attempt to reduce deviations from set patterns. Over time, these routines become taken for granted and difficult to change. More insidiously, they may compromise an organization’s ability to identify and respond to new opportunities or threats (Henderson and Clark 1990).

Likewise, hierarchical governance can reinforce inertial forces. Managerial hubris and bureaucratic red tape within hierarchies can cause decision delays, stalling entrepreneurial efforts (Vaughn 1996). Furthermore, top management may continue to allocate resources based on past decisions (Burgelman 2002). As planning and action become de-linked, top management may no longer respond to new opportunities or threats.

In sum, the inertia built into design elements to stamp out variation may cause organizations to drift farther and farther away from their contexts (March 1991). Yet, many organizations now operate within environments where change is continual. To operate in such environments, it is essential for organizations to be able to transform themselves even as they perform well on a day-to-day basis. We explore how an exemplary organization has managed to do both.

Research Site and Methodology
For four years, we studied Infosys Technologies, a global information technology (IT) services company headquartered in Bangalore, India. We studied Infosys because it has transformed itself in response to changing environments even as it has served existing clients well. For instance, during 1999–2000, Infosys moved from a predominantly mainframe and Y2K focus to include an Internet/e-commerce focus. Subsequently, in response to intensifying competition, Infosys began to move up the IT services value chain into consulting and end-to-end IT solutions while continuing to offer low-end software services. As it moved up the value chain, the company weathered a global downturn due to the September 11th tragedy and the “dotcom and telecom bust.” Infosys has grown rapidly and profitably through these transitions: the number of employees increased from 3,766 in 1999 to 23,750 in 2004, annual revenues from $121 million in 1999 to $1.06 billion in 2004, and net profit after taxes grew at a compounded annual rate of 73%.

The objective of our inquiry was to generate new insights on organization designs. To do so, we induced insights through interpretation until theoretical saturation was reached using Lincoln and Guba’s (1985) systematic four-step process: (1) purposive sampling, (2) inductive data analysis, (3) development of grounded theory, and (4) projection of next steps.

We began purposive sampling in July 2000 by interviewing members of the Infosys top management team, middle managers, and junior employees. In November 2002, we conducted a second round of interviews. In all, we conducted 56 interviews. We interviewed a few key people more than once to track how their perspectives evolved.

For between 1.0 and 1.5 hours, interviewees discussed issues, initiatives, and processes critical for Infosys’s growth and success. They also pointed us to reports, pre-
sentations, white papers, employee surveys, and other detailed cases on Infosys. We coded the information from these sources into a database using key words, including the source and type, to establish validity. Progressively, we grouped the information into broader categories and themes.

Our analysis revealed that Infosys places equal emphasis on its people, technologies, processes, and governance. Consequently, we decided to explore how the company deployed all of these four elements in its organization design. We also decided to study interactions among the design elements and how these evolved to influence day-to-day performance and transformation as the company navigated turbulent times in its industry.

After our second round of interviews in 2002, we decided to get an ethnographic feel for the dynamics at play in Infosys. A member of our research team spent 45 days as a member of the Infosys community observing first hand its organizational practices at various levels. Her detailed accounts strengthened our working hypotheses and generated additional insights.

Subsequently, we wrote cases and presented them at Infosys to generate feedback. We adopted a narrative epistemology. More than conversations and informal stories, narratives provide a temporal ordering of events (Pentland 1999, Van de Ven and Poole 2005) that constitute a phenomenon. Surface-level details contextualize observations, whereas underlying generative forces yield lessons applicable to new settings. By being both specific and generic, narratives create potentially transferable knowledge (Bruner 1990).

**Infosys: Building on the Past for Future Success**

**Investing in People, Governance, Processes, and Technologies**

In 2000, Infosys was moving from its predominantly mainframe and Y2K focus to include an Internet/e-commerce focus. Infosys retrained over 1,500 of its employees—a third of its software developers—in Internet/e-commerce technologies. By 1Q2000, revenues obtained from Internet/e-commerce projects amounted to 18.8% of total revenues instead of just 1.7% in 1Q1999. Explaining how the company transitioned to an Internet/e-commerce focus while still servicing its mainframe and Y2K clients, Mr. Dinesh, a founder and then the Director of HR and Quality, stated:

> The key to our company’s success rests on four pillars—people, technology, process, and purpose [i.e., governance]. From the beginning, we have invested in all four of these pillars so that we can scale up over time. Each time we encounter a fundamental challenge, we view it as an opportunity to transform the company.

Several Infosys executives we interviewed attributed the company’s success to these four design “pillars” or elements. They also recalled initiatives undertaken collectively to strengthen these four pillars. We selectively report on several initiatives: the implementation of specific hiring and training practices, the creation of a “small company” collegial culture, the development of reliable software processes, and the implementation of a companywide information system.

**People.** Infosys’s founders recruited only the top students from India’s best engineering schools. Among the recruiting criteria, one struck us as unique—“learnability,” i.e., “an individual’s ability to derive generic lessons from specific situations and apply those lessons to unstructured problems.” Dinesh explained:

> The only thing constant in our industry is change. If we want our people to cope with change, it does not matter whether they know C++ or Java. This we can teach them. More important is whether they are able to figure out how Java is similar to or different from C++ and to make appropriate adjustments. Or having solved a problem for one customer, can they apply that knowledge to some other problem that they face later? This is why we recruit people who possess this capability that we here call learnability.

Infoscions, as company employees call themselves, spoke often about learnability. They identified different facets including: “an ability to generalize from specific instances,” “using prior experiences to solve new unstructured problems,” and “an ability to go beyond the specifics of a situation to derive abstract concepts and generic principles.” They explained how learnability enabled them to generate generic knowledge for future use, even as they applied their existing knowledge to ensure day-to-day performance.

Learnability was manifest in Infoscions’ tendency to refer to “models.” At Infosys, models are bundles of assumptions, constructs, experiences, and working hypotheses, ranging from a customer relationship model, defining ways to interact with clients, to a global delivery model, defining how Infosys distributes software development tasks globally. An HR manager explained that Infoscions’ ability to appreciate, develop, and evolve with these models was critical for career advancement.

In addition to seeking out and valuing learnability, Infosys also ensured that Infoscions possessed needed expertise and skills to serve client needs. In 1993, Infosys redefined and expanded its training center, the Education and Research (E&R) Center, to include research and the piloting of new technologies. The E&R Center’s Vice President explained:

> We needed to emulate an academic environment and place a lot more emphasis on foundations. Otherwise, people may learn to do a few things but without really understanding the rationale behind them. Also, to anticipate future requirements, we had to get involved in more things in addition to training new recruits on existing technologies. We needed to learn, prototype, and pilot
new technologies, do research, and write and publish papers.

The center initiated “Bodies of Knowledge” (BOK) to enable Infoscions to share written accounts of their on-the-job experiences on topics ranging from technology and software development to living in foreign cultures. At the beginning, these “nuggets of experiential learning” were shared among employees in hard-copy form; soon, however, the E&R Center developed a software repository with predefined templates for recording these experiential accounts.

_Governance._ There was no advantage in hiring best-in-class people with learnability if they were stifled by hierarchy. As the company grew in the 1990s, senior managers decentralized decision making. They then worked to create and inculcate a culture to ensure that Infoscions would make decisions responsibly. Mr. Gopalakrishnan (Kris), a founder and currently the COO, recollected:

We led by example—sharing, teaching, empowering. We still do. We too undertook training, worked on projects, and did all the things we asked others to do. We talked about the success of teams and individuals, the sharing of wealth—how, everything here is geared toward sharing. Sharing created this company.

A middle manager said that these efforts established an “asking culture” driven by an unwritten rule: “if you can help someone, you should.” It became customary for Infoscions at all levels to mentor those below. Mr. Mohandas Pai, Infosys’s CFO, recalled that the founders and senior managers wanted Infosys to outlive them. They mentored juniors in complex situations. As a systems analyst corroborated:

Some time ago, we were preparing estimates for a tricky project when a director walked in, discussed the project with us, and helped us determine a ballpark figure. This is common and means a lot to us. It signals that management too has gone through these same messy processes and that they are ready to hold our hands and help us.

Mentorship and the asking culture ensured that Infoscions shared expertise with one another. In addition, managers encouraged Infoscions to challenge and debate issues. These debates enabled the company to look beyond existing knowledge, especially as environments changed. Incorporating challenges into the company’s governance, culture, and decision making generated an “informed consensus.” Mohandas Pai explained:

Consensus does not mean everyone agrees on everything. It implies finding “binding aspects” [between positions]. The range of interpretive differences diminishes as one finds these binding aspects. Once we reach such informed consensus, we all commit ourselves fully to implementing what has been agreed upon.

_Processes._ Responding to competition from other IT-services companies, Mr. Narayana Murthy (Murthy), Infosys founder and then-CEO, called for “performance excellence.” To achieve this, Dinesh set up the Department of Quality Control and Assurance:

We needed a standard, consistent way for doing things. So, we began the ISO 9001 certification initiative. There was a lot of resistance to a standardized way of doing things. But, leadership is about convincing people that there is a promised land and taking them there through unchartered territory. By the end of 1993, we had built the basic processes and obtained the certification.

Several U.S. clients had initiatives to improve their internal IT processes using the Capability Maturity Model (CMM) and they wanted Infosys to also adopt CMM. CMM, developed by the Software Engineering Institute (SEI) at the Carnegie Mellon University, evaluates the maturity level of a company’s software development processes and rates them from Level 1 to Level 5 (Jalote 1999). Once the company reaches a specific maturity level, metrics built into the framework can trigger actions enabling it to climb up to a higher maturity level.

By 1997, Infosys’s software development processes attained CMM Level 4 certification. Now, Infosys’s processes were consistent and repeatable. They also incorporated mechanisms to utilize learning from completed projects to refine existing processes, and measure the effects of these refinements on software development performance. As a consequence, Infosys’s software development speed increased, as did software quality. The Head of Corporate Planning explained how these new performance capabilities then enabled the company to develop and implement its Global Delivery Model:

Once we gained credibility with our clients, we started moving much software development back to India from our clients’ overseas locations. We call this the global delivery model. Under this model, we break a project up into several modules for execution at various locations, according to cost considerations. We station only a small team at the client’s location. The bulk of software development and maintenance is done by a larger team here in India.

_Technologies._ As Infoscions adopted the Global Delivery Model, software development tasks were distributed between client locations and the company’s Indian software development centers. To facilitate coordination, Infosys implemented a companywide information intranet in 1996. Named Sparsh, meaning “in touch,” this intranet supported e-mail, official electronic bulletin boards, and more informal technical and personal discussions. Sparsh extended the reach of Infosys’s “asking” culture. As a user explained, “I could post a query or send an e-mail and I would get several responses within five or 10 minutes from colleagues located around the world.”

The E&R Center used Sparsh to enable the electronic submission and storage of BOK accounts previ-
ously circulated in hard-copy form. By 1997, Sparsh was Infosys’s central information resource. However, as the company grew, Infoscions found it difficult to locate colleagues with specific expertise. To deal with this, the E&R Center introduced the People Knowledge Map (PKM) on Sparsh. The VP of the E&R Center explained:

Practitioners don’t usually write—they don’t have time. We felt that it was unlikely that we would get everything in explicit form [through BOK accounts]. A lot of things are in people’s heads. Therefore, we built this expert locator application called the PKM where employees go public and say that they are experts in particular areas. When others need information on a specific area, they can search the application to get a list of people who claim to know that area well, along with their contact information.

Sparsh enabled Infosys to reduce its operating costs and meet clients’ needs. It also helped Infoscions tap into private knowledge and expertise, thereby facilitating knowledge synthesis and organizational transformation over time.

Moving Up the Value Chain

As clients grew comfortable with offshore software development, competition to provide these services from low-cost locations—especially India—intensified. Also, as their emphasis on e-commerce increased, clients expected IT-services companies such as Infosys to advise them not just on technical issues, but also on online initiatives appropriate for their operations and markets. Infosys’s managers realized that the company could not continue to offer only low-value project implementation services and rely exclusively on cost advantages to compete. Infosys had to move up the IT value chain to offer consulting and end-to-end implementation services.

These new services entailed short-duration projects dependent on close and continual client interactions. They also required the integration and application of new technologies that themselves were evolving rapidly. This would require Infoscions to develop new competencies. The company also anticipated potential conflicts in the business models, incentive schemes, and value systems applicable respectively to its high-end consulting operations and traditional low-end operations. We now describe how the company negotiated its move up the IT-services value chain even as it continued to service clients’ demands for traditional low-end services.

People. To offer clients customized consulting services, Infoscions had to know the latest software technologies and where to use them. Infosys created separate groups to generate industry-domain-specific and technology-specific knowledge. The Domain Competency Group (DCG) and Software Engineering and Technologies Laboratories (SETLabs), respectively, were resources available to all practice units. The DCG focused on developing expertise in industries such as utilities, health care, and financial services. SETLabs did applied research on new technologies and methodologies to service clients in the industries identified by DCG.

Along with the E&R Center, the DCG and SETLabs served as sensing mechanisms to anticipate market evolution and to develop and disseminate relevant contextual and technical knowledge. The Head of DCG told financial analysts how DCG recognized an opportunity for Infosys when the U.S. securities industry moved to a one-day from a three-day settlement cycle for trades in late 2000:

This move to a one-day settlement cycle requires automating previously manual processes, converting batch transactions to online, and eliminating the data reconciliation need across broker dealers, banks, stock exchanges, and custodial service providers. During the past 10 months, we acquired domain knowledge in these areas.

Emphasizing the complementary role of his unit, the Head of SETLabs added, “One important area we are focusing on is developing concept applications for the \( T + 1 \) [one-day settlement cycle] opportunity that the DCG has identified.” After they developed expertise in an emerging area, people from the DCG and SETLabs worked alongside business managers and software programmers on project proposals and pilot projects. According to the Head of SETLabs, continual engagement enabled the DCG and SETLabs to transfer the knowledge they developed to practice groups and also gauge how well their reference models and concept applications fared in real-life situations.

Technologies. The E&R Center had earlier spearheaded the BOK initiative and created the PKM on Sparsh. The center also created a virtual classroom to offer employees online courses. Yet, as the Vice President of the E&R Center explained, this was not sufficient:

We had a sharing culture and were doing things to manage our knowledge, but this was still not happening in a big way. Also, an IT company like ours cannot survive if we do not reuse the knowledge we have created. We realized that we needed an integrated approach to managing company knowledge. So in December 1999, we created a companywide knowledge management program and a central knowledge management group to champion and implement this program.

The central Knowledge Management (KM) group resolved to make “every instance of learning within Infosys available to all Infoscions.” The intention of the KM group was to ensure ready access to reusable knowledge, thereby enhancing project team productivity and responsiveness. Whereas all subscribed to this goal, there was disagreement within the KM group on how to accomplish it. Some argued for a communities-of-practice approach, whereas others argued for a central
portal-oriented approach. After discussion, the group adopted a “centrally facilitated, yet organizationally distributed” approach to managing the company’s knowledge (see Garud and Kumaraswamy 2005). The KM group would create the technology and process infrastructure, but various project teams and practice communities would create and maintain the knowledge assets themselves.

The KM group created a portal called KShop that offered online access to Infosys knowledge resources including BOK, book reviews, case studies, event material, FAQs and tutorials, downloadable software, reusable artifacts, product reviews, and an Internet gateway to external sources of information. By 2003, KShop was a full-fledged portal with knowledge assets organized into categories for easy search and retrieval. As the content, breadth, and depth of KShop grew, categories multiplied. No single categorization scheme could serve all of the different practice communities well because each had its own specialized language. The KM group introduced a technical feature to allow unique KShop categorization schemes to emerge for different user groups over time. This feature enabled different groups to classify knowledge assets in customized and meaningful ways. Reflecting on efforts to create manageable categorization schemes, a member of the KM group pointed out:

For us, a taxonomy is not just a framework for classifying content; it is a strategy to unify multiple constituencies. Going forward, the search engine will be enhanced to leverage the taxonomy for delivering accurate search results. The next version of KShop will also support automatic classification tools. Even with a huge taxonomy, this means easier classification for users.

The KM group hoped that locally relevant categorization would lay a foundation for new, specialized knowledge to emerge within communities, and for this knowledge to be reinterpreted and resynthesized by other communities into their own knowledge bases.

Processes. Moving up the value chain to support Internet/e-commerce projects required the integration of multiple, evolving technologies. Projects were also shorter in duration and demanded closer and more frequent interaction with clients than mainframe or Y2K projects. This meant new processes.

Beginning in 1999, the Quality Department took the company’s software development processes to CMM Level 5 and also embraced an iterative model of software development. The Head of the Quality Department explained:

We used to do two-year projects and we employed a “waterfall model” of development. We conceived the whole solution after we got all the requirements and then we executed the project. Slowly, we have been modifying this model to become more iterative in our development because people want faster time to market and everybody is under pressure, including the customer. The intensity of the demand for iterative development increased as we shifted our emphasis to e-business projects from Y2K. So, now we have formalized it.

Infosys moved from functional to cross-functional project teams to support the new, iterative software development process. Earlier, project teams handled tasks in a relay-race fashion—designing, building, testing, and then maintaining software in sequence. Now, they organized themselves into overlapping modules, deployed in parallel. Each module had all the competencies required to complete one aspect of a complex project; in addition, each module had general knowledge of the tasks performed by other modules.

Simultaneously, the Quality Department began a companywide program to improve cross-functional processes and coordination. A Quality Department manager offered an example:

We used cross-functional process mapping to evaluate our accounts receivables area. This was slipping, especially in contract renewals. After redesigning the process and going through several iterations, we achieved gains of about $1 million and a 15% reduction in contract renewal time.

These companywide initiatives engendered a mindset of cross-functional task forces and pragmatic experimentation through repeated prototyping and piloting. Mr. Shibulal, a founder and the Director of Worldwide Customer Delivery, explained how Infosys addressed emerging challenges:

We tend to try things in small ways, take small steps in different directions to see what the results will be before taking big leaps. By the time we go through some three or four iterations, we have got it nearly 70% right and only a few small changes are required when we implement across the company.

Governance. Moving up the value chain meant that Infosys had to face the uncertainty and operating risks typical of the e-commerce and consulting domains. Further, inconsistent business models and value systems in the traditional practice units versus the newly established Internet/e-commerce and consulting businesses could create internal cultural conflicts.

To deal with the new uncertainties, the Board of Directors recruited external directors with expertise in managing globalization and growth into new markets. The company’s Customer Delivery unit reorganized into geographical practice units, each focused on a specific world region. This reorganization promoted geographic expansion and also decentralized decision making to those closest to the respective markets.

In addition, top management formalized a business model to move up the value chain without compromising current operations. The new model emphasized four criteria—predictability, sustainability, profitability, and derisking (PSPD)—to manage revenue stream growth.
Infosys’s CEO, Mr. Nandan Nilekani, explained:

When we talk about PSPD, we mean we must be able to predict that, in the next 4, 8, or 12 quarters, certain revenue is assured in order to ensure that we manage growth. Our revenue model has to contain sustainable revenue streams. Obviously, everything we do has to generate margins, profits, and deliver earnings to the bottom line. Derisking means that we should not become overly dependent on any one technology, business, or service offering.

Nilekani illustrated how the PSPD model limited risk as the company grew:

Dotcom projects command very high prices. If our sole goal were to move up the value chain, we would do more business with dotcoms. But the moment we do that, we will be subjecting the company to a high level of risk because dotcoms are funded not by revenues and profits, but by venture capital subject to market conditions. Rapid moves up the value chain have to be balanced with the demands of PSPD.

To address cultural conflicts due to globalization and the move up the value chain, top management solicited wider employee participation in the Management Council, Infosys’s primary body for deliberations and decision making. For instance, a forum called the Voice of the Youth invited junior employees to offer “fresh” perspectives on company issues. An HR manager explained:

Representatives [of the Voice of the Youth forum] participate in the Management Council’s deliberations where they have the freedom to question any decision or issue. Recently, the youth questioned the interpretation of several of the company’s values—for instance, how fairness and integrity ought to be defined now as opposed to how they were defined earlier. Then, Murthy called a one-day workshop in which the Voice of the Youth and half of our senior managers brainstormed on how these values ought to be reinterpreted now. At the end of the workshop, they all came to a consensus and we rearticulated our governing value system.

Shibulal clarified:

The Voice of the Youth [forum] needs to be there . . . to question and debate. This gives us an opportunity to go through a soul-searching exercise whenever one is needed. This does not mean that we are deserting what we believe in, but this allows us to take into account heterogeneity, especially as we go global and move up the value chain.

Governance with inbuilt and legitimized countervailing forces ensured that initiatives for transforming Infosys did not compromise current operations. Rather, transformation occurred in synchrony with day-to-day activities and performance.

An Update

Despite a downturn in the global economy and the IT services market due to the September 11th tragedy and the dotcom and telecom bust, Infosys has grown fourfold since 2001. Even during the downturn, Infosys continued to build and nurture its four pillars. For instance, when demand fell during 2001 and 2002, over 2,000 Infoscions in the Customer Delivery unit were idle. In response, the company’s HR Department slowed hiring but senior managers eschewed widespread layoffs. Nilekani explained:

We have cut people in some areas with little growth prospects. But it would be irresponsible to let a lot of our people go just because demand softens. Instead, we are retraining them in emerging technologies. We are also deploying them to improve our competencies, information systems, and processes, so that we will be well positioned when demand picks up in a year or two.

The Quality Department continued to upgrade Infosys’s processes during the downturn. For instance, it secured the expanded CMM Level 5 certification for both its Indian and client-located software operations, thereby improving efficiency and lowering costs companywide.

When demand began to pick up in 2003, Infosys expanded its operations into China and smaller markets in Asia, Australia, and Eastern Europe. The company also strengthened its U.S. consulting services practice. However, as Kris acknowledged

We have been successful so far, but we know that success is not forever and we make mistakes. As Murthy says, ships are safe in a harbor but they are not meant to be in a harbor. So, there are still ways to go for us. We need to keep proving ourselves, as our context changes.

Discussion

Our study of Infosys highlights how an organization can transform itself even as it continues to perform on a day-to-day basis. Infosys has seeded each element of its organizational design with generative properties, i.e., the routine application of these elements for day-to-day performance also yields new possibilities for the future. These design elements reinforce and balance one another, leading to the emergence of an organizational platform that supports both day-to-day performance and transformation.

Seeding Elements with Generative Properties

Dinesh and others attribute the company’s success to its design and continual investment in four “pillars”—people, technologies, processes, and governance. Equally important, Infosys has built-in dialectical forces that vest these elements with generative properties. Such forces are evident in Infoscions’ learnability to work within and yet go beyond clients’ contexts. They are evident in Infosys’s information technologies that are centrally facilitated yet organizationally distributed. Infosys’s processes promote iterative experimentation, learning, and change even while emphasizing
consistency and reliability. And, Infosys’s governance balances growth with stability, and change with continuity.

People. Every organization recruits bright individuals and trains them rigorously. However, as training emphasizes refinement within a taken-for-granted framework, employees may forgo opportunities to use their skills and knowledge to transform situations. To reduce such possibilities, Infosys recruits for learnability. In contrast to learning-by-doing, learnability is the potential to generate new generic knowledge through reflection-in-action (Schon 1983). Reflection-in-action occurs as individuals tease out causal mechanisms by asking “why” or “why not” and by conducting “framing experiments” to draw rough inferences and construct tentative hypotheses (Schutz 1970, Schon 1983, Garud 1997). By enabling knowledge creation, people with learnability increase the potential for organizational transformation.

There is a dialectical tension between learning-by-doing and reflection-in-action. At Infosys, resolution occurs through models such as the Customer Relationship Model and the Global Delivery Model. These models encapsulate and transfer past experiences, offering the benefits of learning-by-doing. At the same time, they serve as templates to test tentative hypotheses and discover new knowledge and competencies in new contexts (Romme 2003, Boland and Collopy 2004, Garud and Kumaraswamy 2005).

Technologies. New knowledge generated by employees endowed with learnability benefits an organization only if it is shared widely (Nonaka and Takeuchi 1995). Indeed, in the motto thatInfosys has embraced—“Every instance of learning within Infosys should be available to all Infoscions”—we see the emphasis placed on generating a knowledge commons (Davenport and Prusak 1998). Infosys’s KM system is “centrally facilitated, yet organizationally distributed.” Central facilitation is evident in an IT architecture and central knowledge portal with organizationwide reach, enabling Infoscions to routinely archive and disseminate knowledge (Sambamurthy et al. 2003). Distributed initiatives ensure that the IT architecture plays a locally constitutive role. For instance, the central knowledge portal, KShop, allows different practice communities to publish and maintain their knowledge assets. Additionally, it allows them to generate customized categorizations of knowledge assets as they use them. In sum, rules built into technologies are reconfigured in use and evolve over time (Orlikowski 1992, DeSanctis and Poole 1994).

Technologies underlying Infosys’s Global Delivery Model serve as a “boundary architecture” (Bowker and Star 1999) enabling Infoscions everywhere to interact and tap each other’s private knowledge to create collective organizational knowledge. Boundary architectures enhance an organization’s memory of “who knows what” (Wegner et al. 1991). Specifically, the PKM offers information on “who knows what” and “where they can be found,” complementing the company’s “asking culture.” As changes occur in the location and nature of expertise possessed and required, the PKM fosters a generative organizational memory.

Processes. CMM-inspired processes explain how Infosys refines existing knowledge and generates new knowledge. Infosys has applied CMM to ensure its software development processes reliably and rapidly address client needs. Concurrently, Infosys has utilized the CMM framework to apply an iterative “change, measure, learn” approach to transform its software development processes from the traditional “waterfall model” to a more “iterative model.” Infosys has also adapted this iterative approach to enhance cross-functional coordination.

The underlying philosophy of this iterative process-change model is “let us experiment, learn in the process, refine, and only then scale up” (also see Romme 2003, Boland and Collopy 2004). Such is the essence of a “design attitude” (Boland and Collopy 2004) that embraces prototyping and pragmatic experimentation as a basis for moving ahead. As Hedberg et al. (1976) noted, organizational designs themselves can be construed as processes for generating new solutions through experimentation. Routines for learning through experimentation become the source of flexibility and change (Feldman and Pentland 2003) instead of constraining an organization to taken-for-granted ways of doing things.

Governance. In a “distributed but connected” company, decision rights are distributed among employees. However distributed decision making can result in fragmentation. Actions meaningful in one context may conflict with those in other contexts. Governance must prevent fragmentation and maintain connections. Accordingly, Infosys has built dialectical tensions into its governance to maintain balance. For instance, Infosys managers listen and learn even as they mentor. Infoscions challenge and debate one another to eventually arrive at an informed and binding consensus. The company has instituted forums such as the Voice of the Youth forum whose representatives question taken-for-granted actions and values. Indeed, Infosys’s governing strategy framework—the PSPD business model—has built in checks to reconcile growth with the need for predictability, sustainability, profitability, and derisking of revenue streams.

Emergent Organizational Platform

At Infosys, the resolution of dialectic forces within each design element confers generative properties on these elements. Through interactions among the design elements, an organizational platform emerges and also evolves. By platform, we mean the cumulative and interdependent set of capabilities and options that an organization possesses and draws on for its sustenance over time (cf. Ciborra 1996, Gawer and Cusumano 2002).
How does this organizational platform operate? At Infosys, the design elements reinforce one another. The company’s decentralized governance affords Infoscions the decision rights to exercise their learnability mindfully. CMM-inspired processes offer an overall framework within which people can act, reflect, and learn iteratively. Information technologies such as the corporate intranet enable people to coordinate and share the generic knowledge they create as they perform their day-to-day activities. Over time, such reinforcement leads to the accretion of an organizational platform of resources, capabilities, and options (see also Cooper et al. 1996).

Even as this organizational platform mobilizes to facilitate day-to-day operations, generative properties built into design elements ensure that new possibilities emerge continually. As each element gets updated and sympathetic changes occur in other elements, the mix of resources, capabilities, and options constituting the platform itself changes. In other words, the platform evolves over time to suit new contexts, thereby facilitating organizational transformation.

Such dynamics are evident in the transition Infosys made to an Internet/e-commerce focus. Once the E&R Center identified a shift in clients’ focus toward e-commerce and piloted Internet/e-commerce technologies, Infoscions used learnability to develop competence in the new technologies. The newly established DCG and SETLabs explored potential business and technological opportunities. Concurrently, the addition of KShop enabled dissemination of new knowledge, and CMM-induced learning prompted a move to an iterative model of software development. Consistent with the need for rapid response and close client interaction, the company reorganized into decentralized geographic practice units.

Absent countervailing stabilizing forces, however, continual updating could compromise day-to-day performance. Accordingly, at Infosys, the design elements hold one another in a dynamic balance (Senge 1990). For instance, the PSPD model has tempered the pace of Infosys’s transition to an Internet/e-commerce focus and its move up the value chain, thereby ensuring that traditional practice units do not suffer from want of attention or resources. Furthermore, the PSPD model also mitigated the effects of the dotcom and telecom bust on company operations. As Infosys moved up the value chain, countervailing forces generated by forums such as the Voice of the Youth forum and by the social rules built into the company’s IT architecture minimized conflicts between the traditional practice units and the new e-commerce and consulting businesses. These dynamic balances enable the organization to perform seamlessly even as it transforms itself.

Implications and Conclusion
Although “design” and “emergence” appear antithetical, Infosys illustrates how organizations may be designed for emergence. Designing for emergence requires piecing together a mutually complementary and balancing set of initiatives such that an organizational platform emerges to enable both transformation and day-to-day performance. As a result, organizations can endogenize potentially disruptive environmental forces into series of incremental and manageable changes (Weick and Quinn 1999).

One can contrast designs for emergence with designs that are purely modular. Designs that are purely modular have limited emergence capabilities as module interfaces and interactions are prespecified. With designs for emergence, there are synergistic interactions between design elements as they complement and balance one another.

Continuity and change are inherent in the organization’s ongoing operations as the platform evolves to address emerging opportunities and threats (Garud and Nayyar 1994). As the Infosys case illustrates, day-to-day activities generate new possibilities, thereby ensuring exploration along with exploitation. Such a design approach lies in contrast to designs underlying ambidextrous organizational forms, wherein activities aimed at day-to-day performance and transformation are separated from one another with attendant tensions being resolved at a higher level of hierarchy (see Benner and Tushman 2003).

Our perspective is consistent with emerging literature on design (Tsoukas and Chia 2002, Feldman and Pentland 2003, Romme 2003, Boland and Collopy 2004). Its essence is best captured by Hedberg et al. (1976, p. 43), who noted, “Designs can themselves be conceived as processes—as generators of dynamic sequences of solutions, in which attempted solutions induce new solutions and attempted designs trigger new designs.” Complementing this perspective is a design attitude that “views each project as an opportunity for invention that includes a questioning of basic assumptions and a resolve to leave the world a better place than we found it” (Boland and Collopy 2004, p. 9).

This epistemology also has implications for how we as researchers conduct and report studies on organization designs. Instead of confirming pre-existing notions, the research objective would be to discover new insights (see also Meyer et al. 2005). To accomplish this objective, research design would be longitudinal and multifaceted, crossing organizational levels and units of analyses to offer a holistic perspective on organization design. Although researchers may find it difficult to explain fully all interesting or unanticipated findings, their rich accounts would give rise to a “research platform” for future experimentation and theorizing on organization designs and attendant processes.

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