

MANAGEMENT
INFORMATION
SYSTEMS

CHAPTER 1

Outsourcing Failure Case Studies

Outsourcing is a strategic concept to get a competitive advantage by cutting costs, improving performance and refocus on core business. Number of companies worldwide outsourced their activities and some have outsourced to Indian companies. Outsourcing failures are rarely reported because firms are reluctant to publicize them. Some of the failures that have happened in the past as described here:

Dell - Corporate Support Call Centers: After an onslaught of complaints, computer maker Dell stopped using a technical support center in India to handle calls from its corporate customers. Some U.S. customers complained that the Indian technical-support representatives were difficult to communicate with because of thick accents and scripted responses. Corporate customers account for about 85% of Dell's business, with only 15% coming from the consumer market. Calls from some home PC owners will continue to be handled by the technical support center in Bangalore, (India). Dell has no plans to scale back the operation there. Worldwide, Dell employs about 44,300 people. About 54% of whom are abroad.

Lehman - Internal Help Desk Support: In December 2003, it was reported that Lehman Brothers had stopped using Wipro Spectramind for its internal IT help desk. According to a Lehman analyst, the Indian firm could not provide the level of quality and service Lehman sought for help desk support. Lehman is still using two Indian firms—Tata Consultancy Services and Wipro—to manage some of its IT infrastructure support, software application development and applications support. Lehman uses about 450 workers at Tata and Wipro and has generated savings of about 40%-50%.

Cogent Road - Mortgage Banking: Cogent Road offers e-business solutions for the mortgage banking industry that protect banks from loss by identifying potential errors in collateral valuation and loan regulation compliance. When Cogent Road outsourced a project to Kolkata, (India) the company was surprised to find that it took twice as long as expected, due to the language barrier and 12-hour time difference between India and its San Diego headquarters. Cogent decided against outsourcing mission-critical projects overseas.

Shop Direct - Call Center: Shop Direct, which employs 1,200 people in the United Kingdom, opened a call center in Bangalore in March 2002 and transferred 250 jobs from Britain. Service from the new location was rated 'poor' and the experiment came to an end the next month. Jobs moved back to six call centers in the United Kingdom. A spokesman said the Indian center dealt with orders and customer inquiries, but the level of service was not up to the required standard. He noted consumers felt the Indian staff had poorer skills than their British counterparts and were ill equipped to deal with inquiries. "They may be cheaper but I can certainly tell the difference when I am being served by someone overseas. Success is much more important than having someone who costs half the price," he said.

Indian Call Centers: ‘Do-Not-Call’ lists that gather the names of Americans who don’t want to receive telemarketing calls have put many Indian call centers in a jam, even forcing some to shut down. At least five call centers in southern India that do telemarketing for U.S firms have closed shop and many others may follow suit.

[Source: These examples have been adapted from various sources: CNN, November 25, 2003; Associated Press, December 15, 2003; *BusinessWeek Online*, “The Outsourcing Food Chain,” March 11, 2004; IANS, January 26, 2004; HindustanTimes.com, September 2003; <http://www.ebstrategy.com/Outsourcing/cases>]

CHAPTER 2

IT lifeline of Timex

When the joint venture between Titan and Timex came to an abrupt end after six long years of strong relationship, all infrastructures that were created became non-functional. As a result, Timex had no distribution channels, no Point of Sale systems and even no databases in place to sustain business in Indian continent. For the CIO of Timex, it was a challenging task of setting the priority right and create a strong IT infrastructure to revive the business. The parent company in the US was using Oracle based ERP system to manage all its business transactions. So the Indian counterpart decided to build the system around the same solution. CIO set the first priority to create a strong network of POS, as the distribution was not much at that point of time. At the subsequent stage, IT department decided to create inventory, billing and order management systems.

Various technological solutions were evaluated and tested to transfer the POS data back to company's main data server for intelligent data processing. Watch industry is quite dynamic in nature as the styles, textures, and trends keep changing very fast. In order to keep analysing the buying patterns and demand analysis, company needs the complete POS data on real time basis for data analytics. To achieve this, the company decided to implement Power Builder software to connect its POS terminals with the central databases. The proposed system was email-based batch processing system, which would send an email to the data centre at the end of the day. All email received from various vendors were validated and uploaded into the Oracle ERP for managers to view and analyse.

The biggest challenge of implementing this system was to cut implementation and running costs as they had limited funds available for too many technological developments.

Questions for discussion:

1. What was the strategy being followed by CIO of Timex?
2. Was it a correct strategy to follow at this stage?
3. Why Timex concentrated on developing POS network?

Source: Adapted from Timex Fast Track, Dataquest, Vol. XXV No. 1, January 15, 2007

CHAPTER 3

Grid Technology

Computation has changed drastically since its inception from a concept of Mainframe centralized processing to Grid computing. Grid technology allows the organization to share the processing and storage power over the internet like electric grids. This allows the sharing of computational resources spread across geographical locations for high end computation. Grid technology allows the organization to handle complex computational problems in a different manner.

Once the job is submitted for operation in a Grid, the broker which is at the heart of the Grid, discovers resources that the user can access through the Grid Server. It then negotiates with grid-enabled resources using middleware, maps these to the resources and then stages the data for processing. Number of leading IT companies have already started using the concept of Grid technology. Some of the companies that are using this include Sun Microsystems, Oracle, Informatica, etc. Some of these companies are providing grid computing solutions for data centric applications.

Another concept that has also emerged is that of community grids. Community grid is a concept of collaborative computing by providing grid technology. Some of the community grids that are using this concept of collaborative computing are Folding@home, Geo-grid, SETI@home, AFRICA@home, among many others. Most of these grid projects have been established for a single type of research projects. There is also a World Community Grid (WCG) that supports multiple types of projects. IBM is coordinating and managing the WCG project and has donated hardware, software, technical services and other expertise to build the WCG. Fourteen servers serve as “command central” for the WCG. Multiple operating system platforms are available on the WCG like Windows, Linux, Mac-OS etc.

To work on WCG, the user needs to first download a free software agent from the -worldcommunitygrid.org web site. Once this software agent is installed, the user computer is connected to the grid. Multi-level security makes the grid user friendly. Grid computing technology is becoming popular as it has accelerated the discovery of novel treatments for human diseases like Dengue, Hepatitis C, Yellow Fever, AIDS etc.

Source: Adapted from Dataquest, November 15, 2007.

CHAPTER 3

REAL WORLD

CASE



IT Issues in the Case of Merger

Centurion Bank of Punjab is a private sector bank that offers retail, SME and corporate banking product and services. It was formed by a merger of the

Centurion Bank and the Bank of Punjab in October, 2005. RBI gave them twelve months to complete the merger. To do so successfully, the two banks had a ma-

major problem with respect to the technology. The two banks had different technological setups. The architecture of the infrastructure was different, the data centre and disaster recovery centre were located in different cities and following different technologies. The banks were following different core bank solutions developed by two different vendors — Centurion Bank was on M-sys and Bank of Punjab was on Finacle. The mailing solution were also different one was on Linux and other was on Exchange. Both banks were following different methods and topologies to connect their data centre and had five different service providers for the connectivity.

The major technological challenge was to bring the entire staff on to the same mailing platform from day one of operations, keeping the business transaction intact. The ATM network of the two banks needs to be interconnected without affecting the business and at no extra cost to the customer. The connectivity between the two data centre needs to be established. Flexibility has to be provided to the customer, so that their account can be accessed from any bank branch, while maintaining total security. Similar kinds of issues need to be addressed at the branch level.

CASE STUDY QUESTIONS

1. If you are a consultant, how would you approach this problem?
2. What are the precautions that you will consider while implementing the new proposed system?

CHAPTER 4

Linux—a Tool

In 2007-08, most of the banks and insurance companies in India were ridden high on the IT maturity curve and became the highest IT spenders among the Indian organizations. Total IT outsourcing has been the most prominent trend that marked the IT maturity of Banking and Finance sector. The Bank of India pioneered the contract with HP which was replicated by the Bank of Baroda and UCO bank. Some of these banks looked up at hardware and networking outsourcing where as some followed the consulting phenomenon.

Bank of Baroda adopted a change management approach, whereby HP created a model branch. HDFC tied up with Wipro Infotech for IT outsourcing at the branch level, infrastructure management at data centers and level one of application support. UCO Bank also outsourced the core banking solution management to HP.

Banking and Financial sector also emerged as the strong user of Linux. The UTI Bank call center that handles more than 7000 calls per day was running on Linux servers. Other banks like Canara Bank, Central Bank and Allahabad Bank also deployed Linux in their number of branches. Insurance companies like LIC of India, Bajaj Alliance and New India Assurance did Linux deployment across a number of branches all over India. Most of the banks and financial institutions deployed Linux for their critical applications as they found it to be safer and robust.

Source: Adapted from Dataquest, March 15, 2007

CHAPTER 5

Accessing Data from Anywhere

Godfrey Phillips India Limited is a leading tobacco manufacturing company having manufacturing units at Ghaziabad and Mumbai; an R&D center in Mumbai; a tobacco buying unit in Guntur; headquarter in Delhi and sales offices at Ahmedabad, Mumbai, Delhi, Chandigarh and Hyderabad. The challenge that the company was facing was to have anytime, anywhere connectivity for all its employees, especially the sales force.

Majority of company staff are on the move and hence stranded due to lack of access to latest sales data. The company realised that goods were flowing at multiple levels, before they reach the end consumers. Each level was posing problems and required detailed planning. Another problem was dealing with various incentive schemes and demand shaping exercises to achieve sales targets. Finding out whether growth was due to actual consumer demand or incentive programs along the supply chain was a major challenge for the company.

To build an effective solution, company started with standardization of infrastructure on Linux Oracle platform and implemented package applications, depending on specific needs. They started with basic invoicing and accounting system. Later integrated the mobile technology for the sales force and collections were notified to the customers on real-time basis. Managers at headquarter and regional centers were able to get updated information about sales and outstanding.

Source: Adapted from Dataquest, March 17, 2007.

CHAPTER 6

Tele-medicine and Tele-education

India still lacks proper health facilities in remote locations. That's why patients mostly have to come to the metro cities for treatment. For patients with serious ailments, this can be a serious limitation. In most of the remote locations in India, hospitals and doctors are not available. All India Institute of Medical Sciences (AIIMS) is trying to change this through its tele-medicine and tele-education project. This project is initiated by the Government of India to provide training, consultancy and expert opinions from AIIMS to patients and hospitals all across India and sometimes across the globe using teleconferencing facilities.

Teleconferencing facility is located in the Tele-Medicine center of the AIIMS campus. The center is equipped with the state-of-art video conferencing facilities with plasma screen and a computer infrastructure to undertake any sophisticated training and to provide healthcare to critical patients in remote locations.

The project connects over 300 medical institutions and hospitals all over India through VSAT or ISDN links. Tele-consultation is conducted whenever required by the connected locations. For example, if specialists are unavailable in the remote locations or they need a second opinion on some critical case, this infrastructure is used. On request of the connected location, experts from AIIMS assemble in the tele-medicine center and live consultation is held between two or more locations.

The system is currently being used more for medical education with respect to specialty care in Urology, Cardiology, Childcare and other areas. Doctors at AIIMS explain the concept with the help of live demos in specific areas. Facility is equipped with two-way audio/video. The facility is also equipped with display of digital diagnostic reports of patients in a real time environment, which help in providing the best learning environment.

In this system, they have used a classroom required to deliver a lecture and a camera to capture and transmit video and images to remote locations. Satellite communication connectivity is provided by ISRO. ISRO, MTNL and VSNL provided the ISDN connectivity. The project is a great success.

Source: PCQuest, June 2007.

CHAPTER 7

Dotcom: The Focus is on Consumer

IT and dotcoms are inseparable. All over the world, many successful Internet based business models have achieved rapid business scale in a very compressed timeline. In a dotcom, value creation and value delivery is primarily enabled by technology because the Internet or Web becomes the primary sales, marketing and service channel. A well-architected and implemented IT platform drives the business and provides necessary agility and maneuverability to sustain and excel in the competitive landscape.

In the dotcom sector, there are varied business models which can loosely be classified as traditional - existing business models mapped to the Web (like Amazon.com and Barnes and Noble), Web-centric (like Google, Yahoo!), as well as disruptive (aggregators) which have achieved tremendous success in a very short period of time.

While there are many factors which differentiate a dotcom from brick-and-mortar ventures, it is the business instant reach to its customers and partners. With agility, multi-platform access and the availability and delivery of products and services over the Internet, the focus of a dotcom has to be on the end-user or consumer from the very first day.

Some of the best practices that I have witnessed in successful dotcoms are providing delightful user experiences at all customer touch-points. These include not just the product GUI (graphical user interface) but also all the customer touch-points across the services, sales and marketing channel of the business. A paramount focus on best-in-class, high performance, scalable and secure infrastructure to enable their business growth is another facet shared by successful dotcoms; concern about the quality of the team, and competing for top talent and hiring the best people from across the globe; and lastly, an intense focus on continuous innovation as a driving culture to build sustainable competitive advantage is another feature common to successful dotcoms.

A dotcom has to be well grounded in business fundamentals. While eyeballs and aggregating website traffic are important to dotcoms, these indicators should rapidly converge to a path of monetization. In addition, customer acquisition costs should be in line with the overall business plan.

A significant learning from global companies is their ability to leverage the networking effect and word-of-mouth and their focus on customer delight at all brand touch-points. Thereby creating the sustainable advantages of customer stickiness and recurring revenue models. Global organizations recognize the value of constant monitoring of direct and in-direct competition and anticipate by keeping track of disruptive business models, being tried out almost daily and their own strategy to combat competition. In conclusion, all successful global companies build sustainable brands and leverage technology effectively for customer acquisition, sales, and service delivery to keep their bottom lines healthy.

Interactions with CXOs and other CIOs are usually through personal contact and on a broader spectrum through domestic/international industry forums. The print as well as Web 2.0 incarnations of popular publications and websites also allow us to easily connect with our peers in the industry.

Relationship with vendors is also a critical aspect for success. The mantra for a good relationship with vendors who are part of your supply chain is: Create long-term, mutually-beneficial partnerships. With vendors, who have some similar offering in terms of product and services in the same domain, the focus should be on “Co-opetition”, which is to cooperate in creating a market and then competing to acquire a lions share of it.

Source: *Dataquest*, Feb 29, 2008, Vol. XXVI No. 04.

CHAPTER 8

FMCG Companies Moving Fast on IT

Integrating the complex supply chain continues to remain the most important challenge before the FMCG industry in India. It is here that most action is taking place. IT is becoming integrated part of the strategy of all leading FMCG companies in India.

The basic challenge for these companies is that goods flow at multiple levels before they reach the end consumers, and at each level a new problem arises which require detailed planning. There are various incentive schemes and demand shaping exercises that ensure that the sales targets are met. Tracking also becomes complicated if the necessary IT infrastructure is not in place. All this keeps companies wondering if the growth is due to actual consumer demand or because of incentive programs that happen along the supply chain.

FMCG companies are not hesitating to outsource their IT infrastructure function to leading system integrators. They are also revisiting their relationships with the telecom service providers and factor in every possible details before entering into Service Level Agreements (SLAs) with them. On the technology front the companies are moving on to the next level. Some of them are moving to MPLS-based VPN instead of leased line due to its scalability and other features.

A big push for mobility applications is being witnessed in the FMCG sector with companies increasingly going in for mobility applications ranging from SMS to enabling their employees and suppliers to access ERP applications. For example, an application developed by Colgate Palmolive for its stockist is being accessed by more than 600 persons. This system works when the salesmen go to rural areas, take order using PDA and then upload all the data at their distributor's end.

One of the early adopters of IT, Hindustan Lever realized the importance of IT long back and overhauled its entire IT system implementing the supply chain, data warehousing and customer relationship systems.

Companies are also using the Internet as a medium to reach out to their customers through their customer portals wherein they are inviting customers to register their complaints and grievances related to their products. A lot of backend integration is to make the system work. Many companies have implemented CRM but are not able to utilize the power of the system.

Some companies have invested in developing solutions to help their suppliers and distributors. Companies are increasingly using supply chain optimisation tools apart from business intelligence tools to stay ahead of competition.

As FMCG companies expand their scattered operations and cut throat competition, because of the retail boom, IT is all set to play a major role in the endeavour to efficiently reach out to the customers across the country.

Source: *Dataquest*, March 15, 2007

Supply Chain Management

Supply chain are as dynamic as the business environment and there is an increasing pressure to bring about efficiency through the whole value chain. The intense competitive landscape makes it imperative for businesses to continuously evolve with an emphasis on optimising at all levels of the value

chain. Supply Chain Management (SCM) integrates the entire chain right from suppliers to manufacturers, distributors, wholesalers, retailers and finally to the end consumers, and emphasizes the need for collaboration between all entities to optimise the whole system.

The basic aim of any SCM function is to make the organization more agile to respond to continuously changing consumer needs by capturing the data of material flow at all levels of the value chain.

Areas of Concern

- Data available from different stakeholders should be clear and easy to understand and be able to recognise different business patterns clearly. There are standards available for data transmission over the supply chain.
- System should be able to track and use new information immediately after an event and influence the decision of the concerned people.
- The real value of the immense data generated throughout the supply chain can be realized by the sharing of information between various entities to improve overall efficiency.
- Sharing of forecasts and related business information among business partners enable high product availability. Collaboration results in better cross docking, less product returns, reduction in reverse logistics, B2B integration and providing manufacturers or vendors with valuable customer data for improving marketing efforts.
- With proper inventory planning, potential stock-outs can be detected and replenishment requested before the inventory drops to critical levels.
- Financial efficiency when enabled can ensure accurate billing, efficient utilization of funds and human resource, better financial reporting and lean operations across the chain.

Source: *Dataquest*, March 15, 2007.

CHAPTER 9

Managing Traffic using Technology

Chaos and disorder on Mumbai roads may soon be a past story for the city as the city's traffic police tighten screws over transport mechanism in order to deliver a well-managed traffic situation, using e-Governance tools. Beefing up transport mechanism have become all the more important in the view of increasing road traffic in Mumbai.

Statistics revealed that while the road length has increased by 230% since 1951, the vehicular congestion in Mumbai has jumped by over 3,700% since then. As a result, the vehicular density of 700 vehicles/km is extremely high as compared to the international average of 30 vehicles/km. During peak hours local trains in Mumbai carry an average of 5,000 passengers against their capacity of 1,700 passengers. The available infrastructure of road and rail transport has reached a saturation point. In addition to this, major road development projects have been adding up to the traffic snarls for the last three years.

The Mumbai Traffic Control Board decided to use technology to manage the traffic. As part of the e-Governance initiatives, the Traffic Control Branch has launched its official website for disseminating information, with an objective of encouraging public to plan their travel and avoid traffic congestions.

The Traffic Control Branch, Mumbai launched its official website in September 2005. The website flashes regular updates on traffic situation at the time of every major event in the city, providing directions for possible traffic diversions. All these traffic related information is also mailed to individual email-IDs of the group, which has currently more than 2,200 members.

The site has become a medium to reach more and more road travelers. The Board also gets feedback via emails, which is a motivating factor for the department. They receive complaints against erring auto rickshaw/taxi drivers, which helps them in taking suitable action. The website has indeed served as a forum for Mumbai road users. The number of enforcement cases registering a jump by over 41% over 2002 exhibits the positive impact the website has on the enforcement. This also led to increase in the revenue generated by 35% (Compared to the year 2002). Among the other key e-Governance initiatives, the Mumbai Traffic Control Branch also started an effort of Interactive Voice Response system, which is a 24-hours help-line for the road users.

A call received on the system is recorded in digitized format and seen on the computer located at the traffic control room. The problem is attended via a wireless network installed at the traffic control room and followed up by the control room staff. SMS service was also started for road users to report traffic congestions, accidents, other problems faced by travelers, and to get traffic updates. The Board is in the process of setting up electronic display boards to communicate recent and authentic traffic updates to commuters. Seventeen boards have already been installed and 18 more are in the pipeline.

Modernizing Traffic Signals

To further improve traffic management with the help of technology, the Mumbai Traffic Control Board has also replaced the preset timing system in traffic signals, which allots fixed seconds for each phase, irrespective of the traffic flow, with actuated traffic signals.

In this system a vehicle actuates traffic signal system with the help of the sensors affixed underneath the road surface, and the actual vehicle count is taken through software, and time for each road at junction is decided accordingly. The system provides flexibility in the timing which helps managing traffic at a junction as per requirement, thus helping in reducing waiting time for the vehicles at the signal.

In addition to this is the installation of CCTVs, which so far has been designed for 100 Mumbai junctions to help the control room keep a track of video recordings of important signals. The pictures/videos captured by these cameras are sent to CFTV at the Traffic Control Branch via Internet protocol.

The traffic control board has also initiated the computerization of all its branches and divisions last year. 25 divisions have already been computerized, and steps are being taken to computerize other branches/offices, connecting via LAN/WAN.

In the near future, the board also plans to implement digitization of records, linking up all traffic chowkies/divisional offices with head quarters, providing a facility to pay fine through ATM cards, procuring handheld computers with a link to the digitized data about vehicles and providing license information to traffic personnel.

Source: Adapted from *Dataquest*, Vol. XXV No. 2, January 31, 2007.

CHAPTER 10

Adopting GIS

Growth in the use of spatial technologies has secured acceptance for geo-spatial technology as an effective decision-making tool even by government agencies. They have realized that this technology can provide them the much-needed tool to address the ever-increasing demand for data availability. The technology is widely used in integrated land information systems, land reform offices, education sector and urban planning.

According to a recent study conducted by Geospatial Today in association with Antrix Corporation and Survey of India in May 2006, the Geographical Information System (GIS) market (domestic and export) is expected to record a potential growth from Rs 962 crore (\$209 mn) in the year 2005 to Rs 2,820.30 crore (\$613 mn) by 2010 at a CAGR of 14.5%.

The study focused on different parts of the geospatial industry including geospatial data, services (including remote sensing), products and export of geospatial services from India. It estimates that the domestic market for these services amounts to about Rs 562 crore (\$122 mn) in fiscal 2005, and is expected to reach Rs 1,824.3 crore (\$396 mn) by 2010, at a CAGR of 17.6% per annum. The key driver for this increased growth is the expected investments in land information systems (ILIS) in several states across the country.

Though the awareness of GIS-based applications is in its initial phases, due to extensive research and education, many government/semi-government agencies and corporate organizations have recognized that this technology can provide them the much-needed tool to address the increasing demand for data availability through a highly visually intuitive decision making tool that gives you a panoramic view instead of a myopic view. The basic premise is to leverage spatial data for increased productivity.

In India, the central and state governments are major users of geospatial applications since most of the basic infrastructure is owned and managed by them. The extensive use of GIS is palpable in various fields like laying pipelines, building roads, laying transmission grids etc.

Several large private sector organizations have also started extensive usage of GIS in utility mapping and asset management, retail and logistics management, pipelines and refineries, integration with CRM, location-based services, and agriculture produce management.

Today, the government of India and almost all state governments are convinced of the fact that to retain the over all economic growth of the country and have a continuous FDI inflow as well, substantial investment on infrastructure is very much needed. Besides this, most of the mega infrastructure projects have already started rolling, and are making reasonably good progress. Some of the best examples of such projects are Rajiv Gandhi Drinking Water Mission, National Highways Development Project (East-West and North-South Corridors, Golden Quadrilateral, etc), Water Resources (Major Irrigation, Interlinking of rivers, interstate water dispute resolution), Yamuna Action Plan, Jawaharlal Nehru National Urban Renewal Mission, National Urban Information System, National Hydrology Project, National Agricultural Technology Project and the APDRP Power Reforms projects.

Also, to sustain the current economic growth, India would require a large number of new projects to provide the required infrastructure. The heartening news is that most of the existing projects are reasonably on schedule in spite of several initial hiccups, and some have been successfully completed too.

Having said that, there are several major challenges that the industry still faces:

- GIS and remote sensing application software require high-end computers with high end-graphic cards which, at the moment, are comparatively expensive in India. But this problem will cease to persist gradually as prices of hardware go down.
- GIS awareness and education levels are still low in India. It has yet to proliferate fully in the formal technical education space (graduate degree programs, and diplomas), even though many universities and colleges have started teaching GIS in PG programs.
- The last but the biggest constraint is the easy availability of spatial data. In India, most of the organizations that have adopted GIS are still spending a lot of money and time on building data. One of the reasons attributable to this is the disparity between the various systems from which data has to move from one form to another before the final desired output is available. The second reason is very tight government control on spatial data acquisition and high cost of satellite and aerial data.

The prospect of geospatial as a market is huge looking at the investment that is going in to the infrastructure industry. Also, the adoption of GIS applications is gaining very high popularity and mindshare in most of the core infrastructure development areas like roads and highways, hydrology, hydro-power, bridges, land development and earthwork, grading, site planning, and power distribution.

Source: Adapted from *Dataquest*, Sept 15, 2007, Vol. XXV No. 17.

Predicting Future

IT adoption in healthcare has grown at both process and enterprise level. The pharmaceutical vertical has been the first to take advantage of IT, and like any other industry, it started IT adoption at the department level, having department specific solution without integration. Then came the ERP era, and the pharmaceutical companies realized the need for integrated solutions to reduce duplication of work and use information across the enterprise. This helped enterprises to integrate departments like finance, procurement, manufacturing, sales and HR. Today, the scenario has changed; healthcare organizations, particularly pharmaceuticals, are adopting IT solutions to automate the entire process of the organization.

Apart from pharmaceuticals, hospitals, diagnostics, laboratories and pharmaceuticals R&D are considered the biggest spenders in IT. Pharmaceutical retail has also seen considerable amount of spending in IT to reach out to the customer.

Strategic deployment in IT has helped at all stages of the pharmaceutical value chain, starting from drug discovery, drug development, manufacturing and distribution to sales and marketing. India is being considered the new destination for drug discovery and development because of our advantage of having talent, cost effectiveness and availability of volunteers to conduct clinical trial studies. India has more number of FDA approved pharmaceutical manufacturing setups and, very shortly, will have more number of pharmaceutical R&D units. This trend has been a major contributor for Indian healthcare to adopt the best world practices in the entire spectrum of healthcare.

IT is used to automate the entire data capture and extraction process from multiple source and systems. There are three components in e-enabling data management aspects in clinical trial processes. One is remote electronic data capture (e-CRF {case report form}+e-LAB). The second is

Web-based data reporting and collection, and the third is data analysis.

Currently, some CROs have implemented the e-diary concept using PDA, which is replacing paper diaries used for clinical data capture at the investigating site. This has reduced the time for capturing information and cleaning the captured data.

Wireless information technology has helped save significant time in the healthcare sector. RFID labeling on drugs has helped in better tracking and tracing of drugs as well as combating counterfeit drugs. Even though India is most vulnerable to counterfeit drugs, Indian companies have not yet started using the RFID tagging for domestic drug distribution. Indian pharmaceutical companies have been using RFID technology for some time to meet global requirements for shipping drugs to the international market.

Most businesses in the healthcare vertical are in service, and pharmaceutical is an exemption. In any service ecosystem all stakeholders involved are critical for the success of that business, so vendors are partners in business too.

Once we consider them partners, half the concerns of CIOs are taken care of. Today, one needs to have a balance between business and technology and by that virtue, has to rub shoulders with other CXOs. A CIO is the change agent in any organization, and any change will not be successfully achieved without taking your peer CXO in confidence. So, people management and PR are some of the soft skills the CIO should have in this highly competitive business environment. A CIO should also be a visionary to anticipate future business needs, as both business and technology are very dynamic.

Source: *Dataquest*, Feb 29, 2008, Vol. XXVI No. 04

CHAPTER 12

Selecting the Right IT Solution

Every CIO wants an answer to the most common question, “How to select the right IT solution”. The challenge becomes more compounded with most IT solutions providers claiming that their products are the best. With rapid business expansion, CIOs are being asked to ramp up the IT infrastructure and clearly put in place a clear enterprise application deployment plan, which is indeed a daunting task. Most CIOs says that finding a solution that matches their requirement is a big challenge. Some organizations have developed a custom specific solution for their operations, as they could’nt find any suitable ready-made solution. But for a majority of the enterprises, either they deploy a solution as per popular perception or get stuck with a product that does not meet their requirements on a real life basis.

According to successful CIOs who have conducted large-scale enterprise wide deployments, mapping internal processes and pinpointing pain areas is the starting point. Once pain areas are understood, the vendor selection process comes into play. As per the CIO of a leading pharmaceutical company headquartered in Chennai, “When we rolled out our ERP solution across eighteen of our sites spread across locations, the vendor selection process was not done by the IT department alone. We involved all stakeholders in the company and asked for inputs. We gathered all department specific requirements and consolidated the requirement plan. Then we narrowed down on four ERP solutions and selected the one that satisfied most of our requirements.”

It is a must to study the detailed feedbacks from existing customers, both from functional and technical teams, regarding the strengths and weaknesses of the ERP toward meeting organizational objectives, after having gone live for at least over a year. The success or failure of ERP has a lot to do with the implementation approach and usage. Also, people need to champion the product, deflect internal conflicts and bring domain value into the project. Flexibility to meet changing business, market, regulatory and environment needs is also important.

Yet another key criteria in selecting a right fit solution lies in understanding the vendor’s track record in the market. For instance, in the case of an ERP solution, the vendor’s domain capabilities have to be closely studied. Every vertical has unique demands and it is mandatory to look at the vendor’s track record in similar deployments. This, in most cases, will act as a prelude for successful deployment.

Some of the serious and obvious issues need to be addressed. Instead of looking at the company alone, time should be spend with the implementation project team of the vendor and ask questions like: Do you have the necessary experience to implement the solution? Have you implemented in similar industries? CIOs then need to do a reference check. Other things to look at are aspects like: Do the vendors understand your requirement clearly? Do they articulate the solutions clearly enough for you to be comfortable with? Meanwhile country specific issues like the tax and excise duty regimes, and compliance need to be clearly defined in the ERP selection process. The kind of support vendors provides for resolving these issues should also be closely studied. Once the solution is identified, it is mandatory to set realistic deployment deadlines.

Reaching Customers

While ERP takes care of the seamless integration of enterprise wide processes, a CRM solution brings in the competitive edge. It is today seen as an effective tool for aligning business goals with IT. But the road to CRM is strewn with challenges. Usability is one of the key elements in selecting a CRM solution. The key question a CIO should ask is whether the CRM solution can provide insight into customer behavior for better decision making. IT experts believe that a successful CRM is a confluence of people, process and technology. So, a CRM solution has to permeate across hierarchies. A CRM solution's success depends on its usability and ability to integrate with existing IT systems.

If one can implement a centralized system, a branded solution should be opted for. If that's not the case, one needs to look for decentralized custom developed software. For instance, when we take FMCG or the pharmaceutical vertical, wherein a good number of the company's stockists are in smaller towns, they cannot afford a dedicated leased line. Here, a decentralized CRM approach is the only option with data synch over broadband every few hours.

To assure success of a CRM, the enterprise must manage the change effectively and convince the employees that CRM is absolutely necessary. The CIO should prioritize customer information, separate relevant ones and create strategies for using that information. Once these are done, a right CRM solution will automate this customer information for a holistic view.

Success with SCM

If your enterprise is struggling to create a lean mean inventory, you should take a closer look at supply chain management (SCM) solutions. A good SCM solution enhances operational efficiencies and hastens collaboration and communication. The top two things one should look for in a SCM solution are to understand the complexities of the current processes and need to change; re-engineer first, and then select software. Secondary, a CIO must look at the integration ability with core ERP systems, which is a key requirement for SCM products.

Experts suggest that the success of a SCM solution lies in understanding 'flows'. There is a widespread consensus on three key enterprise flows—product, information and finance. These flows originate from processes like the supplier giving materials or components to the manufacturer, and from the manufacturer to the wholesaler and from there to the retailer. The SCM solution seamlessly integrates these flows and enables the enterprise to create a lean mean manufacturing and delivery of its products.

In terms of types of SCM solutions, the two widely adopted ones are planning and execution applications. By putting in place a planning SCM one can arrive at a successful order fulfilment. Execution applications are more of a tracking and monitoring solution that takes care of the various processes like material status and its management, and financial information.

Intelligence through BI

Maturity of operational transactional systems such as ERP, OLTP, and CRM (which generate high volumes of data and regulatory compliance issues) are among the primary factors driving the BI market in India. According to experts BI, is nothing but a group of applications used for collating, storing and analyzing data that facilitates better business decisions. A typical BI solution would include decisions support systems, online analytical processing, statistical analysis, data mining and forecasting. Before determining what BI can deliver tomorrow, assess what is captured today and

what extra needs to be done to make BI meaningful. Also, the product should fit into the current systems architecture within the company.

BI also needs a lot of synchronization with the existing systems as any conflicts could lead to obstruction in capturing data. Experts agree that the starting point of any BI solution is creating a selection committee involving all stakeholders. This enable the CIO to understand the analysis requirements from each. Like other solutions, one should also ask the vendors about similar size/scale deployments. This would help in inferring the benefits of the solution. Yet another area is to create proof-points for BI. For instance, one should run multiple BI solutions in simulated environments, which would help in figuring out fitment requirements.

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Key to Success

The process of selecting and deploying enterprise solutions is indeed a challenging one. The key to success lies in a comprehensive diligence at every stage that secures a right solution. So, in order to achieve a smooth transition into a highly automated information driven enterprise, a CIO needs to put in place various best practices and manage various conflict situations, that might arise in the pre- and post-deployment stage with the top management as well as with different stake holders within the enterprise. When RFP is out, every partner will present his product as the best possible solution ever made. However, being a business IT manager who is internal to the enterprise, the CIO should align business requirements and priorities with what is required and what is offered.

Source: Adapted from *Dataquest*, April 30, 2007, Vol. XXV No. 8.

CHAPTER 13

Data Security Tools

As computers become more mobile and better connected, threats to data security keep increasing in magnitude and complexity. While security features increasingly rely on established industry standards and are better integrated with other security elements, there are still challenges to widespread deployment and utilization. These challenges include usability, manageability, awareness, interoperability and extensibility.

Some of the following integrated tools can go a long way in protecting data and providing a secured mobility experience.

Credential Manager: The core functionalities delivered by credential manager are multi-factor authentication, Windows logon service, and single sign-on backed by identity storage, backup and migration capabilities. These help in various ways such as single sign-on which is more convenient for the user and password security, fully-integrated embedded security chip support that can provide another authentication factor while protecting the user's credentials.

Embedded Security: OS-level security solutions can provide a high level of protection against unauthorized access. But in order to truly protect a system at each of the points of vulnerability, security has to be built into the hardware and firmware.

BIOS Configuration: Some users may not be comfortable modifying BIOS settings through standard F10 access. BIOS configuration may be designed to make the BIOS features easily accessible to all users from the familiar Microsoft Windows environment.

Smart Card Security: This enables access to the smart card configuration and enables smart card security features on systems equipped with a smart card reader. Smart card readers can either be integrated or can be added using the PC card slot on notebooks and USB on desktops and workstations.

Smart Card Reader: A smart card is an authentication credential containing an embedded integrated circuit, that can uniquely identify the cardholder. The smart card is the same size as a credit card. Authenticating the user before the operating system, pre-boot security can load without the need for credentials stored on the system. This simplifies operating system logon.

Device Access Manager: A common assumption with today's client usage model is that users who are authorized to log on to a client and access sensitive data are also able to copy or print that information. In reality, this is not always the case. Companies may need to allow users to view sensitive data, but restrict their ability to copy or print that data. Device access manager solves that problem.

Creating a secure system involves looking at all areas of vulnerability and creating solutions to address each of those areas.

Disk Sanitizer: It helps to protect the data from unauthorized access by completely removing it from the hard drive. It eliminates the need to purchase third-party software to erase hard disk data. This feature is perfect for recycled equipment, planning for lease expiration and preparation ahead of a service event as it permanently destroys data.

TPM-Enhanced DriveLock: Hard drive protected by an automatically created, strong, random password makes it more transparent and easier to use. DriveLock password protected in TPM hardware improves security by requiring users to authenticate before accessing the hard drive and without the need to memorize another password.

Privacy Filter: This ensures that only the relevant person can view displayed and confidential data. The security filter narrows the viewing angle in your notebook display with no blurring or image distortion so that screen data is visible only to the user, thus people on either side see a dark, blank screen.

Source: Adapted from *Dataquest*, Feb 15, 2007, Vol. XXV No. 03

Outsourcing Security Management

Customers and outsourcing suppliers who engaged in the outsourcing boom, three to five years ago, are now facing significant security challenges. Particularly, the last couple of months have seen a shift in the perception of the security issues that face networking infrastructures. For the first time, networking products have made it to the SANS Top 0 vulnerability list, with Cisco's IOS getting specific attention. In the past, there was very little attention paid to the possibility of security vulnerabilities in network infrastructure equipment being exploited. The research firm Gartner recommends that enterprises that run Cisco IOS, pay close attention to IOS vulnerabilities, treat them seriously and follow the guidelines within advisories to upgrade to a newer version of software at the earliest possible opportunity.

He also recommends that in the event of buffer/heap/stack overflow vulnerability exploitation enterprises take immediate action to shield their network by implementing a layered defense, including network-based intrusion prevention technologies, to block exploits while executing normal test-and-patch deployment processes. The sheer amount of Cisco equipment installed, the many versions of IOS involved, the difficulties of upgrading IOS and the IOS vulnerabilities already out there or yet to be discovered, presents a major challenge to network administrators and security professionals. This is an aspect that needs to be reflected in outsource contracts, or if handled in-house, the amount of effort required should be recognized and planned for.

Security Shift

All these developments resulted in widespread realization that traditional firewall and antivirus technologies, as covered in original outsourcing contracts, were not able to withstand emerging threats such as self-replicating worms, port 5 (mail), port 80 (Web), PP exploits and spyware, amongst others. And to compound the external threat, internal IT assets that were infected were infecting other internal assets.

A detection and response strategy within the perimeter was now required to supplement the ailing protection strategy. Many enterprises were also not aware that their insurance policies did not provide cover against malicious code attacks. Other companies who tried to buy coverage found few policies being written that protected against digital attacks.

The biggest error made by organizations and outsourcers was to expect that deploying this technology would solve their issues. What they did not realize was that they were only solving particular issues, in much the same way as when they invested in firewalls, VPNs and antivirus software. While IPS appliances, application firewalls, host-IPS, desktop firewalls and IDS were being installed, no one considered the fact that security needed to be a holistic process involving people, process and technology.

Outsourcing contracts were modified to include the provision and management of additional security hardware at strategic points within the network. These measures repeated the mistakes of the past. They catered for short-term challenges, but did not make provision for long-term issues.

Outsourcing Security

In response to growing concerns about security and the ever increasing complexity of the management of these newly installed point devices, many companies turned to the same companies who managed their existing network infrastructure, or to the emerging band of managed security service providers. This seemed the logical response for any company seeking to offload the complexities of security management and to alleviate the need for highly-priced technical talent.

The problem was that most of the contracts contained clauses in the fine print absolving the service provider of liability and accountability for security incidents. Many such contracts promised little more than notification of events, which could not be confirmed as false positives. This level of service put the onus on the customer to respond to and resolve the incidents reported. In many cases, this caused extreme distress to unprepared clients in their hour of need, especially when these same service providers were able to assist in the incident response for additional hourly fees.

Outsourcing security has been a hot topic of debate for some time. There is a strong argument for both sides and no sign of consensus on the horizon. The facts are simple, yet overwhelming for many and include the following:

- Addressing security and IT risk is not optional
- Legislation and liability are driving security to the top of CIOs' priority lists
- There is a real awareness of the problem in bridging the gap between business people and the technologists
- Technology is ever changing; therefore security is a moving target
- Good security resources are difficult to find, and costly to hire and retain
- Outsourcing security does not transfer accountability or liability to the service provider

Regardless of whether organizations choose to outsource or go in-house for security, the challenge lies in getting executive support and alignment between the business units and the security function. At worst, these relationships are adversarial and conflict between groups results in decrease in productivity. At best, the security officer understands the business and is able to communicate the threats to business operations clearly and show that effective risk management actually enables the business.

Many enterprises make the mistake of outsourcing their security as part of a generic outsourcing agreement before obtaining this alignment. The outsourcing then leads to a false sense of security or a 'tick in the box'.

Recommendations

Organizations that simply cannot afford the investment in resources, need to be sure of the services that they are buying and specifically what exclusions are in their outsource contract. Frequently, outsourcers offer low bids to secure the business and then try to make up for it in change or out-of-scope orders.

In fact organizations need to continuously adapt their security practices to suit the ever changing environment. Threats, vulnerabilities and mitigation procedures have changed dramatically over the years and organizations must be able to adapt their contract and the underlying security architectures used to keep pace.

If organizations have questions about the service level commitments or the verbiage in the contract, they should consult a trusted advisor. A technology partner, independent auditor or legal counsel can help them navigate the complexities. For international and multinational organizations, it is important to seek advice on compliance requirements in every individual country in which the organization is conducting business and to find out how their service provider is addressing those requirements. Once organizations understand what the outsourcer intends to do, they need to figure out how to fill the gaps.

Considerations

Organizations should consider the following points when outsourcing security (either in its entirety or as part of a bigger infrastructure outsource contract):

- Note that compliance is the responsibility of the company, not the outsourcer.
- How does the service organization's purchase enable them to better manage risk?
- What are the terms of the agreement? Check SLAs, limitations and exclusions. Organizations need to know exactly what they are getting for their investment.
- Be prepared to respond when incidents occur-this means that organizations need an incident response plan and someone to deal with the response. The contractor must support post-incident review.
- Verify that the outsourcer is compliant with all relevant legislation and verify the security procedures and best practices deployed by the service provider.
- Define security-related roles and responsibilities clearly and completely and specify clear security objectives in the SLA for integrity, confidentiality, availability, accountability and use control.
- Appoint a security officer, even if it is initially in a secondary role. The security officer should have a direct reporting line to an executive who is empowered to address tough questions and make decisions that impact the risk exposure of the company.
- Retain the ability to monitor and audit the outsourcer's environment to independently verify fulfillment of all the objectives and expectations.
- Ensure contract terms are flexible enough to allow for changes in a rapidly changing threat landscape, and to avoid being blocked by the organizational walls that outsourcing erects and the difficulty of anticipating all the contingencies in a contract.
- Measure contractor performance through security metrics such as number of incidents, time taken to respond to incidents, best practices, benchmarking, etc.
- Even if an organization is using best practices frameworks such as the ITIL or CoBIT for SLAs, do not rely on these for security - use security specific frameworks such as ISO 17799: 005.
- Customers need to try and include infrastructure "Security Assurance Level Agreements" with their standard SLAs in outsourcing contracts in the future and minimize the number of people managing the network components.
- The outsourcers' goal is to lock down and standardize to gain efficiencies and then sweat the assets. This is diametrically opposed to the adaptive nature required by modern day secure infrastructures.

Choosing a Partner

As applications such as Telephony, PP and Microsoft Live Messaging rapidly converge onto the network infrastructure, security becomes more complex and important. In addition, the industry is

faced with strong convergence of networks, systems and security management as companies like Microsoft and Cisco embed more security functionality into their OSS and networking fabrics.

Network access control and other integrity architectures are emerging to take their place in the self-defending network of the future, which means configuration, identity and asset management are going to play larger roles in future managed, secure infrastructure. Also, infrastructure components themselves are subject to security vulnerabilities. Now the proactive 'Assurance' management of those devices themselves becomes as important as managing standalone firewalls and IDSs. This implies that enhanced configuration, security and patching management are going to play increasingly important roles in infrastructure management.

All this means is that careful deliberation needs to be given to the partners used in outsourcing contracts. Organizations cannot have a situation where multiple parties manage the same devices to achieve their respective goals. This can defeat security objectives because too many people are involved.

Many MSSPs will insist on full device control to provide their services. This scenario was suitable for standalone.

But Firewalls and IDS/IPSs need consideration when the Firewall/IDS/IPS functionality becomes embedded into standard routers. The question of who will then manage the router bits and who will manage the security bits in that device becomes an issue.

Just as applications are converging onto the network and security is converging into the network and applications/OS, outsourcing functions will converge. Customers will increasingly seek out systems integrators and outsourcers who have skills in network management, desktop and branch office life-cycle management, systems management and configuration management in addition to world-class security expertise. This may very well spell the demise of the boutique security shop or niche-managed security services player, over time.

Source: *Dataquest*, April 15, 2007, Vol. XXV No. 7.

CHAPTER 14

Toward Transparency

With IT becoming the backbone of the financial sector, security has become a key issue. And striking the right balance between security and flexibility is now paramount for growth.

IT adoption was like a blessing in disguise for the financial sector. If we analyze the last decade, we can clearly see that the tremendous growth of the financial sector would not have become possible without the active usage of information technology.

A decade back, the entire financial industry was so opaque, time consuming, rigid and inconvenient that it was very difficult to get the required market and financial information about any stock. Accessing banks was a major issue as the working hours of banks were in conflict with the financial sector. But today, with the help of IT adoption by the BFSI segment, the entire system has become transparent and all the required information is available easily to all the participants; be it the client, the intermediary or even the controlling body.

With the help of Internet banking and e-broking services, IT has become all pervasive. IT has also helped us in handling higher volumes with better transparency and better quality of services. While a few years back the volume handled by each exchange was small, today we see that each prominent broking house handles more than 2-4 times of that volume.

The financial sector without IT is history, and the sector cannot move a step further without IT. The sector relies highly on IT which is considered to be the backbone of the business. This throws exceptional challenges for the IT folks in the financial sector. Security is a key issue in the financial sector because of its nature of business and the direct involvement of finance. It is also equally important to be quite flexible to the business so that the business objective is also achieved.

Striking the right balance between security and flexibility is the key challenge. To hit the right balance between this, one needs to create awareness about the usage of IT among users, who may or may not be IT savvy.

When IT is accessed on the move, it raises the security alert since the data may get leaked. However, it is not advisable for companies to deny accessibility to those on the move yet ensure security. Creating the right IT policy and awareness about the usage of mobile devices and handling credentials is essential.

The second challenge is the scalability of organization IT. The way business is growing in the financial sector, it is important to build scalable IT infrastructure. Normally, the time gap between identifying the need to upgrade any system and the time when one actually upgrades that system is very high due to reasons like approval of budget from the management, doing technical feasibility, procuring the material and then implementing and fine-tuning. It has been observed that during this intermediate time the business grows faster than the buffer kept.

As good IT governance, I would suggest two key participants should be fully involved in the projects, one is the CIO/CXO, and the other is the vendor. From the management perspective, it is important to have the involvement of CIO/CXO so that they are aware of how a particular IT adoption is going to benefit the business. Vendors are equally important as they need to support the en-

vironment post implementation, and it is very important that we explain to them our requirements very clearly. One of our innovative steps was to adopt a decentralized IT architecture, which was totally against the trend. When everybody was talking about consolidation, we thought out of the box for our customers and designed a decentralized architecture. This has not only enabled us to achieve greater reach but has also provided commercial benefits to our customers.

Source: *Dataquest*, Feb 29, 2008, Vol. XXVI No. 04

Aricent—When IT's the Elixir

A full-service, full-spectrum communications software company, Aricent has its core infrastructures like LAN, WAN, Internet access, email system, active directory system and IP Key system, etc in place. The company also has the usual hardware stuff like routers, switches, firewalls and various types of servers like development servers and email servers.

Backbone Called IT

Being a software development company, Aricent's IT infrastructure assumes critical importance for its business. "In Aricent, all software product development is aligned with IT. As our business runs on IT, we need high quality infrastructure. Otherwise, if the development server is down, then a team sits idle leading to wastage of manpower," Rajeev Seoni, assistant vice president and head, IT, Aricent says.

It is this criticality of infrastructure that has coerced the company to use infrastructure management tools (IMT). It help in remotely monitoring the infrastructure and also inform the team about the overloading of a particular server by displaying a red dot on the central screen enabling requisite rectifications to be made. The IMT monitors desktops, servers and network equipments, etc.

Seoni adds that the importance of IT infrastructure can be gauged from the fact that even if you are adding 500 new employees, then the basic infrastructure has to be arranged before hand so that work can be started.

Overall Infrastructure

The company attaches a lot of importance to information security systems like the firewalls, anti-spam and intrusion detection system in place. It also has a proper access control system based on a need-to-know basis that is anyone not authorized to access a particular project will not be able to access it.

"On the applications front, ERP is the heart of core functionality as it manages critical enterprise functions like the finance, HR and software project management efficiently. We have been using ERP from SAP for the last two years prior to using distributed type of applications built in-house," says Seoni. For providing good post-sales support of products and for sales force automation, it uses Siebel apart from in-house applications like the Time Sheet. The company also boasts of an intranet called Anthra, a communication tool used by the employees for their daily activities.

On being asked about the level of IT adoption in Aricent, Seoni says: "As far as IT adoption in the infrastructure and development environment goes, it is very high, may be even 100%, so I can say that our IT infrastructure is highly matured and well utilized. But as far as applications goes, there is no end to it."

Challenges

The challenges for IT infrastructure of any growing IT services firm is different from what any other organization would face. This is because the staff itself is up-to-date with the latest technology and predictably expects that the required IT systems would be made available quickly. "This in turn builds up the pressure on us," he says.

"Another challenge is, during the time of mergers and acquisitions since the expectation is that we will seamlessly merge with the entity and also start working together. And above all, all of this should be done at minimal costs," Seoni says.

Road Ahead

“We are planning to introduce mobility in our applications to provide information mainly for our sales staff for handling customer queries on the move. This would be introduced within next one year,” Seoni says.

The company is also working on a pilot project of knowledge management system (KMS) and will be used as a strong collaboration tool. “The KMS will essentially focus on solving the attrition problem by capturing experience and knowledge gained of various people by working on various projects,” says Seoni.

Source: *Dataquest*, April 15, 2007, Vol. XXV No. 7.