# Progression of Application Software in India

**V Raghuraman**
*Confederation of Indian Industry, New Delhi*

## ABSTRACT

Growth in information technology (IT) in the past decade has changed the scenario worldwide and there is hardly any activity, that has not been affected by IT. It finds use in areas like home, business, public sector, financial services, defence, etc. A number of IT applications for the Indian Defence sector have been described in the paper. Several Indian companies have come forward to provide IT solutions for the Indian Defence. By collaborating with Indian software companies, the Indian Defence can gain several advantages without jeopardising its security, by taking appropriate security measures. This, in turn, will help and encourage the Indian software companies to become global players.

## 1. INTRODUCTION

The Indian software industry has grown by leaps and bounds during the 1990s. It has been a major export revenue earner for India and has established India as a major centre for intellectual capital in the western world. There are more than hundred software companies in the Silicon Valley of the US that are owned by persons of Indian origin. Even software companies based in India, like Infosys, Ramco, Wipro and TCS have made a name for themselves in the US.

It is expected that software industry will continue to grow exponentially to reach export revenue of US$ 50 billion by 2008. In such a scenario, some key issues remain to be discussed in the Indian context. These are:

☆ What is the level of deployment of application software within Indian organisations, both in private as well as public sector and government?

☆ Having deployed software solutions, how are they being used—only for office automation purposes (like wordprocessing and spreadsheets), or are organisations deriving tangible business benefits from their application software solutions?

☆ Have we leveraged adequately on the convergence of software and communication technologies to achieve business benefits?

☆ What is the state-of-the-art in terms of application software technology and where does India figure in the whole picture?

In this article, these issues are examined. The evolution of IT in the world at large and within India is kept in perspective. Applications available and also in use in various industries are outlined. Recommendations are given for a variety of businesses, including defence and government, for areas of application software to focus on, at the start of the next millennium.

## 2. EVOLUTION OF COMPUTERS & IT

Computers have come a long way since 1623, when the German scientist Wilhelm Schikard invented a machine which could add, multiply and divide. The difference engine designed by the British mathematician and scientist Charles Babbage, was a significant milestone in the evolution of computers. In fact,

the Babbage's analytical engine was the forerunner of the modern computer. The evolution of the computer, as we know it today, really began in the 1970s, with the invention of microprocessor.

Today, information technology (IT) comprises three key building blocks, viz., hardware, software and networking. (Appendix 1 gives more details of these terms).

# 3. STAGES OF APPLICATION SOFTWARE DEVELOPMENT

Application software in India has gone through five developmental stages over the past 30-35 years. (See Appendix 2).

# 4. IT APPLICATIONS

IT is all pervasive and traverses all types of businesses, home and even defence. Various applications of IT in the Country are:

## 4.1 Home

The applications of IT at home are essentially aimed at offering education and entertainment through multimedia CD titles and CBTs to learn some hands-on software techniques. A host of educational games CDs are being targeted at this market. Internet's ease and hype has caught the fancy of Indian households and Internet service providers (ISP) are finding a niche to address this market. Further, large MNCs and Indian agencies are offering user-friendly multimedia computers and printers for home use with added CD titles.

Digital photography has immense potential and already there are several companies targeting homes with digital cameras and scanners. Web TV, internet-ready television or the convergence of PC, TV and the Internet is being tested with Videocon and BPL having announced their offerings.

## 4.2 Education & R&D

Applications in this area are real-time data acquisition equipment, high-capacity storage devices, and high-end workstations. The application software is generally being developed in-house. Similarly, pharmaceutical research organisations and materials research institutions rely heavily on third party applications in areas like molecular simulation.

## 4.3 Business & Industry

### 4.3.1 Maintenance

IT applications being targetted by maintenance vendors are routine customer support, facility management, network management, IT asset management, site planning, environmental engineering, structured cabling, and so on.

But with maintenance and support growing up both in terms of opportunities as well as technical challenge, things might be changing for the better in the near future. The new order is of maintenance engineers being encouraged to get certification.

### 4.3.2 Services Sector

Two important parameters that control the performance of any service sector industry is the level of service and the corresponding cost incurred. Even small increase in service levels sometimes warrants disproportionate increase in the technology infrastructure. Unless IT-enabled service systems take on the job, it becomes very difficult to create customer lock-in. That is why express companies invest in elaborate networks to track-n-trace packets, hotels have express check-out, airlines can accommodate customer preferences, and the like. A segmentwise insight on IT applications in the service sector is given below.

#### Airline & Airports

Use of IT in the airlines industry is moving beyond the area of passenger reservation and cargo to yield management functions. Aircraft maintenance engineering and crew scheduling are also getting recognised to be important areas.

Traditionally, the airlines sector worldwide relies on outsourcing deals with technology service companies because the service uptime is very critical. IT applications in airports include —automated gate readers, boarding card readers, etc.

#### Print & Publishing

Use of IT in the publishing industry has now gained maturity. Almost all the publishing

majors like Bennett Coleman, Indian Express group, Living Media, and others now rely on IT for all their internal and external publishing functions. Office automation, beyond local area networking involving groupware and messaging, is also prevalent. The Times of India intranet implementation is one of the examples of intranets in the country.

### Hotel Industry

The hospitality sector too is gaining maturity in IT usage. The Taj Group, the Oberoi Group, and the Welcomgroup are some of the efficient users of IT in the hospitality industry. With most of the back-office and front-office automation in place, the star-graded hotels are looking at harnessing IT for emerging applications like e-commerce and data warehousing to get to the next level of returns. This includes designing loyalty programmes and positioning on the Internet to attract foreign business and tourists. Service is extremely cost-driven in the hospitality industry and efficient property management systems help in reining the costs.

### Railways

The Railways which falls under the public sector, has unfortunately been lagging in terms of IT usage. After the big move towards computerised reservations four to five years back, nothing new has been undertaken. In this sense, the Indian Railways is only looking at organic growth and not a quantum one. Freight management, a big revenue earner for the Railways, has only rudimentary IT components in its operations. This area could give the Railways a couple of hundred crores each year in savings alone, if proper freight management systems are adopted.

### Manufacturing

Prompting companies to keep their plants rolling with better integration of business processes, are mantras like enterprise resource planning (ERP) and CAD/CAM. The process manufacturing sector traditionally spends more on IT because of the larger population of companies engaged in this activity as well as their scale of operations. In general, the business and IT priorities of both process and discrete manufacturing are the same: controlling inventory, production and marketing

cost; improving supplier and delivery channel relationships on the business front; improving IT infrastructure; automating internal and external processes, and better decision-making using IT, on IT front.

In the pharmaceuticals industry, the WTO agreement on patents has forced companies to get patents on their formulations. Clinical trials, a very data-intensive area, is fast emerging as an application in the pharma industry.

The major investment heads for a manufacturing company are: infrastructure (which includes systems, connectivity, messaging), design, applications databases, application development and packaged application implementation services, consulting and other services, external connectivity (connecting to dealers and suppliers), and e-commerce.

Many manufacturing organisations, especially in the private sector, have messaging and groupware in place for intra-organisational communication. Network-centric applications continue to be developed.

ERP is the watchword in the manufacturing industry and the term has gained mindshare more than marketshare in the past 5-6 years in India. With almost all the global players present in the country, the stage is set for the launch of Indian manufacturing sector into the age of integrated applications. The move to ERP is a high-investment proposition with accompanying investments in hardware, connectivity, and implementation services, apart from a lot of invisible costs involved in process change, change management and training.

The process industry's focus is on integrating business applications with the plant floor. The major areas under consideration are: finance, materials, and sales and distribution. Since production in the case of process industry is plant-oriented, it falls within the realm of distributed digital control systems. The most important area after this is the maintenance function.

Selection of proper ERP package is based solely on the business needs and the fit that the product offers. CAD/CAM is the other major

focus area for the manufacturing sector. Traditionally, the automotive and aerospace industries are the largest consumers of CAD/CAM. Increasing design capacity is also a competitive edge for a company. There is also a trend towards reverse engineering, especially in the engineering and appliances industry. Product data management is another leading edge CAD/CAM philosophy. For the supplier, it means enhanced competence and improved competitiveness. Many of these suppliers with their improved design capacity and integration with OEMs have also started exporting. Another reason which prompts a company to consider design as an imperative activity is the improved alignment that many manufacturing organisations have acquired due to business process re-engineering.

### 4.3.4 Banking & Finance

The investments made by the banking sector can be broadly characterised by a continuation of IT automation plans by large public sector banks, implementation of connectivity and leading-edge technology solutions by the new private sector banks, continuing branch automation and branch connectivity by the old private banks, and refinements in service using IT by the cooperative banking sector.

Toward this, the banks invested heavily in renovation of offices, rendering value-added service schemes, and moving to card culture by putting up cash dispensers and ATMs. The broad direction in IT usage points toward a continuation of refinements in key application areas like loan appraisal systems, policy management, decision-support systems, and funds management. Technologies like groupware are now being used by almost everyone because of the collaborative nature of work in financial institutions and credit rating agencies.

While insurance companies like LIC, GIC, and Oriental Insurance invested in connectivity and policy management during the year, UTI invested in production systems. NSE's major investments were in setting up disaster recovery systems, dataware housing, market surveillance and settlement systems. From an applications point of view, apart from the operational automation areas like general ledger,

inter-branch reconciliation, and bank-wide MIS, the main IT-centric applications that are gaining maturity are cash management and treasury management. These crucial banking functions are now actively being addressed using technology.

Retail banking using network applications like electronic funds transfer (EFT) and any branch banking caught the attention of many public and private sector banks. To facilitate these applications, a shared payment network system *Swadhan* was set up last year. *Swadhan* is a large network of ATMs spread over Mumbai and connected to a central host. The services offered under the network include: cash withdrawal, balance inquiry, cash/check deposit, funds transfer, requests for check book, standing instructions, and accounts statement.

The other network coming up is IDRBT (Institute for Development and Research in Banking Technology) network. Its central hub located in Hyderabad handles data switching, network monitoring and supporting multiple user groups. As a VSAT network, it supports TDM/TDMA and hybrid network structures. The applications of the IDRBT network would be: data traffic between banks and FIs, isolated traffic in virtual bank groups, fax traffic, voice traffic between banks in mesh network, and videoconferencing at select sites. Messaging involves enhancing customer collaboration using knowledge sharing, information dissemination, and better service delivery channels. The key benefit sought is to strengthen customer relationships.

### 4.3.5 Oil & Power

Here, large-scale infrastructure upgradation and systems integration projects which are addressed by large vendors of national repute, capable of giving implementation and support services in a large number of remote locations are covered. The common line running through them is the nature of process generation, transmission, and distribution. The latest pre-occupation with IT has been more customer-responsive and competitive. The unbundling of the SEBs and restructuring of the power sector is ushering in numerous applications as asset management, online load despatch/control, discrete customer services,

etc. In the oil refinery, optimisation of the processes to ensure maximum safety, maximum output, minimum wastage and possibility of upgradation in the future with the eventual linking of geographically-balanced distribution processes is feasible. In short, maximising on production efficiency is the target toward which oil refineries work. IT plays an important role here in helping refineries achieve this target as easily and as productively as possible.

Today, distributed digital control systems (DDCSs) are common, with refineries taking to this device of automation in a major way. For this purpose, major refineries are now either installing or upgrading DDCSs and also integrating the outputs of the refinery MIS to that of the central corporate MIS of the company. One very significant area that is being looked in the refineries today is an AI system. It is a system that will enable a business model-based prediction for refinery processes that are currently being addressed by DDCS. This will have a higher level of computer control whereby the entire refinery processes could be designed for the future.

An important area of automation, and one where a considerable ground has been covered is the MIS. With MIS systems in place, there have been considerable benefits. In the area of product dispatch, the manual system has been changed to an electronic one and security checks have now been reduced to a minimum. One more area of gain is in the reduction of wastage due to delays.

### 4.3.6 Telecom

Business imperatives do drive IT acquisition in this segment, but not from a competitive standpoint. Application of IT in telecom are: customer acquisition and retention; Market segmentation and prospect identification; targeted campaign and promotion; customer schemes and tariff plans; total customer management facility; Churn prediction and prevention; analysis of connections, disconnections, and reconnections; dealer analysis and monitoring; revenue enhancement; profitability analysis; aging analysis of accounts receivable; products sales analysis; and bill assurance, economic modelling, network utilisation and capacity planning.

In an industry like telecom, the winners will be those who can quickly adapt to new market opportunities. In this backdrop, telecom providers need mission-critical informational technology solutions that can combine performance and scalability with flexibility and modularity.

## 5. INDIA: ERP CASE STUDIES

### 5.1 Coats India

Coats India is the undisputed leader in the business of cotton, synthetic and core spun threads in India. With manufacturing operations in six different locations, the company faces a daunting task of servicing the needs of 25,000 direct and 2,00,000 indirect customers through its 20 sales offices spread across the country.

Coats selected Ramco to implement an ERP solution that would meet its generic requirement as also fulfill its specific needs as a threads company. Dynamic re-scheduling of production orders, Intranet report publishing of key material consumption are some of the highlights of ERP implementation.

Besides fine-tuning business processes, Coats is well on its way to achieving other key business objectives like reducing inventory, compressed lead times and increased conformance to promised delivery dates.

### 5.2 Global Tele-Systems Ltd

To retain its competitive advantage in the face of emerging challenges, Global, the largest private telecom company in India, felt the need to restructure all its processes using a distributed ERP solution.

Today, after implementing, Global is experiencing not just ease of accessibility and availability of vital information, but also tangible increase in productivity and decrease in order processing time by over ten times.

### 5.3 Bharat Earth Movers Ltd. (BEML)

In 1997, Bharat Earth Movers Ltd. (BEML) created history of sorts by becoming the first public sector enterprise (PSE) to implement an ERP solution.

Dispelling the notion that it is difficult—if not impossible—to bring about changes in a public

sector environment, BEML looked to I ERP as a tool to bring about change management. Also, it wanted to bring about transparency in operations, data integration and online information for considered decision making.

Some of the key applications computerised include: vendor management, planning and control of materials and purchasing process. A notable feature of the implementation is that BEML's ERP is a clear winner with both its management and employees.

## 5.4 EIH Ltd. (Oberoi Group of Hotels)

Being in the hospitality business, a strong people-oriented approach in every facet of its activities has been the hallmark of EIH's success. To help integrate the HR processes, EIH selected and implemented HR and payroll solution.

With implementations having been completed at five sites in different cities, EIH has an up-to-date database on people, their performance, skills and training records. The integration with payroll reflects transactions such as leave, loans and changing roles of employees.

*(Case studies: Courtesy—Armco Systems)*

## 6. IT APPLICATIONS FOR DEFENCE

The Indian Defence sector comprises Army, Navy, Air Force, Ordnance Factories and Hindustan Aeronautics Ltd. Defence has a large pool of resources be it men, material, machine or money. Army has a strength of about ten lakh. As in other organisations, one of the applications of IT in defence was the computerisation of functions, such as accounts, personnel management and inventory management. These applications, initially written in FORTRAN or COBOL and running on mainframe/supermini computers, have now been ported on to relational database management system (RDBMS) platforms like SQL Server, Oracle and Ingres on NT or Unix-based PC servers.

Defence can specifically gain from the convergence of IT and communications. Inventory of equipment, weapons and their spares is maintained at various depots all over the country. Individual software packages at each depot, where present, give status of (availability/nonavailability) of items. However, a very pressing requirement for a command-centre-based organisation like the Army is a decision-support system (DSS) which will provide online information at the command headquarters regarding exact quantity of a particular item available all across the command territory. If a critical spare is not available at one location, it is crucial to find out, its availability at other locations, so that it can be transported from one location to the other. An integrated materials management system across the entire Army, connecting all depots through wide area network links, like leased lines or VSATs would be extremely useful in setting up this DSS.

Weapons are a key asset to any defence organisation. Uptime of weapon is of paramount importance. Asset management products like enterprise asset management help track the asset (i.e. weapon) through its lifetime, including details like uptime, cost, availability of spares, etc.

Satellite remote sensing provides more accurate terrain mapping, which can improve the efficiency of air sorties.

IT solutions can also be used to integrate tank electronics with other logistics systems in defence. Computerised automated testing systems based on dedicated computers and programming facilities are in use at central repair depots/agencies.

## 7. IT OFFERINGS FROM INDIAN COMPANIES

Enterprise applications and the media interest, in its potential in transforming businesses into efficient and successful entities, is an area which is expected to grow by 74 per cent by the turn of the next millennium. Some of the applications include: financial management systems, human resource management systems, materials management, sales management, and manufacturing.

Now, the focus is moving from traditionally manufacturing industry solutions to retail,

utilities, defence, financial services, healthcare and public sector. ERP is a high-impact area because it leads to a bottom-up change in the organisation. That is, it is by no means an incremental technology. While many companies do not even understand the full implications of using an ERP, they are nevertheless enchanted by the concept of integrated applications. Further, functional simulation solutions allow the optimisation of product performance by providing a fundamental understanding of how a design will perform in its real-world environment. This understanding provides the necessary insight for creating the best possible product. Functional simulation solutions enable users to utilise common engineering terms, in place of numerical analysis language, through an interface created with design engineers in mind. As the simulation progresses, the system automatically refines the mesh to ensure accurate results.

Traditionally, ERP software has been developed and marketed by European companies like SAP and BaaN. Even an advanced IT country like the US came into picture quite late. So far, Ramco Systems is the only Indian company to have developed a world-class ERP product (Ramco Marshal) which is in use at several countries worldwide.

Specifically, for the defence sector, there are Indian software solutions available in the following areas:

♦ Integrated solutions for the enterprise, with or without ERP products—integrated operations, logistics and technical functions and if required, human resource management

♦ Decision-support systems

♦ Equipment and aircraft simulators—refurbish/modernise/upgrade existing simulators, and development of new simulators

♦ Cooperation with defence to evolve indigenous IT warfare strategy and components, and to combat hostile IT warfare methods

♦ Development of indigenous operating system and ruggedised computers immune to deliberate radiation or electronic attacks

♦ Operational task planning and wargaming systems

♦ Enhanced visualisation using virtual reality techniques for better decision-making

♦ Network engineering and solutions, including setting up inter- and intranets, and integration of voice, data and video over the networks

♦ Data warehousing solutions for specific organisations

♦ Computer-based training and methods to implement distance education/training

♦ Knowledge management

♦ General purpose software development on non-proprietary platforms.

## 8. EVALUATING IT SOLUTIONS FOR DEFENCE

Proposals from the industry should be sought against firm and clearly drawn qualitative requirements. If the concerned defence organisation requires to explore solutions before drawing up the qualitative requirements, it could circulate a concept paper to potential companies and request them for technical solution with approximate indication of costs. For complex/large projects which could have non-uniform solutions from the vendors, technical presentations and discussions should be held with shortlisted vendors. The vendor should be allowed to submit his final commercial proposal at this point of time. The total procurement cycle, from enquiry to order placing, would typically not exceed four to five months.

Defence could facilitate prototype development/concept proving and ensure that it is commercially viable to the vendor. Preference could be given to Indian products.

A broad checklist (general & technical requirements) for evaluating purchase of IT solutions for the Indian Defence is given in Appendix 3.

## 9. ROLE OF INDIAN SOFTWARE COMPANIES

Indian IT strength in solutions and applications software is an acknowledged fact. In the past, in the name of security, most of the IT applications required by Defence sector, were attempted to be developed in-house or through Defence labs and PSUs. While these

concerns still hold true, it is also true that the present requirements of Defence sector in IT have become very high. While Defence labs and PSUs have excellent capabilities to provide IT solutions, they cannot add manpower, to an unlimited extent, to take care of Defence's growing requirements.

Our country is not unfamiliar to control regimes and sanctions. In the present geo-political scenario, with a single global superpower, any attempt by India to utilise foreign technology to the hilt will not only be thwarted but also subverted. Systems software and hardware and networking used in IT applications are prone to external subversion through viruses, trojans, and cyber-bombs, which could be programmed and timed in their activity.

On the other hand, these problems are not prevalent in the solutions offered by Indian software companies, who are responsible corporate citizens of the country. These companies have a commitment to building an equity, not only for themselves, but also for the country (India) as a whole, in the global scenario.

Moreover, the cost of an Indian solution or product would be significantly lower than that compared to a similar one from abroad. Costs of IT solutions have to be viewed at from two perspectives. One is the capital cost, where there may not be significant difference between an Indian solution and an overseas one. However, the second cost is the total cost of ownership (TCO), which includes all costs over the lifetime of the IT solution. For example, hardware costs, maintenance costs, manpower training costs, costs of building extensions and customisations at a later date, and networking bandwidth costs are some key components of TCO. Indian companies can surely provide a significantly lower TCO as compared to foreign companies.

## 10. ADVANTAGES OF INDIGENOUS IT SOLUTIONS

Indian IT vendors provide the following advantages to the Indian Defence:

□ The solution itself can be evolved through very close interaction between the vendor and the customer. It avoids project teams located abroad and interfacing difficulties between the end user and the vendor.

□ Availability of source programs of these applications which can be easily ported to other platforms once they are developed using quality systems.

□ Protection from deliberate information warfare tactics/sources.

□ Less security hazard since the employees of the vendor will be Indian citizens subject to Official Secrets Act.

□ Cost advantage.

When one talks of application/computerisation, the user—Defence, needs to share its operational requirements with the vendor, e.g. organisational aspects, number of tanks, type and location and all these become known to outsiders (especially, foreign vendors). This information is vital for the security of the country. IT war is going to be the new age war, and thus, knowing what information is kept at which place could provide a lead to the hackers who can access this information.

Defence always held the opinion that information with only Defence personnel is safe and so they were not even open to private Indian industry. But lately, with increasing collaboration between Defence establishments and the Indian private sector, this opinion is wearing off and Defence now seeks active participation of the private sector .

## 11. SUMMARY

Information technology in the worldwide scenario has evolved tremendously in the past decade and has affected day-to-day life. IT usage in India has also gained considerable ground and now state-of-the-art products and solutions are available in India, almost concurrently with their global release. The role of IT is going to increase further in the next millennium. IT finds use in the various areas like home, business, public sector, financial services, and defence. There are a number of IT applications for the Indian Defence. A number of Indian companies have focussed on

providing IT solutions for the Indian Defence. Defence can gain several advantages by collaborating with Indian software companies, while at the same time, ensuring that security considerations are taken care of. By collaborating with Indian software companies, the Indian Defence can also encourage and enable them to become global players.

## Contributor

**Shri V Raghuraman** is presently Senior Adviser, Confederation of Indian Industry (CII), New Delhi. Formerly, he was Secretary General, ASSOCHAM.