Infosys Technologies Ltd.: Improving Organizational Knowledge Flows

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Abstract:

Knowledge is being discussed as one of the most important organizational resources. But these resources exist in specialized pockets dispersed across the organization, and dedicated knowledge management (KM) programs are required to improve their flow. However, high failure rates of such programs raise serious doubts about their ability to improve knowledge flows. This case traces the KM program of Infosys Technologies, Ltd – a Global Most Admired Knowledge Enterprise. The case describes how, in 1999, Infosys' top management detected a severe lack of organizational knowledge flows while implementing a program aimed at continuously improving their core business processes. A more detailed examination exposed that the lack of knowledge flows stifled the effectiveness of their organizational structure and their business model. Alarmed by these critical findings, Infosys initiated their KM program. A five-stage knowledge maturity model (KMM) was conceptualized to aid KM implementation. With people, processes, and technology as the three pillars of Infosys' KM program, KMM identified specific capabilities Infosys needed to develop in each of the five levels. Things worked fine till 2004 when Infosys began moving towards KMM Level 4, which required developing clear metrics to measure KM effectiveness, that is, improvements in knowledge flow. In the absence of such metrics, Infosys' Board of Directors started questioning company's financial investment in the KM program. The CEO, who championed the KM program, knew that he faced two key challenges – to convince the Board of future revenue prospects of the KM program, and to identify metrics for assessing improvements in organizational knowledge flows.

Keywords: knowledge flows | knowledge management maturity | knowledge management implementation | knowledge management technologies

Article:

Nandan Nilekani, the chief executive officer (CEO) of Infosys Technologies (Infosys), sat at his desk at the company's headquarters in Bangalore, India, reading an email from one of his account managers in his North American operations.[1,2] The manager, Vivek Pradhan, had just landed a project with a major Detroit automobile manufacturer, and was commenting to Nandan on how instrumental the company's knowledge management (KM) program was in his securing the project.

Vivek told Nandan that his client had given him 48 hours to develop a pre-proposal on upgrading its nationwide sales and order operations. He added that his technical team had never seen such a project. Vivek felt he could never meet his pre-proposal deadline, but that evening he received an email from Nandan announcing the launch of a new Domain Competency Group (DCG) as part of the company's nascent KM initiative. As stated in the email:

> DCG would serve as a centralized think-tank to provide round-the-clock knowledge support on various industrial domains to our practice units around the world.

Vivek further explained that a quick call to the DCG contact number helped him locate a similar project completed for a German automotive company. He was sent the necessary materials, including a client presentation, which proved very similar to what his client had in mind.

After reading the email, Nandan sat back in his chair feeling quite pleased at the success of the 5-year-old KM program. Infosys' KM implementation was guided by the KM Maturity Model (KMM) (see Table 1).[3] Infosys was currently working towards attaining the fourth level of KM maturity. However, one requirement was seriously lacking and would impede progress to the next level: Infosys did not have robust metrics for assessing productivity benefits of the KM program.

Table 1. Infosys's knowledge management maturity (KMM) model

Level	Label	Organizational capability
1	Default	Complete dependence on individual skills and abilities
2	Reactive	Basic knowledge management in scattered pockets across the firm
3	Aware	• Ability for data-driven decision-making • Restricted ability to leverage internal expertise • Restricted ability to manage virtual teams
4	Convinced	• Measurable productivity benefits through knowledge sharing • High ability to leverage internal and external sources of expertise • Ability to sense and respond proactively to changes in technological and business environment
5	Sharing	• Ability to manage organizational competences quantitatively • Streamlined process for leveraging new ideas for business advantage • Ability to shape technological and business environment

Source: Kochikar (2003); Suresh and Mahesh (2006).

To add to this concern, Nandan knew that the Board of Directors was getting anxious about Infosys' increasing monetary commitment to the KM program. Nandan knew that the inability to assess KM success would be a hot topic at next week's Board meeting.

He had begun discussions with various KM stakeholders throughout the organization, and had the beginning of a list of possible metrics. He planned to discuss these with Narayana Murthy, the previous CEO and Infosys' chief mentor, before the Board meeting.

Infosys: early years

Based in Bangalore, the IT hub of India, Infosys was founded in 1981 by seven software professionals led by the then CEO, N.R. Narayana Murthy, as an offshore software service

provider. Murthy's management philosophy was characterized by five core corporate values. Symbolized as C-LIFE, they included Customer Delight (surpassing customer expectations), Leadership by Example (commitment to set standards and be an exemplar for the industry), Integrity & Transparency (commitment to be ethical, sincere, and open in dealings), Fairness (commitment to earn trust and respect), and Pursuit of Excellence (commitment to constantly improve themselves).

Total revenues in the first decade were an unimpressive $3.89 million, but over the next few years, Infosys grew at a compounded annual rate of 70%. By 2005, Infosys had a market capitalization of $10 billion, and 2004–2005 profits of $688 million. With over 49,000 people employed across 30 locations in 17 countries, the company emerged as the second largest IT firm in India. During this time, Infosys evolved from an offshore software service provider to an IT consulting firm. Table 2 traces Infosys' corporate journey over the past 25 years. Figure 1 traces the company's revenue growth. Section (a) of Table 3 summarizes Infosys' revenue distribution by clients' industry domain for past three years, and Section (b) of the Table summarizes revenue distribution by primary service domains.

Table 2. Infosys' timeline (1981-2003)

1981	• Year of incorporation in India
1987	• Opened first international office in the US
1992	• IPO in India
1993	• Listed successfully in India
	• Obtained ISO 9001/TickIT certification
1995	• Set up development centers across cities in India
1996	• Established e-Business practice
	• Set up first European office in UK
1997	• Attained SEI-CMM level 4
	• Set up office in Toronto, Canada
	• Set up Engineering Services Practice
1998	• Established Enterprise Solutions Practice
1999	• Listed on NASDAQ
	• Crossed $100 mn in annual revenues
	• Attained SEI-CMM level 5
	• Opened offices in Germany, Sweden, Belgium and Australia and two development centers in the US
2000	• Awarded the 'National award for excellence in corporate governance' by the government of India
	• Crossed $200 million in annual revenue
	• Set up development centers in Canada and the UK
2001	• Crossed $400 mn in revenues
	• Rated best employer of India in a study by Business Today – Hewitt associates
2002	• Touched $0.5 billion in annual revenues
	• Declared Most Admired Knowledge Enterprise (MAKE) for Asia region
2003	• Declared Most Admired Knowledge Enterprise (MAKE) globally
	• Banking software chosen by ABN AMRO Bank for China region

Source: Infosys.

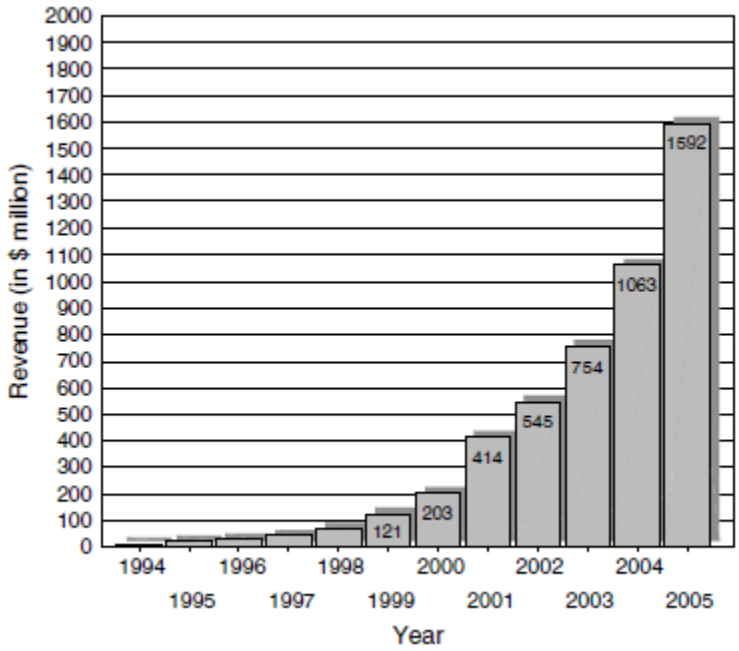

Figure 1. Infosys' revenue growth over the years (1994-2005). *Source:* Infosys.

Table 3. Infosys' revenue distribution by (a) clients' industry domain and (b) service domain

	FY05 (%)	FY04 (%)	FY03 (%)
(a) Industry domain			
Manufacturing	14.4	14.8	16.4
Insurance, banking and financial services	34.6	36.6	37.6
Telecom	18.5	16.6	15.2
Retail	9.8	11.6	11.4
Energy and utilities	3.2	3.0	2.9
Transportation	7.6	7.1	6.8
Others	11.9	10.3	9.7
Total	100	100	100
(b) Service domain			
Software development	23.2	25.7	32.1
Software maintenance	29.9	30.1	28.2
Package implementation	15.2	14.5	11.0
Software testing	5.8	5.3	3.4
Software re-engineering	6.2	6.0	5.5
IT Consulting	3.6	3.7	4.3
Business process management	2.7	1.6	0.5
Software engineering	2.0	2.2	2.6
Other services	8.4	8.1	7.8
Total services	97.0	97.2	95.4
Products	3.0	2.8	4.6
Total	100	100	100

Source: Infosys Annual Report, 2004.

Scalability strategy

In the early 1990s, there appeared to be a disconnect between what the management of Infosys believed they could accomplish and what clients perceived them to be capable of. As Murthy explained:

> When we went to the Fortune 1000 companies to sell our services, most CIOs didn't believe that an Indian company could build large IT applications. The CIOs were very nice to us, of course. They offered us tea, listened to what we had to say and then said, 'Look, don't call us, we'll call you.'

Infosys' founders realized that to be taken seriously, they would need to build a global corporation that could manage both growth and risk simultaneously. Accomplishing this goal required attaining completely opposite sets of objectives – profits had to be maximized while simultaneously reducing risk, quality of processes had to be improved while simultaneously reducing costs, and sustainable sources of revenue had to be developed while remaining responsive to new market trends. Attaining such opposing objectives required the resource clout of a corporation and the nimbleness of a small company.

To address these issues, the founders envisioned Infosys as a scalable corporation – an organization that could grow in terms of revenues, profitability, people, and cultural value systems, and yet remain flexible and agile. Murthy summarized scalability as …*the ability to constantly evolve while avoiding a major disconnect in operations. The crux of scalability is to ensure that we grow simultaneously on all fronts while maintaining the quality, agility, and effectiveness of a small company.*

Flexible organization structure

In 1998, Infosys realized that its organizational structure was too cumbersome for its new scalability strategy. Nandan explained:

> Scalability demanded that Infosys be agile and flexible in responding to the new market trends. Our organizational structure didn't facilitate that.

Murthy had a similar opinion:

> We were operating in a market where technology changes rapidly and business models quickly become obsolete. Success depended on our ability to recognize and assimilate these changes quickly.

As a result, Infosys reorganized into highly flexible business units. The business units were geographically based, in North America, Europe, Asia Pacific, and India. Each business unit had a dedicated sales arm to bid on software projects, a software development center to build software solutions, and a delivery unit to successfully execute the project. Support functions including finance, quality control, and research and development were centrally located in India.

Global delivery model

The underlying framework for the new organizational structure was the global delivery model (GDM). Infosys developed this model on the principle of distributed project management, that is, executing the project at multiple locations with flawless integration. As Murthy explained:

> We wanted to do the work where it could be done best, with the least amount of acceptable risk, and where it made the most economic sense, for example, by shifting costly project components from the client location to relatively cheaper locations around the world.

Table 4 presents the GDM and highlights the location of various project-related activities. As per the model, sales teams at each business unit would bid for software projects in their respective markets. After a project was landed, a technical team from the project delivery unit attached to that business unit would travel to the client's site to assess project requirements. Based on the project requirements, a team would be assembled at the software development center attached to that business unit to develop the software solution. Alternatively, if the project requirements dictated, a virtual team would be assembled from multiple software development centers worldwide. After the software was developed, the technical team would revisit the client to install the software, as well as handle maintenance and training-related issues.

Table 4. Infosys' Global Delivery Model (GDM)

At client site	**At global development centers**
Project activities	*Project activities*
Analysis and planning	Project management
High-level design	Detailed design
User interface design	Coding
Project coordination	Testing
Onsite Testing	Documentation
Implementation	
Post-implementation support	*Post-implementation support*
Rapid reaction support	Bug fixes
	Warranty support
	Maintenance

Source: Infosys.

GDM enabled Infosys to operate as a virtual corporation that could work across multiple time zones on a 24 hour work cycle. Other advantages included:

- Scalability – software engineers at all locations had access to organizational resources, helping them respond swiftly to client requirements.
- Reduced cost of completing a project.
- Reduced time to complete a project. Projects could be divided into modules that were completed simultaneously at multiple locations.
- Enabled a highly networked environment where one project location could act as a complete back-up for another location to ensure disaster recovery.

The need to improve knowledge flows

Continuous innovation

Murthy believed that to build a scalable company would require continuous process innovation. In 1992, Infosys launched the 'Excellence Initiative' to ensure that core organizational processes adhered to highest quality standards. The excellence statement declared: A commitment to strive relentlessly, to constantly improve ourselves, our services and products so as to become the best.

In 1999, Murthy named the then chief operating officer (COO), Nandan, as his successor. As a part of his mentoring plan for Nandan, Murthy made him responsible for the Excellence Initiative. The initiative required developing robust technical, human, and procedural systems to ensure continuous improvement of Infosys' core processes. Nandan believed that continuous process improvement could only be achieved by improving organizational knowledge flows. To test his belief, he met with employees at various levels in the company. Virtually everyone, from software engineers to sales managers, voiced complaints about the lack of relevant knowledge inputs in their day-today operations. Nandan was surprised to discover the magnitude of the problem. As he commented:

> I could feel a huge knowledge void, as if Infosys had become opaque to any kind of knowledge flow – within itself as well as with outside sources. I was very surprised to notice that while I was aiming to enhance complex knowledge flows for the excellence initiative, Infosys lacked the mechanisms to support even the simplest of knowledge flows.

Nandan also recognized that knowledge flow constraints were impacting the effectiveness of new GDM-based organizational structure.

Knowledge flow requirements of the GDM-based organizational structure

GDM required that 12,000 of Infosys' 36,000 employees be based at the corporate campus in Bangalore, India, another 18,000 in 12 development centers across the globe, and the rest at various client locations. The success of GDM structure was contingent on seamless knowledge sharing across a dispersed global workforce.

Despite a robust communication infrastructure connecting Infosys' global locations, knowledge flows across various locations were conspicuously absent. Each location operated as a knowledge oasis. An employee encountered a problem at a client location in Boston, without the knowledge that a solution lay in Bangalore. As Nandan explained:

There were clear-cut knowledge redundancy issues. Our engineers required knowledge inputs during all stages of a project. Most of the times the required knowledge existed somewhere, but no one knew where. They were recreating same knowledge at multiple locations.

Knowledge flow requirements of scalability strategy

Scalability strategy envisioned Infosys as a learning organization that constantly utilized its knowledge assets to replenish its repertoire of resources and capabilities. It became clear to

Nandan that true scalability would elude them unless Infosys' knowledge resources were made accessible to every employee.

As he put it:

> Scalability demanded 'learnability' – the ability to extract knowledge from specific concepts and situations and apply it to other situations. And learnability required real-time access to firm's knowledge resources, which could only be improved through better knowledge flows.

Scalability also required efficient capacity utilization. Infosys had to be ready for project opportunities in new functional and technical domains. This required a highly responsive KM system that would quickly assimilate knowledge from multiple domains, and disseminate it to appropriate people, allowing for speed and accuracy of project execution. As Nandan explained:

> The absence of truly scalable knowledge resources, and the infrastructure to share those resources, constrained Infosys' growth potential. We badly needed a technical system to create and store domain-specific knowledge resources, and the infrastructure and culture to share those resources.

Beginnings of a KM program

In 1999, Nandan decided to formally initiate a KM program. A steering committee was formed to articulate the KM implementation strategy. The committee began by defining the intent of the KM program:

> To make Infosys an organization where every action is fully enabled by the power of knowledge; which truly believes in leveraging knowledge for innovation; where every employee is empowered by the knowledge of every other employee; which is a globally respected knowledge leader.

The steering committee then conducted a study of knowledge requirements of various user communities. The study revealed that a significant number of requirements were for explicit knowledge, such as project documents, client reports, reusable software code, and previous architectural diagrams. Keeping these knowledge requirements in mind, the steering committee decided that the immediate objective of KM program should be to enhance explicit knowledge flows. Improving tacit knowledge flows was identified as a primary long-term goal.

In light of these KM objectives, the knowledge management maturity (KMM) model was conceptualized to aid KM implementation (see Table 1). KMM level 1 (default) represented a firm with no integrated KM system in place. Each subsequent level represented aspirations that Infosys wished to achieve. These levels represented a firm's ability to be: (2) reactive (basic KM), (3) aware (knowledge managed throughout the firm leading to the ability for data-driven decision making), (4) convinced (effective KM with the ability to measure productivity benefits), and (5) ready to share (ability to shape technological and business environments). Successfully

achieving these levels required simultaneous development of capabilities in three key result areas: people, processes, and technology (see Table 5) (Kochikar, 2003).

Table 5. Key capabilities required for various levels of Infosys' KM maturity model

Level	Label	Key result areas		
		People	**Processes**	**Technology**
1	Default	None	None	None
2	Reactive	Knowledge awareness	Knowledge capture	Basic KM infrastructure
3	Aware	Knowledge involvement	Knowledge creation & sharing	Robust KM infrastructure
4	Convinced	Customized enabling	Knowledge enlivenment	Self-managing KM infrastructure
5	Sharing	• Expertise Integration • Knowledge Leverage • Innovation Management		

Source: Kochikar (2003); Suresh and Mahesh (2006).

Achieving level 2: reactive

To attain level 2 of KMM, Infosys needed to improve the knowledge awareness of its employees, implement at least the knowledge capture processes, and develop basic technical infrastructure to support KM. These developments are described below.

People issues: improving knowledge awareness

The steering committee realized that the success of the KM program was contingent upon employees' perception of the firm's knowledge resources. Nandan was of the opinion that organizational values, norms, and practices influence employee perceptions, and a new HR strategy was required to change these institutional structures. Thus, the new HR strategy focused on:

Improving recruiting and training: Stringent recruiting standards were outlined, which, although improved the quality of Infosys' hiring process, reduced the pool of qualified candidates. To compensate for this change, Infosys attached its recruiting process to future revenue predictions. Thus, future revenue predictions were made based on the availability of a qualified workforce.

Heavy investments were made in training. An Education and Research (E&R) department and a Management Development Center (MDC) were created. These units developed and imparted about 300,000 man-hours of technical and managerial training annually. Training included a 4-month module on analytical-thinking, problem- solving, technical fundamentals, and customer negotiation skills for the new employees, and an annual 10-day domain-specific training program for all employees.

Empowering employees: Empowering a highly talented workforce was easier said than done. As Murthy explained: *Most employees were young engineers with a strong self-concept, clear life goals, and effective ways of doing things. Talking to them about individual empowerment was a redundant exercise.* So Infosys designed a unique approach to empowerment – channeling individual aspirations towards a common corporate objective. 'Continuous Innovation' was identified as an objective worthy of knowledge workers. Employee empowerment also served to reformulate the relationship between employees and organizational knowledge. More

empowered employees were less threatened by the idea of sharing their unique knowledge, and thus were less prone to knowledge hoarding.

Developing a supportive culture: The next step was to create a KM supportive culture. As Murthy opined: *Knowledge management required an open culture that recognized merit and encouraged ideas. A culture that free of politics, a culture of excellence.* The E&R department and the Management Development Center (MDC) were asked to handle this issue through their training sessions.

Process issues: knowledge capture through a facilitated – distributed architecture

The right KM architecture was considered key to the implementation of KM processes. After examining KM architectures of several companies, the steering committee realized that Infosys' culture, norms, and practices should dictate the choice of architecture. To best understand these issues, an internal survey was conducted. Based on its results, the committee decided on a 'facilitated-distributed' architecture that resembled the middle-up-down model proposed by Nonaka and Takeuchi (1995).

The KM architecture was 'facilitated' by a centralized 'KM Group'. The KM Group, headed by the principal knowledge manager Dr. J.K. Suresh, was comprised of a process expert team to identify and initiate core KM processes; a technology team to build and maintain the technical infrastructure; and a team of 'KM evangelists' to promote the KM program across the organization.

Foreseeing the immense breadth of organizational knowledge, the architecture was also kept 'distributed', in the sense that various KM processes were distributed among various groups of people. The KM Group was made accountable for knowledge capture, while knowledge creation and application were identified as combined responsibilities of management and employees.

To facilitate knowledge capture, a comprehensive taxonomy was developed to classify organizational knowledge resources. The taxonomy included 1100 knowledge areas (called knowledge nodes), arranged in a four-level hierarchy. Level 1 nodes were organized according to broad subject categories, such as technology, industry domain, and project management. Each Level 1 node branched into more granular nodes to populate the subsequent Levels. For example, the node *Wireless Application Protocol* could be traced under (Level 1) *Technology*→(Level 2) *Mobile Technologies*→(Level 3) Protocols (Kochikar and Suresh, 2004).

Technological issues: building a basic KM infrastructure

In the past, various groups of employees developed IT-based applications to support knowledge sharing. For example, since 1992, Infosys' project managers documented brainstorming and mentoring sessions and stored the documents in a central library for future reference. The library, termed Body of Knowledge (BoK), was later converted to an electronic format. Over the years, more IT-based applications evolved, such as the corporate Intranet, a database for storing project-related artifacts, and a marketing assets repository consisting of client case studies.

The KM Group consolidated these applications into a single technological system, thus creating a basic infrastructure for KM. This system was attached to company's intranet in the form of a portal. Seminars and presentations were held to inform people about the KM system. Stock market trends and live soccer scores were constantly flashed on the KM portal to attract repeat visits by users.

Some other stand-alone applications were not merged into the system at the time. Dr. Suresh explained the reason behind this decision:

> Employee groups that had developed these IT applications had a sense of pride attached to them, and it would have been counter productive to merge them with the KM system in the initial stages of the program. So we decided to let them grow as standalone applications and to merge them when the time was right. Our decision averted any negative feelings in employees towards the KM program.

Achieving level 3: aware

By 2001, Infosys had attained KMM Level 2 and was progressing towards attaining the next level. The requirements for attaining KMM Level 3 included developing a serious involvement of employees into the firm's knowledge resources, implementing knowledge creation and sharing processes, and setting up a robust technological infrastructure to support these processes.

People issues

Capturing initial interest. To initially promote the use of KM system, an incentive scheme was introduced. Content reviewers and system users were asked to award quality points, called knowledge currency units (KCU), to the documents they reviewed or downloaded from the system. Different denominations of KCUs were associated with different types of contributions. For example, regarding BoK submissions, a lessons-learned summary of the project was assigned higher denomination than a project snapshot. Employees could trade KCUs for books, music, and other products from an e-commerce company.

The KCU scheme helped the KM program receive extensive participation, and populated the KM system with good quality knowledge documents. Additionally, the KCU scheme ensured a market-driven approach to keeping the KM system lean and current – the system automatically phased out knowledge documents with low KCUs.

Converting interest to serious involvement: Owing to the popularity of the KCU scheme, the KM program captured the interest of employees. The KM Group then faced the challenge of converting this early interest into a long-term involvement. Dr. Suresh explained:

> While the KCU scheme served our initial purpose well, it was an imperfect instrument to sustain long-term involvement of employees. It was time for us to move up the Maslow's need hierarchy.

In an organization of nearly 36,000 people, the need for recognition appeared to be a strong motivator for employees. To capitalize on this need, the KM Group added a scoreboard on the KM portal displaying the names of employees who had submitted 10 best knowledge submissions in each content type. The scoreboard was updated every month and the names of top contributors were also publicized in corporate communications.

Process issues: from mandatory knowledge sharing to knowledge-generating units

Once the KM program had attracted appropriate employee involvement, the KM Group started identifying areas where knowledge sharing could be enforced as a mandatory process. Project management emerged as one such area. The KM Group began developing an IT-based project learning system (PLS) where project managers could submit a detailed account of their learning from a project. Dr. Suresh initiated discussions with some project managers on this issue and faced very strong resistance. Although he was not surprised at the project managers' response, what surprised him were their reasons for resistance. As he mentioned:

> Project managers complained about issues such as 'lack of time' and 'project deadlines' as reasons against sharing their project-related learning. But, I think the actual reason was that they didn't want to be forced into sharing their proprietary knowledge.

So, the KM Group scrapped the PLS, and instead modified an existing integrated project management (IPM) system to ask for project-related information that had a low 'proprietary knowledge' component. Originally, IPM was a tool for project lifecycle management. The KM Group altered IPM to require a brief project summary and information regarding project's quality indices. The project managers provided the project summary, while the quality department provided the quality indices after the project audit.

With the employees incented to do their part in knowledge creation, it was top management's turn to fulfill their responsibility. This led to the creation of two knowledge-creating units: the Domain Competency Group (DCG) and the Technology Competency Group (TCG). DCG had a business focus and was assigned the role of creating new knowledge in various industry domains. It had experts on various domains such as aerospace, banking, Ecommerce, insurance, manufacturing, retail, and telecommunications.

TCG was technology-focused and had the responsibility of creating new knowledge in various technical domains. A key subsidiary of TCG was the Software Engineering and Technology Laboratories (SETLabs), which developed novel software engineering methodologies and technological architectures for Infosys' project teams worldwide.

To involve global locations in the knowledge creation exercise, knowledge-generating divisions were added to all practice units. These divisions gained access to the latest technical and functional knowledge from their local environment. This knowledge was then supplied to DCG and TCG. These two units then coordinated with the Education and Research Department and the Management Development Center to disseminate newly acquired knowledge through their training programs.

Technological issues: integrating IT applications

By late 2002, most of Infosys' employees had begun using the KM system. At this time, the KM group made the critical move to merge the stand-alone applications that were previously left untouched, to include:

- The Integrated Project Management (IPM) system.
- The Employee Skill System (ESS), maintained by the HR department. This system kept mandatory records of changes in employee competencies.
- The electronic bulletin board. After detailed discussions with various user groups, the bulletin board was split into 45 separate domain-specific discussion forums. The originators of the bulletin board were resistant of the change. This resistance stifled out as the KM Group acknowledged their contribution in the corporate magazine. The employees were also invited to be discussion moderators for different bulletin boards.

By the end of this round of consolidation, Infosys' KM system emerged as a robust consortium of IT-based applications for knowledge creation and sharing. Employees could visit the KM system to access various forms of documented knowledge such as previous client proposals, client case studies, technical white papers, project summary and snapshots, and even reusable code. They could visit bulletin boards to view and participate in various technical as well as non-technical discussions. Additionally, they could search the discussion archives for previous discussion threads.

Moving towards level 4: developing KM metrics

Infosys attained KMM Level 3 by late 2004. Nandan was content with the progress of the KM program and its company growth (see Table 6). The program had grown to be the organizational backbone, and allowed the company's 30 worldwide locations to operate as a single intellectual entity. On any typical workday, Infosys' employees worldwide downloaded more than 1000 knowledge artifacts from KM portal totaling over 150,000 documents every quarter. Additionally:

- The knowledge taxonomy had developed into a robust structure encompassing more than 1700 nodes, representing more than 18,000 knowledge assets covering various industries, technologies, and project management topics.
- One in every four employees had contributed at least one knowledge artifact to the central knowledge repository.
- Thousands of employees regularly participated in knowledge exchanges on the discussion forums.
- Infosys was recognized as Asia's Most Admired Knowledge Enterprises for 2002 and 2003, and in 2003 and 2004, was recognized among the Globally Most Admired Knowledge Enterprises, along with such organizations as Accenture, Amazon.com, BP, General Electric, Toyota, and The World Bank.

Nonetheless, the Infosys' Board of Directors were relatively unimpressed with the company's success. They were concerned about the KM program's return on Infosys' financial investment, and wanted some evidence of financial success as it relates to KM.

Table 6. Timeline of Infosys's KM program

1992	Body of knowledge (BoK)
1995	Online technical bulletin board
1996	Corporate intranet unveiled
1997	Online sales and marketing system introduced
1998	Project leader toolkit introduced
1999	KM Initiative formalized
2000	• Integrated KM portal launched
	• Satellite servers added at global locations
2001	• Integrated project management (IPM) tool integrated with the KM System
	• Employee skill system (ESS) integrated with the KM System
	• Electronic bulletin board integrated with the KM system
2002	Infosys recognized as the Asia's Most Admired Knowledge Enterprise (MAKE)
2003	• Various communities of practice formalized across the organization
	• Infosys recognized as the Globally Most Admired Knowledge Enterprise (MAKE)
2004	Infosys recognized as the Globally Most Admired Knowledge Enterprise (MAKE)
2005	• KM benefits assessment initiated
	• Increased focus on tacit knowledge sharing

Source: Infosys.

Nandan had concerns as to whether the Board would remain patient enough to allow Infosys to attain Level 5 status. One of the capabilities required was leveraging internal and external sources of expertise. In other words, Infosys needed to improve its tacit knowledge flows. There were many ways in which this could be accomplished. More focus on employee training – in person as well as through better audio–visual communications worldwide. Knowledge sharing within business units would need to be improved to provide for more technical seminars, as well as open communication between and across organizational levels. Nandan knew what needed to be done but he also knew that it would require further investment in the KM program. Once again his thoughts returned to the upcoming Board meeting. He knew there would be questions about the already substantial investment in KM and he would have to deliver an appropriate response.

In preparation for the meeting, Nandan asked various KM stakeholders throughout Infosys to submit some facts and figures in support of KM's financial success. According to Nandan:

> The quality department has indicated a 15% lower defect rate in high knowledge sharing projects. These projects were also found to have a 13% lower cost of overall project quality. Project leaders reported savings of over 4 man-days per person per year as a direct benefit of reusing project-related knowledge available through the KM System. Project managers further reported a 2 to 4 percent increase in operational efficiency. About 90 percent reported saving at least one day every quarter, and about 20 to 30 percent reportedly saved up to eight days.

He then held a meeting with Murthy to help formulate a plan. Nandan asked Murthy: *Do you think the directors would be satisfied with this anecdotal evidence?* Murthy replied:

> I don't think so. These metrics are too broad. I think, in asking about KM metrics, the Board expects a more focused response…. I think the KM program needs a narrower focus. The initial objective was to improve explicit knowledge flows, but I think this is too vague a goal. And that is the reason you are not able to assess KM's impact, I mean, how will you quantify the improvement in knowledge flows?

Nandan knew Murthy was right: the broad metrics that he had established thus far did not prove anything – especially it did not provide evidence as to why Infosys should continue to sink money into the KM project. The Board would want to see how the KM program gives Infosys a competitive advantage. Then Nandan's thoughts returned to the email he received from Vivek informing him that because of the KM system, he was able to land a major project in the Detriot market. How many other examples were out there where an account manager was able to deliver a well developed proposal on a short timeline simply because the 'know-how' was already collected in a company-wide repository? It was time to get busy. Nandan felt that if he could prove that KM provided a competitive advantage for Infosys, which was difficult for others to copy, he might just receive the backing he needed from the Board of Directors.

It was also time for Infosys to think more proactively. If they truly had the answers to many organizational problems 'stored' in their KM system, what was stopping them from proactively providing solutions to their clients? In other words, account managers could begin to work with clients to anticipate future problems based on the experiences of past Infosys clients. This truly could make KM a core competency of Infosys and give the company a competitive advantage in the marketplace. Nandan realized he had a lot of work ahead to adequately prepare for the Board meeting.

Notes

1. Teaching note available from the lead author.

2. This case study was prepared by Nikhil Mehta, Sharon Oswald, and Anju Mehta as the basis for class discussion. The case is not intended to serve as an endorsement, source of data, or an illustration of effective or ineffective management.

3. Based on Software Engineering Institute's capability maturity model (CMM), KMM defined five maturity levels of Infosys' KM program, ranging from level 1 (lowest KM maturity) to level 5 (highest KM maturity).

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