

# **INFORMATION TECHNOLOGY IN PROCESS AUTOMATION (Case Study ONGC)**

**Project dissertation submitted in partial fulfillment  
Of the requirement for  
MTech (Petro-Informatics)**

**By  
VIBHUTI DWIVEDI**

**Under the guidance of  
Prof. Ashish Bharadwaj  
Program Director**



**College of Engineering  
University of Petroleum & Energy Studies  
Dehradun  
2006**

UPES - Library



NC71



## ACKNOWLEDGEMENTS

This is to acknowledge with thanks the help, guidance and the support that I have received during my Dissertation work.

I would like to express my deep feeling of gratitude to the under mentioned faculties for their inspiration, guidance and assistance before and throughout the dissertation.

I have no words to express a deep sense of gratitude to **Prof. Ashish Bharadwaj (Program Director, M.Tech (PI))**, my mentor and guide for giving enormous help and valuable guidance to pursue my Dissertation, and I hold the same for **Mr. Ravindra Gussain, Sr. Accountant, ONGC Dehradun** for his support.

I would be deeply indebted for the guidance and support provided by **Mrs. Mousumi Das Gupta (Associate Program Director)**.

I also place on record my appreciation of the support provided by my faculty members and colleagues.

**VIBHUTI DWIVEDI**

M.Tech (Petroinformatics)  
College of Engineering  
University of Petroleum & Energy Studies  
DEHRADUN



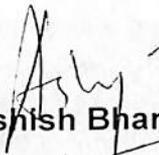
UNIVERSITY OF PETROLEUM & ENERGY STUDIES

## Certificate of Originality

This is to certify that the dissertation report on “ **IT In Process Automation (Case Study ONGC)** ” submitted to the University of Petroleum & Energy studies, Delhi by **Vibhuti Dwivedi**, in partial fulfillment of the requirement for the award of the degree of **Masters of Technology (Petro Informatics)**, is a bonafide work carried out by him under my supervision and guidance.

Place:

Date:

  
Mr. Ashish Bharadwaj

Program Director M.Tech. (PI) & Head (Academic Computing)

UPES, New Delhi - 110048

**Table of Contents**

Acknowledgement	i
Certificate	ii
Table of Contents	iii
List of Tables & Figures	v
Executive Summary	viii
<b>Chapter One- Introduction</b>	<b>1</b>
<b>Chapter Two- The Issue Industry Faces</b>	<b>2</b>
<b>Chapter Three- The Solution</b>	<b>4</b>
3.1 The Need to E&P Tasks & Teams	4
3.2 Perceived role of IT in Process Automation	5
<b>Chapter Four- IT enabled Process Automation Systems for O&amp;G</b>	<b>6</b>
<b>Chapter Five- ERP Automating the Business Processes</b>	<b>10</b>
5.1 The Evolution of ERP	10
5.2 ERP II- Bringing ERP to Entire Enterprise	11
5.3 The Enterprise Wide Solution	12
5.4 Bringing the Organization together	13
<b>Chapter Six- SAP in Oil Industry</b>	<b>15</b>
6.1 SAP India – Presentation of the Company	16
6.2 SAP R/3 Architecture	17
6.3 R/3's Application Modules	19
6.4 SAP Oil & Gas Solution Map	22
6.5 SAP Oil & Gas Functions	23
6.5.1 Fuel Management	23
6.5.2 Site and Headquarters Accounting	24
6.5.3 Business Analysis & Reporting	26
6.5.4 Terminal Automation System Interface	28
6.5.5 SCM in Oil & Gas Industry	29
6.5.6 Enterprise Asset Management	32
<b>Chapter Seven- ONGC Overview</b>	<b>35</b>
7.1 Global Ranking	35
7.2 ONGC Represents India's Energy Security	36
7.3 India's Most Valuable Company	37
7.4 ONGC Pioneering Efforts	37
7.5 ONGC Group	38
7.6 Competitive Strength	38
7.7 Organization Chart	39
7.8 Strategic Vision 2001-2020	40
7.9 Sourcing Equity Oil Abroad	41
7.10 Frontiers of Technology	42
7.11 ONGC History	44
7.12 Vision & Mission	47



<b>Chapter Eight- ONGC Leveraging on IT</b>	<b>48</b>
8.1 Integrating Across the Organization	48
8.2 ONGC IT Roadmap	49
8.2.1 Project KUBER	49
8.2.2 Project SHRAMIK	50
8.2.3 Project ICE	50
8.2.4 Project IMMS	51
8.2.5 Digital Oil & Gas Field in ONGC	54
8.3 mySAP ERP Implementation in ONGC	55
8.3.1 Challenges	55
8.3.2 New Platform Integrating Existing SAP Solutions	55
8.3.3 Ensuring New Procedures adopted at Remote Sites	56
8.3.4 Improving Access across Network	57
8.3.5 Increased Collaboration	58
8.3.6 Growing User Acceptance	58
8.3.7 Using Built in Checks	59
8.3.8 Raising the Visibility of Critical Data	59
8.4 ONGC's Communication Networks	62
8.4.1 ICENET	62
8.4.2 EPINET	62
<b>Chapter Nine-High Paybacks from Investments</b>	<b>65</b>
9.1 ERP key benefits Realized	65
9.2 Other IT Benefits	65
<b>Chapter Ten- Future Scenario</b>	<b>66</b>
<b>Abbreviations</b>	<b>67</b>
<b>Bibliography</b>	<b>69</b>

**List of Figures and Tables**

Figure 1: Integrated E&P: Driving Value, Speed, and Accuracy for the Upstream Industry	4
Figure 2: ERP grow from 1990 to 2005	10
Figure 3: Enterprise wise solution	12
Figure 4: vision of centralized database	13
Figure 5: SAP R/3 Architecture	18
Figure 6: SAP Oil & Gas Solution Map	22
Figure 7: ONGC Group	38
Figure 8: Organization Chart	39
Figure 9: OVL spans across the globe	41
Figure 10: Project ICE integrating all Departments	52
Figure 11: First Off The Blocks - The western offshore was the first to go live	53
Figure 12: EPINET Sites & Networking all over India	64
Figure 13: Corporate Server Dehradun connected with all servers from all over India	64



## Executive Summary

*“Without a doubt, these are interesting times for the oil and gas industry.”*

Changes in global demand are bringing pressure to increase production and revenue. A sharpened focus on profitability is resulting in mergers, consolidations, acquisitions, and divestitures for many of the world’s oil and gas leaders. Outsourcing is rising significantly as companies increase scale to handle transition.

Several emerging trends face the major players in oil and gas. Energy commodity production is booming in Norway, Iran, Canada, and the Gulf of Mexico, creating increased challenges in rapid resource deployment. With a truly worldwide market, **technology and IT** will increase their role in supporting **real-time decision-making, process automation, visualization, and collaboration.**

Traditional Exploration & Production Organizations are incorporating customized Information Technology tools to **automate and integrate** their business processes. And more than ever, **integration of IT systems** is essential to support **remote locations, disparate applications,** and the **massive amount of data** that the industry generates.

It has been seen that in case of ONGC there were several pockets where the infusion of IT has been at reasonable level whereas due to the lack of integration the accrued benefits has been limited to those segments only. To improve the overall effectiveness, ONGC has taken a approach, with different functions implementing various networks such as ***Integrated Material Management System (IMMS), Training Need Identification Program (TNI), Up-gradation of Financial System of ONGC (UFSO), Computerized Maintenance Management System (CMMS), HR-Net or SHRAMIK (System of HR Automation & Management information for Kaizen)*** etc. with the Re-engineering of business processes for improving specific functional efficiency and integrating the same where-ever possible.

This dissertation study has been aimed to learn and identify the ***role of IT in process automation*** specially the tools and solutions incorporated by ONGC to improve the productivity and enhance the connectivity between E&P business processes.



## Introduction

World is seeing virtual explosion in **Information technology** with the new inventions taking place on daily basis. The modern workplace is equipped with all kind of electronic gadgets fulfilling the informational needs of the managers at each level of the organizational ladder. Concepts like Paperless office, **workflow through computer, enterprise wide solutions** are in the lexicon of executives. However mere installation of Electronic gadgets and network does not result in the improvement in the operational efficiencies of the organization due to various group working at the cross functional purposes resulting in the cancellation effect. To achieve maximum benefit of the system networks, the **informational model** of the organization should be in consonance with the broader organizational Model. Advances in IT and rapid implementation of these advances to achieve important business goals are the hallmarks of Information technology today. The union of IT and networks and their **application in process automation** gives enormous capability to the management, if properly utilized could lead to enormous savings in real terms.

Applying 21st century technology to a complex business is a challenge. Modernizing one of the world's largest oil exploration and production companies was a personal and professional goal for chairman and managing director Subir Raha. His vision for Oil and Natural Gas Corporation Limited (ONGC) involved bringing about **quantum improvements** and **automation** in daily work processes for personnel separated by thousands of miles on land and at sea on offshore drilling platforms.

With a market capitalization over **US\$20 billion**, ONGC contributes more than 80% of India's oil and gas production. Over decades, ONGC evolved from being a commission to a state-run corporation. Today, it is a publicly traded company with the Indian government owning an 84% stake. It must comply with unique regulations as a state enterprise, yet be flexible enough to compete against other global gas and oil companies in the wake of deregulation and globalization of the economy.



## The Issue the Industry Faces

With an annual expenditure in excess of US\$250 billion, today's upstream oil and gas exploration and production (E&P) companies are facing extraordinary challenges that are putting unrelenting pressure on them to squeeze every additional drop of profit out of each barrel.

Pressure on cost controls, once reserved to periods of low oil prices, is now constant. Capital expenditures, once mainly isolated to traditional U.S. and Western European areas, are focused increasingly on challenging developments in remote regions of Asia, Africa, and Russia. The price of oil, always unpredictable, continues to be the wild card, and even with today's sustained high crude prices, forecasters still maintain a highly conservative approach. In addition, other challenges abound – a “graying” workforce and a shortage of graduates entering the E&P domain; **complex supply chain demands** to improve margins in remote operations; broadening competition from national oil and gas companies; and more stringent health, safety, and environment compliance.

The last decade witnessed the integration of the back office with enterprise resource planning (ERP) solutions. But the need for integration within the front office is 10 times greater; the number of applications and the volumes of data are truly profound.

Furthermore, the increased use of **smart field technology** – a new trend for realtime information – portends an even larger increase in data in the near term. This rapid proliferation of data and systems is resulting in **growing inefficiencies** and **the lack of meaningful information** due to inconsistent, missing, or incomplete data as well as data replication and redundancy issues.



This lack of understanding negatively impacts the operators, energy service and manufacturing firms, and IT suppliers as well as the analytic community. Users wrestle with problems others have solved, while those providing **IT products** and solutions often “sell” the wrong capabilities resulting in frustration, missed opportunities, and significant direct cost overruns for all parties.

While the torrid pace of information development has slowed in recent years, some believe that the shift is now towards how **information is deployed** rather than simple procurement of the latest technology. Conversation with several industry executives has suggested that many of those responsible for funding IT initiatives (and therefore justifying expenditures) do not have a firm foundation for their efforts. They do not fully understand what the expenditures drive, or more importantly, what value is derived. Moreover, they do not have a grasp of what solutions are available, what the sources are and what options are open to them.

In the face of this scenario, any company serving or operating within the petroleum industry that does not gear itself to use these tools runs a severe risk of being left behind and losing out competitively. But what are the priorities? What issues need to be addressed? How will the market impact such things as **asset management, IT deployment and implementation issues, project management and scheduling, procurement, outsourcing, ERP concerns, Sarbanes-Oxley Section 404** and other operational and **internet-oriented** considerations including **data management** and real time operations.

**To compete effectively and profitably, today’s oil and gas exploration and production (E&P) organizations must have the information they need, when they need it.**

Information is the lifeblood of multidisciplinary teams, whose important tasks depend on accurate and timely data. But in most E&P companies, key applications have not been integrated and real-time information has not been available to the workforce.



**THE SOLUTION**

**3.1 THE NEED TO INTEGRATE E&P TASKS AND TEAMS**

To overcome these obstacles, the **process automation** and use of **timely information** for better decision-making is essential to the E&P industry. However, in many E&P companies, core applications like ERP are not being harnessed for the wealth of information they contain; yet, they should be maximized and made easily available to a company's diverse and internationalized workforce. Such information is vital to a structured approach to operations efficiency, which begins with a solid understanding of the *life cycle of upstream assets*.

Enabling one seamless, open, integrated operating solution has HUGE potential to drive value, speed, and accuracy amongst upstream partners.

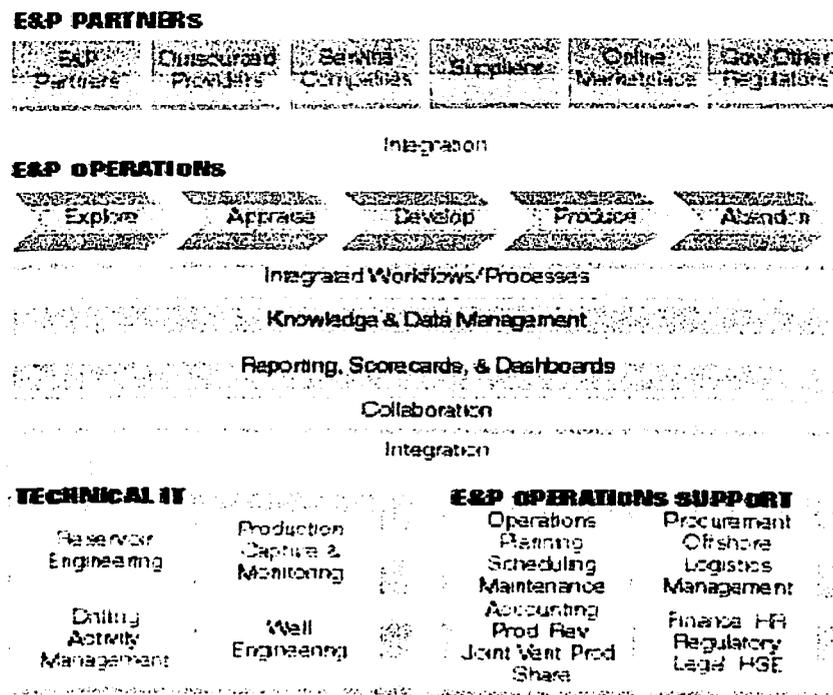


Figure 1: Integrated E&P: Driving Value, Speed, and Accuracy for the Upstream Industry



The advent of what **POSC (Petrotechnical Open Standards Consortium)** has framed as **Integrated Operations**, or the so-called **digital oilfield** has brought **IT** to the forefront of **asset management and other process automation**. Increasingly, how IT is used is not just the key to lowering costs, but increasing shareholder value—**raising stock price**.

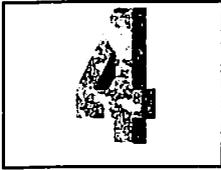
Information Technology offers a full range of products and solutions to help address the challenges that oil and gas companies currently face. These solutions focus primarily on achieving the following goals:

- Replenishing oil and gas reserves faster.
- Increasing production yield
- Improving the efficiency and cost structure of downstream operations
- Enhancing IT agility and return on investment
- Helping to increase customer loyalty for gas-station chains

### **3.2 Perceived role of information Technology in Process Automation**

- Workflow and process management / change
- Real Time Operations (RTO)
- ERP backbone deployment / upgrade including production accounting
- Upgrade existing G&G and engineering systems
- Outsourcing
- Technology refresh strategies
- Cost savings
- Transaction costs
- Materials/service costs
- Savings in logistics costs
- Inventory management and control
- Enterprise operations / optimization

Oil & Gas companies are having the vision for what we call the Adaptive Enterprise an enterprise in which **business and IT are synchronized** to capitalize on change helps oil and gas companies create a dynamic and agile IT infrastructure that adapts to customer and business needs.



### **Information Technology enabled Process Automation Systems for oil & gas**

Here are the key focus areas accompanied with the ISV (Independent Solution Vendors) proving the solution for the same.

#### **4.1 Seismic acquisition, processing, and interpretation**

These systems use the properties of sound and its reflection from land and marine rock formations to give a seismic profile of the geological formations. Having a visual representation of these subsurface formations aids in the decision-making process for further exploratory work.

Partial list of ISVs: Western GECO, Paradigm, CGG, Veritas DGC, and SMT

#### **4.2 Reservoir management and simulation**

These systems aid in the quantitative description of multi-phase flow in heterogeneous porous media. They are needed for detailed performance prediction used in intermediate and long-term reservoir management.

Partial list of ISVs: Schlumberger, Landmark, and Paradigm

#### **4.3 Exploration and production data management**

Integrated data management systems are advanced yet easy-to-use tools for capturing, storing, archiving, accessing, and delivering exploration and production data. As a master database, these systems support online storage of information such as well header, seismic navigation, and production data. Data is stored in unique, industry-standard data models.

Partial list of ISVs: Schlumberger, Landmark, Paradigm, Earth Decision Sciences, and Computer Modeling Group



#### **4.4 Reservoir characterization**

Integrated reservoir characterization systems help to precisely describe the subsurface throughout the full exploration and production workflow by integrating project data management, geology, geophysics, and modeling to create a seamless workflow for multidisciplinary needs. Productivity increases as less time is spent looking for data and more time is spent evaluating it. This solution features scalable visualization, fluid monitoring, and supervisory control and data acquisition (SCADA) solutions based on CBI.Net technology and Adaptive Enterprise architecture.

Partial list of ISVs: Schlumberger, Landmark, Paradigm, and CGG

#### **4.5 Refinery process management systems**

These systems aid in the day-to-day plant operations and management for refineries and petrochemical plants, including systems such as plant planning, scheduling, optimization, simulation, mass balancing, yield accounting, and historian.

Partial list of ISVs: Siemens, AspenTech, Honeywell, Invensys, ABB, Yokogawa

#### **4.6 Plant document management systems**

These systems manage the extensive document creation, management, and flow in the various units of the refinery. Also included are version control and change management.]

Partial list of ISVs: IXOS

#### **4.7 Fuel and C-store retail systems**

These are integrated systems for managing fuel products and convenience-store retail. These applications manage inventory, head-office reconciliation, decision support, site transactions, and point of sale (POS). HP provides integration of these products with various fuel-station devices as well as tight integration to enterprise resource planning (ERP), marketing, and distribution, and other headquarters-based systems.

Partial list of ISVs: PDI, SAP IS-Oil, and SAP Retail



#### **4.8 Retail marketing solutions**

Retail marketing solutions enable the capture and analysis of retail transactional data by customer segment and profile, enabling companies to launch innovative promotional and loyalty programs. Forming the backbone of such systems are tightly integrated CRM, data-warehouse, and market-analysis systems.

Partial list of ISVs: SAP, Oracle®, and PDI

#### **4.9 Fuel management and distribution**

Fuel-management systems manage fuel operations such as tracking inventory levels, delivery schedules, tank readings, and meter readings. These systems allow fuel stations to enhance the fuel supply chain at each level, from the terminal to the retail site.

Partial list of ISVs: SAP IS-Oil

#### **4.10 Project portals**

Project portals are important collaboration tools for capital projects such as well projects and plants projects that are characterized by their size and complexity. Project portals provide key benefits such as improving project tendering and procurement, enabling communication of project progress and 24x7 access for project changes and requests, shortening project lifecycles, and improving record-keeping and documentation.

Partial list of ISVs: Microsoft, webMethods, and BEA

#### **4.11 Payment solutions**

These systems and solutions deliver the speed, convenience, and security of electronic payment to millions of businesses worldwide, including fuel retail outlets. The systems interface with most of the predominant electronic dispensers and dispenser card readers. They also provide a single control point for fuel sales, speeding customer turnaround.

Partial list of ISVs: Verifone



#### **4.12 Asset maintenance systems**

These systems are crucial in managing the lifecycle of assets maintaining and enhancing all strategic components that have a direct and significant impact on company operations and performance. The goal is to help companies more effectively manage the life of these assets.

Partial list of ISVs: MRO, SAP, Indus, and Oracle



## ERP Automating the Business Processes

Enterprise Resource Planning (ERP) implementations have swept through the business sector since the early 1990s, helping corporations to drive down costs and operate more efficiently. ERP has allowed department heads to view their data more easily and manage it more effectively. It also has streamlined a host of manufacturing and distribution processes, ranging from product development to order processing to the cataloguing of goods. ERP solutions were developed to deliver **automation** across multiple units of an organization.

### 5.1 The Evolution of ERP

ERP has grown over the years to become part of the entire enterprise. From its beginning as a tool for materials planning, it has extended to warehousing, distribution and order entry.

With its next evolution, ERP expands to the front office. Now administrative, sales, marketing, and human resources staff can share a tool that is truly "enterprise-wide".

This diagram shows how ERP has grown since the 1990's to accommodate the needs of the entire organization.

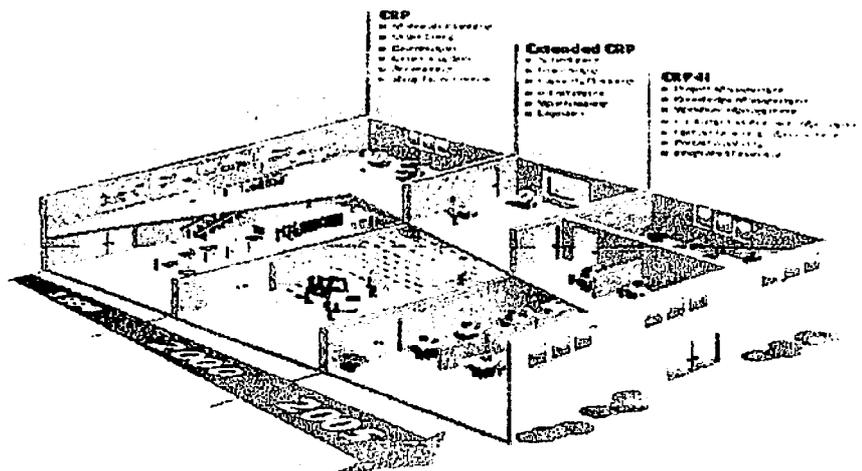


Figure 2: ERP grow from 1990 to 2005



As the idea of the extended enterprise emerged, it raised serious questions about how to most effectively **integrate partners, service vendors** and the entire value cycle with documents and workflow driving the business and capturing all the information involved. Today's enterprise has evolved and expanded beyond internal influences and organizational borders. The reality is that businesses using a traditional ERP deployment, without full operational and informational integration, will continue to struggle. It is this reality that leads us to the materialization of the ERP-II philosophy.

## 5.2 ERP-II—Bringing ERP to the Entire Enterprise

All technologies adapt to changing business climates if they are to survive and prosper. The ERP market is no exception. As businesses entered the 21st century, they began to tinker with the idea of **extended ERP** bringing functionality that existed outside of the ERP system into the mix.

ERP-II is the next step in extended ERP. It's a solution that includes the traditional **materials planning, distribution, and order-entry functionality** strengthened by capabilities like **Customer Relationship Management (CRM), Human Resources Management (HRM), Knowledge Management (KM)** and **Workflow Management**.

Such a system can quickly, accurately and consistently operate an entire organization. It delivers information in an instant to the people who need it. It manages the access to that information by establishing security roles and ratings that define which employees can use certain pieces of information. It also addresses the issue of multiple office locations by making the solution web-based, so employees can access the system no matter where they may be.

Businesses are utilizing the Internet more and more. It is no longer just a tool for email, research and single-transaction commerce. It is quickly becoming a tool for globalizing a business—a tool that allows an organization to tie together its employees, its suppliers and its customers. It enables the free flow of information, and the next generation of solutions will be built upon it.



### 5.3 The Enterprise-wide Solution

To compete on a functional level today, businesses must adopt an enterprise-wide approach to ERP that utilizes the Internet and connects to every facet of the value chain. They must change their own internal processes and procedures to foster collaboration efforts both inside and outside the organization, and they must integrate technologies that allow their collaboration efforts to take full flight.

Systems that leverage advanced levels of ERP-II functionality integrate disparate software packages in a manner that is seamless and transparent to those using them. A single interface loads information from separate systems, allowing it to be modified and saved back. Actions can trigger events in individual systems, resulting in a chain of events across the enterprise and throughout the value chain.

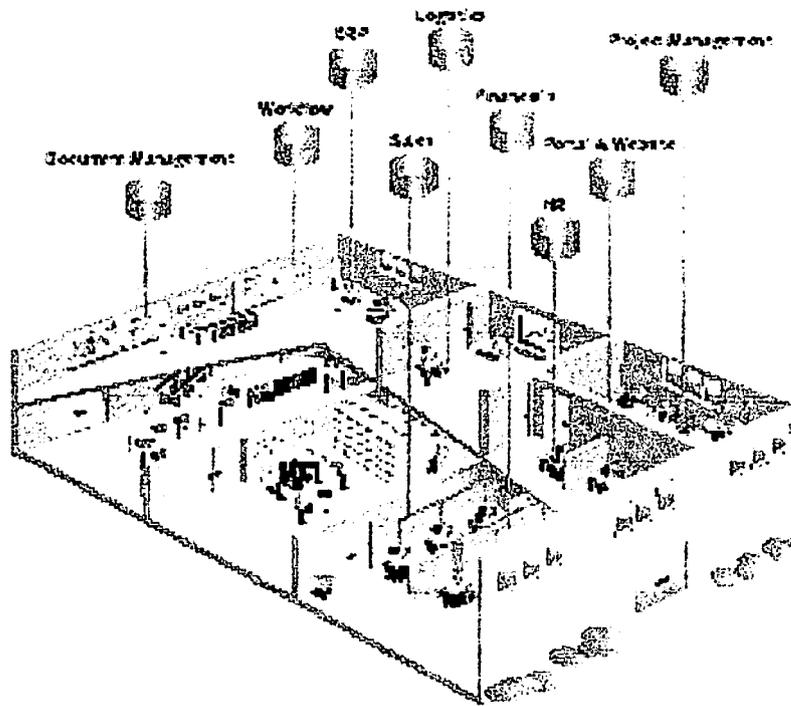


Figure 3 : Enterprise wise solution

#### 5.4 Bringing the Organization Together

In most organizations, information has traditionally been isolated within specific departments, whether on an individual database, in a file cabinet, or on an employee's PC. ERP-II enables employees across the organization to share information across a single, **centralized database**. With extended **portal capabilities**, an organization can also involve its suppliers and customers to participate in the workflow process, allowing ERP to penetrate the entire value chain, and help the organization achieve greater operational efficiency.

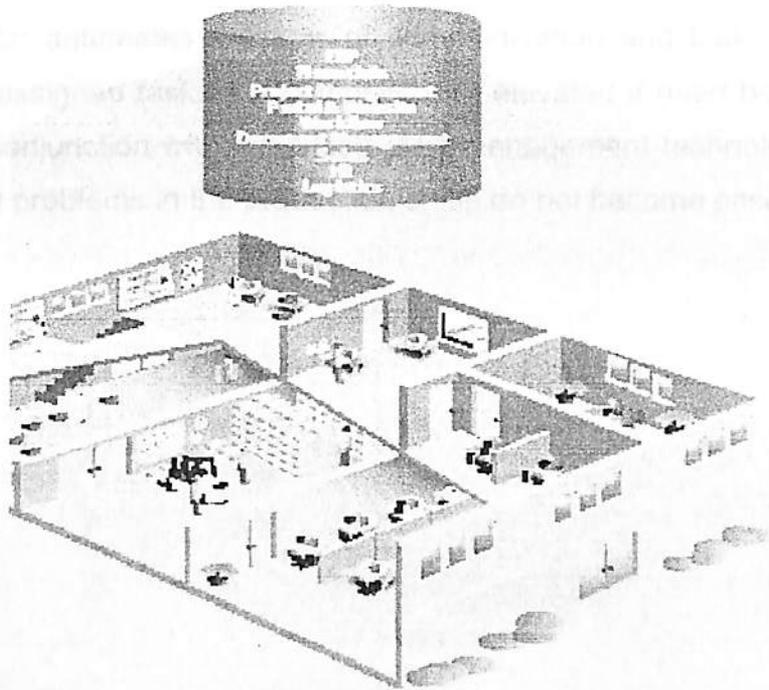


Figure 4 : vision of centralized database

Software providers need to provide vehicles to connect traditional ERP capabilities with front-office processes. They need to present companies with the means to unify the **people, processes and knowledge** that matter most to a business. By linking traditional ERP with advanced tools that help run a business, customers can create an



IT in Process Automation Case Study ONGC  
accurate, up-to-the-moment view of the extended enterprise to enhance decision-making, analysis, scenario planning, and ongoing management of the value cycle.

True enterprise-wide solutions create an environment in which companies can not only model, but also effectively streamline workflow and **automate manual, unsecured processes** into a secure centralized environment. This roles- and rules-based approach eliminates the "data islands" outcome inherent in most, if not all, ERP deployments. This enables all members of the value-chain to be included in processes. But most importantly, advanced ERP requires a powerful workflow component. Workflow that provides each member of the value chain, based on their **roles and responsibilities**, with a process-centric view of the business. Workflow that does not depend upon a crude "send"-only model like email, but on a business-rules system, which automates the flow of communication and tasks. Workflow that can ensure that assigned tasks are completed, or elevated if need be. Workflow that can be used in conjunction with advanced alert management technology to make certain that potential problems in the production chain do not become crises.



## SAP IN OIL INDUSTRY

### 6.1 SAP India

#### Presentation of the company

**SAP India** was set up in March 1996, as a wholly owned subsidiary of SAP AG. It is part of SAP South Asia Pacific, headquartered in Bangalore. SAP India is responsible for sales and implementation support of R/3 and training and certification of its users and partners.

SAP India emerged as one of SAP South Asia region's fastest growing subsidiaries. Growth has been fueled by a strong demand for SAP's end-to-end business solutions. In just over two years, the company has made significant headway achieving over 50 percent share of India's enterprise application software market. It has also clinched major deals with corporations like Reliance, Arvind Mills, Telco, Mahindra & Mahindra, Essar, ICICI, **ONGC**, Ranbaxy and its customer base has grown to over 92 with 48 of these already productive.

The industry segments that have successfully implemented SAP packages and benefited from them include the Automobile, Hi-tech, Engineering & Construction, **Chemical**, Cement, Textile, Diversified groups among others.

For the coming year, SAP India aims to strengthen its manpower resources in the areas of sales, consulting, customer service and support. The company will significantly increase its head count by 60 percent from its current base of 115. The company will continue playing a pivotal role in **localization of SAP R/3** solution to meet Indian statutory and legal requirements offering industry solutions for some specific industries like manufacturing, **oil and gas**, banking and finance, retail, power



IT in Process Automation Case Study ONGC and public sector. The business development effort will be aligned to the above industry focus as well as penetrating the mid-market.

SAP is the world's market and technology leader in end-to-end integrated business applications, providing comprehensive solutions for companies of all sizes and all Industry sectors. Cultivating innovative technologies on a solid foundation of business experience, SAP delivers scaleable solutions that enable its customers to continually improve upon best business practices. SAP products empower people to respond quickly and decisively to dynamic market conditions, helping businesses achieve and maintain a competitive advantage.

Founded in 1972, SAP is based in Walldorf, Germany, and employs more than 18,000 people at offices in more than 95 countries worldwide who are dedicated to providing a high level of support and service for the more than 17,000 installations of R/3 worldwide.

In a standard SAP project system, it is divided into three environments, **Development, Quality Assurance and Production.**

The development system is where most of the implementation work takes place. The quality assurance system is where all the final testing is conducted before moving the transports to the production environment. The production system is where all the daily business activities occur. It is also the client that all the end users use to perform their daily job functions.

To all company, the production system should only contain transport that has passed all the tests.

SAP is table drive customization software. It allows businesses to make rapid changes in their business requirements with a common set of programs. User-exits are provided for business to add in additional source code. Tools such as screen variants are provided to let you set fields attributes whether to hide, display and make them mandatory fields.



**This is what makes ERP system and SAP in particular so flexible.** The table driven customization are driving the program functionality instead of those old fashioned hard-coded programs. Therefore, new and changed business requirements can be quickly implemented and tested in the system.

In order to minimize your upgrading costs, **the standard programs and tables should not be changed as far as possible.** The main purpose of using standard business application software like SAP is to reduce the amount of time and money spend on developing and testing all the programs. Therefore, most companies will try to utilize the available tools provided by SAP.

SAP is today the recognized leader among the E-business solutions editors between firms. With nearly a third of the market, it is the first ERP editor in the world and the 4th software publisher with manpower of 22 300 people in more than 50 countries.

## **6.2 SAP R/3 Architecture**

The R/3 system is composed of functional modules corresponding to the company's activities. We can distinguish the following functional modules families:

- The MM module (Material Management) deals with the articles management from a purchases point of view and inventory control.
- PP module (Planning Production) deals with the production control.
- SD module (Sales and Distribution) deals with the sales administration.
- QM module is dedicated to the Quality Management.
- PM module is dedicated to the maintenance management
- FI module (Financial) contains all the sales and purchases writings
- CO module deals with the cost accounting.
- The PS module relates to the projects management
- HR module relates to Human Resources management

Traditionally, businesses assemble a suite of data processing applications by evaluating individual products and buying these separate products from multiple



IT in Process Automation Case Study ONGC software vendors. Interfaces are then needed between them. For example, the materials management system will need links to the sales and distribution and to the financial systems, and the workflow system will need a feed from the HR system. A significant amount of IS time and money is spent in the implementation and maintenance of these interfaces.

R/3 comes prepackaged with the core business applications needed by most large corporations. These applications coexist in one homogenous environment. They are designed from the ground up to run using a single database and one (very large) set of tables. Current production database sizes range from 12 gigabytes to near 3 terabytes. Around 8,000 database tables are shipped with the standard delivery R/3 product.

SAP R/3 architecture is composed of 3 levels. SAP system is made of the whole servers assigned to only one database.

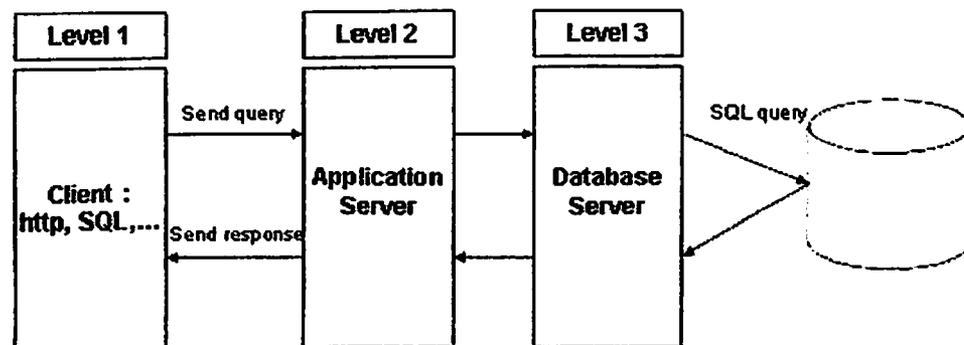


Figure 5: SAP R/3 Architecture

The RDBMS (Relational database management system) is stored on only one physical machine. It is on this level that the management of the physical data dictionary is carried out:

- Data access (input/output routines)



- Data physical update
- Data validation

R/3 comes prepackaged with the core business applications needed by most large corporations. These applications coexist in one homogenous environment. They are designed from the ground up to run using a single database and one (very large) set of tables. Current production database sizes range from 12 gigabytes to near 3 terabytes. Around 8,000 database tables are shipped with the standard delivery R/3 product.

### 6.3 R/3's Application Modules

	<b>Module Name</b>	<b>Description</b>	<b>Key Elements</b>
FI	Financial accounting	Designed for automated management and other sub-ledger accounts with a user-defined chart of accounts.	General ledger, Accounts payable, Accounts receivable, Treasury, Special-purpose ledger, Legal consolidation, Accounting information system.
CO	Controlling	Represents the company's flow of cost and revenue, and is a management instrument for organizational decision.	Cost/profit center accounting, Job order accounting, Project accounting, Product costing analysis, Activity based costing, and Profitability analysis.



## IT in Process Automation Case Study ONGC

AM	Asset management	Designed to manage and supervise individual aspects of fixed assets.	Plant maintenance (repair, schedule), Inventory control, Traditional asset accounting (depreciation, etc.), and Investment management.
PS	Project system	Supports the planning, control, and monitoring of long-term, highly complex products with defined goals, accelerates work and data flows.	Funds and resource management, Quality control, Time management, Project management.
WF	Workflow	Links SAP R/3 modules with cross-application technologies, tools, and services to automate business processes.	
IS	Industry solutions	Combines SAP R/3 modules with additional industry specific functionality.	Segments: Consumer goods, Utilities/telecommunications, Healthcare, Process industries, Oil & gas, High tech/electronics, Automotive.
HR	Human resources	Supports the planning and control of personnel activities	Payroll accounting, Recruitment, HR Information



## IT in Process Automation Case Study ONGC

PM	Plant maintenance	Supports the planning, processing, and completion of plant maintenance tasks, track maintenance costs, and make maintenance decisions	Processing of unplanned tasks, Service management, Maintenance planning, Maintenance bill of materials, Plant management information system.
QM	Quality management	Supports quality planning and control for manufacturing and procurement.	Quality inspection, Quality planning, Quality management system.
PP	Production planning	Supports planning and control of manufacturing activities.	Bill of materials, Work centers, Sales and operations planning, Master production scheduling, Material requirements planning, Shop floor control, Product costing.
MM	Materials management	Supports the procurement and inventory functions in daily operations.	Purchasing, Inventory management, Reorder point processing, Invoice verification, Material valuation, External services management.
SD	Sales & distribution	Helps optimize all tasks and activities carried out in sales, delivery, and billing.	Pre-sales support, Inquiry processing, Quotations, Sales order processing, Delivery processing, Billing.



Although R/3 typically supports 80 to 95 percent of a large company's needs, certain unique functionality or specialized business processes may not be supported. This unique functionality can be obtained in four ways:

- Interfacing R/3 to existing legacy systems using SAP-supported middleware.
- Interfacing R/3 to third-party (SAP partners) solutions, typically written in C or C++.
- Writing custom software in ABAP/4 (a proprietary fourth generation language) to extend R/3's functionality.
- Modifying R/3 source code directly (this approach is strongly discouraged by SAP and may lead to loss of after-sales support).

#### 6.4 SAP Oil & Gas Solution Map

<b>Enterprise Management</b>	Strategic Enterprise Management	Business Intelligence	Managerial Accounting	Financial Accounting	Regulatory Compliance	Joint Venture Management
<b>Customer Relationship Management</b>	Customer Service	Product Brand Marketing	Marketing Program Management	Sales Management	Service Agreements	Service Fulfillment
<b>Exploration &amp; Production</b>	Exploration & Appraisal	Development	Production	Marketing		Disposal
<b>Supply</b>	Supply Chain Optimization & Planning	Acquire. Trade & Sell	Exchange & Throughput Handling	Scheduling	Inventory Management	Primary Distribution & Transport
<b>Manufacturing</b>	Manufacturing Planning & Optimization	Process Management	Gas & Fuel Manufacturing	Lubes Manufacturing	Blending & Packaging	Product Quality Management
<b>Market</b>	Marketing	Contracts & Pricing	Commercial Sales			Secondary Distribution & Transportation
<b>Service Station &amp; Convenience Retailing</b>	Category Management	Transaction Processing & Settlement	Retail Network Management	Inventory Management		Site Management
<b>Business Support</b>	HR - Core Functions & Strategy	HR - Analytics & Enabling Solutions	Procurement	Corporate Finance Management	Fixed Asset Management	Engineering, Construction & Maintenance

Figure 6: SAP Oil & Gas Solution Map



## **6.5 SAP Oil & Gas FUNCTIONS**

### **6.5.1 FUEL MANAGEMENT**

#### **Fuel Sales Processing**

SAP Service Station and Convenience Retailing enables the automated upload of fuel sales and inventory levels from local site systems, for example, POS or forecourt, as well as the manual capture of data via SAP EP at the site, for review at headquarters. Fuel sales are gathered as direct quantities or calculated from meter readings, which represent single pumps or, on an aggregated level, sales according to service type. Meter readings can be used to register various events such as sales, recalibration of meters, or flushes. Relevant sales quantities can be provided to other processes like fuel inventory management and site settlement.

#### **Fuel Inventory Management**

Fuel inventory management capability provides all functions required for tracking and valuing all transactions related to fuel that is held for sale at the site. Fuel deliveries and sales quantities provided from site-level systems are recorded. This includes the handling of blending at the pump and calculation of sales from multiple tanks for the same fuel product. All movements can easily integrate fuel-quantity conversion calculations for alternative units of measure based on factors such as temperature and density.

#### **Fuel Stock Reconciliation**

Based on fuel deliveries and sales, SAP Service Station and Convenience Retailing tracks book stock of all tanks. In addition, tank dip readings can be uploaded from the site or manually entered via a Web browser at the site and stored in the central system. Based on the book and physical stock data derived from tank dips, SAP Service Station and Convenience Retailing provides the capability of reconciling these quantities. During the reconciliation, differences are calculated and checked against



IT in Process Automation Case Study ONGC  
individually defined tolerances. Differences within limits can then be automatically reconciled by posting the stock differences.

### **Fuel Pricing**

Fuel pricing capability enables you to manage retail fuel prices and to monitor competitors' fuel prices across the network. Competitors' price changes may be tracked through uploads from local systems or input via a portal at the site. Pricing strategies can be defined to determine retail prices for fuel –for example, that regular should always be five cents lower than premium – and service types. Default differences in relation to competition can be defined as well. Also, clustering sites for retail fuel pricing enables proposals for additional changes to sites within a cluster when a price change for one of the cluster sites is executed.

SAP Service Station and Convenience Retailing enables fuel pricing to be pushed either to the whole network or to particular regions based on a change in market conditions, such as a purchase price increase. In both cases, a check on specific upper or lower limits for fuel prices as well as on the expected sales margin can be performed in order to comply with pricing policies. Once price changes have been determined, they can be automatically downloaded with assigned time stamps to the local site systems in order to be published as effective when defined.

### **Interface to Station Network**

In addition to the capabilities of traditional POS integration, SAP Service Station and Convenience Retailing also supports interface formats to upload data for meter and tank dip readings as well as exchange of fuel prices.



## 6.5.2 SITE AND HEADQUARTERS ACCOUNTING

### Rebate Management

Rebate management capability involves a suite of functions including a tool for maintaining vendor rebates and automatic tracking of corresponding transactions in the supply chain for settlement, financial postings, and reporting. At its foundation is a rebate arrangement that contains all the necessary information including relevant vendor data; merchandise, such as items subject to rebate; validity periods; and negotiated conditions, such as discounts that are scaled according to business volume over a defined time period. The system automatically collects relevant data connected with the rebate arrangement at the posting of purchase orders or goods receipts. Using a special settlement function, the system analyzes collected data according to the conditions and creates corresponding financial postings such as credit memos. Reporting includes the tracking of all operational and financial transactions related to a rebate arrangement.

### Payment Card Processing

Payment card processing covers uploading of card transactions from retail sites, validation checks, and settlement with the clearinghouses for reimbursement. In addition, payment card data can be provided to other processes, such as site settlement, if necessary. Payment card settlement provides several options, such as the creation of transmission files for clearing houses, as well as several methods of fee calculation and their distribution to site cost centers.

The solution also provides the option to automatically match card transactions provided by retail sites with those provided by the clearing houses as accepted. This process can be performed at the transaction or summary level. Non matching transactions are then processed as disputes in order to get them cleared out. The matching logic provided can be extended to meet specific needs. Payment card processing covers all standard bank debit cards, credit cards, and fleet cards.



## **Site Settlement**

Site settlement functions handle the collection of all financial and operational data from retail sites. This data is then used to update financial records as well as for reporting, analysis, and reconciliation.

In the specific case of consigned fuel stock sales via dealer operators, site settlement functions handle all aspects of settlement with dealers, such as fuel sales, calculating the dealer commission for sales, credit of payment card charges, and dealer participation in card fees. All necessary tax components are included as well.

## **Site Cash Balancing**

Cash balancing includes the necessary activities for the shift or day closing of the site. This includes the recording of paid-in and paid-out transactions as well as the reconciliation of cash, card, payments with vouchers, checks, coupons, food stamps, and other forms of payment captured at the POS. Finally, bank deposits and the movement of money from safes to armored car services and banks can be registered.

## **Site Expense Invoice**

The site expense invoice function allows for the decentralized capture and verification of vendor invoices at the site. Invoices can be identified as payments to be processed at headquarters after management approval or as cash payments already paid to the vendor. In the second case, invoices will also be visible as paid-out transactions in the site cash-balancing application.

### **6.5.3 BUSINESS ANALYSIS AND REPORTING**

#### **Sales Audit and Loss Prevention**

Sales audit and loss prevention is a tool that provides verification, correction, and processing of detailed sales data sent by POS systems, including analysis of cashier activities and POS sales transactions.



## **Sales Analysis**

Sales analysis allows for the reporting of category sales and flash sales, on transaction or summary levels, within the retail network (that includes the site, district, region, and so on) along defined KPIs.

## **Market Basket Analysis**

You can report and analyze sales-receipt data to build a consumer profile for given merchandise baskets, differentiating by region or demographic attributes. Market Basket Analysis can be used for assortment planning as well as to effectively plan promotions with respect to known customers.

## **Vendor Performance**

The vendor performance function tracks and reports on actual vendor performance according to negotiated standards. It provides requisite data for adjusting logistical parameters such as delivery times as well as the necessary information for future vendor negotiations.

## **Loyalty Card Processing**

The solution provides capabilities for Customer Loyalty Marketing. With SAP BI you can consolidate and analyze sales data provided by the POS systems, which are then matched with customer data. Analytics support the identification of target groups out of the consolidated information. You can also leverage the mySAP™ Customer Relationship Management (mySAP™ CRM) solution for comprehensive campaign management and customer loyalty capabilities to design targeted marketing programs. Loyalty programs are used to reward customers for purchasing from the same retail sites, reaching volumes targets and dollar amounts, frequency, and point accumulation.



## **Franchisee Support**

Franchisee support aims at the reporting and analysis on franchisee business activities in a cooperative business environment. Using POS data management, the business data of franchisees such as sales are uploaded into SAP BI, which provides powerful tools for analysis. Results of analyses such as site benchmarks assist franchisees with category management processes and other business improvement opportunities. These results are made available to the franchisee through SAP EP.

SAP Service Station and Convenience Retailing is a comprehensive solution that includes the full range of operations such as convenience retailing, fuel management, site and headquarters accounting, and business analysis and reporting. It combines the best business practices of the two leading industry solutions, SAP Oil & Gas and SAP Retail, for the petroleum marketing and convenience retailing businesses. SAP Service Station and Convenience Retailing is fully integrated into mySAP Business Suite solutions and can therefore be easily combined with other SAP software.

### **6.5.4 TERMINAL AUTOMATION SYSTEM INTERFACE**

Many oil companies implement a highly automated equipment and control software system, called a terminal automation system (TAS) for efficient bulk product handling and inventory management. The terminal automation system improves terminal operations such as lifting and discharging product moving product between tanks, and managing the inventory of each tank efficiently.

#### **PURPOSE**

The TAS Interface provides seamless integration between mySAP™ Oil & Gas and external terminal automation systems. The system integration made possible by the TAS Interface improves the business processes involved in terminal management, such as taking orders, managing terminal operations for orders and the corresponding shipments, and managing tank stocks in the terminal.



## FEATURES

The TAS Interface supports the following functions:

- Sending loading information to an external terminal automation system
- Receiving loading information from the external terminal automation system and providing that information to mySAP Oil & Gas using:
  - Intermediate documents (**IDocs**) and application linking enabling (**ALE**)
  - An internal table and a remote function call (RFC)
- Manually entering loading information in mySAP Oil & Gas
- Processing loading information in mySAP Oil & Gas

### 6.5.5 SUPPLY CHAIN MANAGEMENT IN OIL & GAS INDUSTRY

Supply chains start with crude oil production at wellheads and platforms and continue with the refining of crude oil into a variety of products, followed by midstream and primary supply of both crude and refined products and, finally, the secondary distribution of refined products to service stations and commercial customers. Each movement is a critical business action because of the enormous value of the product involved. For example, a single oil tanker may carry 2 million barrels of crude oil worth more than \$50 million.

To cover this complex business arena, mySAP™ Oil & Gas works seamlessly with mySAP™ Supply Chain Management (mySAP™ SCM), especially its advanced planning and optimization capabilities.



## KEY FUNCTIONS

### PLANNING AND OPTIMIZATION

The advanced planning and optimization capabilities in mySAP SCM include the following:

- Master data and core interface for enhanced supply chain modeling and integration with mySAP Oil & Gas
- Demand planning, including collaborative forecasting and demand contracts planning
- Supply network planning with optimization techniques such as a heuristic, repair-based planning approach; a linear program optimizer for a cost-based approach to produce a first-cut schedule; and multilevel supply and demand matching using a capable-to-match function to check production capacities and transportation capabilities
- Transportation planning and vehicle scheduling for scheduling and optimizing trips and movements.

Nomination interface and execution functions for handling the entire nomination process, through integration with the Trader's and Scheduler's Workbench in mySAP Oil & Gas SAP has enhanced this broad range of capabilities with functions that are specifically tailored to meet the needs of the oil and gas industry. In general, the processes involved in planning and in statistical data handling take place in mySAP SCM, whereas document processing and communication are handled by mySAP Oil & Gas. Planning data and historical data originating from external systems are imported using a variety of communication interfaces.

### THE E-BUSINESS OF OIL AND GAS

The **mySAP.com e-business** platform is a **family of solutions** and services that empowers employees, customers, and business partners to collaborate successfully anywhere, anytime. The mySAP.com e-business platform can be tailored to suit the



IT in Process Automation Case Study ONGC requirements of any industry. The result is a solution like mySAP Oil & Gas. And no other e-business solution provider can deliver the degree of industry-specific expertise that SAP brings to its e-business solutions. Think of mySAP Oil & Gas as a two-part approach to making your e-business run better. Part one is a collection of processes and tools that are designed specifically for the oil and gas industry. Part two is a collection of the mySAP.com cross-industry solutions that really give part one its e-business bite. Here's what they are

mySAP™ Supply Chain Management (mySAP™ SCM)

mySAP™ Customer Relationship Management (mySAP™ CRM)

mySAP™ Product Lifecycle Management (mySAP™ PLM)

mySAP™ Business Intelligence (mySAP™ BI)

mySAP™ E-Procurement

mySAP™ Workplace

mySAP™ Mobile Business.

mySAP™ Human Resources (mySAP™ HR)

mySAP™ Financials

### **The Benefits**

mySAP Oil & Gas is the product of leading industry experience coupled with the latest Internet technology. The result is a customized solution that delivers some big business benefits:

- Reduce the number of expensive legacy applications and their interfaces
- A complete solution from wellhead to service station that integrates tools for exploration and production and gets your product to the customer.



## IT in Process Automation Case Study ONGC

- Full integration with the mySAP.com e-business platform, opening a new world of value creation, personalization, and collaboration.
- Web-enabled software so you can take advantage of the power of the Internet
- End-to-end supply chain management, covering all the steps needed to market the final product
- 24x7 support
- Strengthened supply chain partnerships
- Improved decision-making capabilities with the right tools for decision makers
- Improved customer responsiveness
- World-leading e-business technology
- Business solution consulting

### 6.5.6 ENTERPRISE ASSET MANAGEMENT

EAM helps companies manage physical assets – production plants, capital equipment, vehicle fleets, and facilities complexes – over the complete asset life cycle. In conjunction with powerful reporting and analysis, the **SAP solution's EAM** capabilities enable you to reduce operating costs, better manage capital expenditure, and improve asset utilization. The SAP solution's comprehensive capabilities for EAM cover the total scope of the asset life cycle across the asset support network, including the following:

#### **Investment Planning, Asset Specification, and Design**

- Business planning and simulation
- Investment management
- Collaborative engineering for specification and design
- Collaborative project management

#### **Procurement and Asset Construction, Installation, and Implementation**

- Supplier qualification and candidate selection
- Bidding and contract management



- Environment, health, and safety (EH&S) management, complete with work clearance management
- Mobile asset management with radio frequency identification (RFID) integration
- Maintenance, repair, and operations (MRO) parts and services procurement
- MRO inventory management
- Employee and contractor management
- Integrated asset accounting and maintenance budgeting
- Asset performance analysis
- Decommissioning and Disposal
- Asset transfer and disposal
- Collaborative engineering and project management
- Waste management
- Regulatory compliance management
- Asset re-marketing

**Powered by SAP Net Weaver™**

Based on the open architecture of the SAP Net Weaver™ platform, SAP Service and Asset Management can be seamlessly combined with **SAP and non-SAP applications** for network wide asset service visibility and control. SAP Net Weaver allows enhanced business flexibility and competitive advantage by enabling business process optimization across the asset life cycle, and collaboration among all the stakeholders in the EAM support network.



## ONGC Overview



OIL AND NATURAL GAS CORPORATION

### 7.1 Global Ranking

- Is Asia's best Oil & Gas Company, as per a recent survey conducted by US-based magazine 'Global Finance'.
- Ranks as the 2nd biggest E&P company (and 1st in terms of profits), as per the Platts Energy Business Technology (EBT) Survey 2004
- Ranks 24th among Global Energy Companies by Market Capitalization in PFC Energy 50 (December 2004). [ONGC was ranked 17th till March 2004, before the shares prices dropped marginally for external reasons.
- Is placed at the top of all Indian Corporates listed in Forbes 400 Global Corporates (rank 133rd) and Financial Times Global 500 (rank 326th), by Market Capitalization.
- Is recognized as the Most Valuable Indian Corporate, by Market Capitalization, Net Worth and Net Profits, in current listings of Economic Times 500 (4th time in a row), Business Today 500, Business Baron 500 and Business Week.
- Is targeting to have all its installations (offshore and onshore) accredited (certified) by March 2005. This will make ONGC the only company in the world in this regard.



## IT in Process Automation Case Study ONGC

- Owns and operates more than 11000 kilometers of pipelines in India, including nearly 3200 kilometers of sub-sea pipelines. No other company in India operates even 50 per cent of this route length.
- Crossed the landmark of earning Net Profit exceeding Rs.10,000 Crore, the first to do so among all Indian Corporates, and a remarkable Net Profit to Revenue ratio of 29.8 per cent. The growth in ONGC's profits is not solely due to deregulation in crude prices in India, as deregulation has affected all the oil companies, upstream as well as downstream, but it is only ONGC which has exhibited such a performance (of doubling turnover and profits).
- Has paid the highest-ever dividend in the Indian corporate history.
- The Market Capitalization of the ONGC Group (ONGC & MRPL) constitutes 10 per cent of the total market capitalization on the Bombay Stock Exchange (BSE). ONGC has an equity weightage of 5 per cent in Sensex; 15 per cent in the Nifty (the only Indian corporate with a two-digit presence there); ONGC commands a 7 per cent weightage in the Morgan Stanley Capital International (MSCI) Index.
- The growth in ONGC's Market Capitalization (from Rs. 18,500 Crore before May 2001 to Rs. 1,25,000 Crore in January 2004) is unprecedented and except Wipro (who had a higher market capitalization temporarily), no other Indian company (either in public or private sector) has seen such a phenomenal growth.

### 7.2 ONGC Represents India's Energy Security

ONGC has single-handedly scripted India's hydrocarbon saga by

- Establishing 6 billion tonnes of In-place hydrocarbon reserves with more than 300 discoveries of oil and gas; in fact, 5 out of the 6 producing basins have



IT in Process Automation Case Study ONGC  
been discovered by ONGC: out of these In-place hydrocarbons in domestic acreage, Ultimate Reserves are 2.1 Billion Metric Tonnes (BMT) of Oil Plus Oil Equivalent Gas (O+OEG).

- Cumulatively producing 685 Million Metric Tonnes (MMT) of crude and 375 Billion Cubic Meters (BCM) of Natural Gas, from 115 fields.

### **7.3 India's Most Valuable Company:**

- With a market capitalization having exceeded Rs 1 trillion, ONGC retains its position as the most valuable company in India in various listings.
- As per 5th Business Today Stern-Stewart study, ONGC was the biggest Wealth Creator during 1998-2003 (Rs 226.30 billion). It was again the highest wealth creator during 1999-2004, as per Motilal Oswal Securities.
- ONGC's mega Public Offer (India's biggest-ever equity offer worth more than Rs 100 billion was over subscribed 5.88 times.
- ONGC is the only Indian company to have earned a Net Profit of over Rs 10,000 crores (2002-03).
- The market capitalization of the ONGC group constitutes 8% of the market capitalization of BSE.
- ONGC added 49.06 MMT of ultimate reserves of O+OEG during 2003-04 (including overseas acquisitions), maintaining the trend of positive accretion for the third consecutive year.

### **7.4 ONGC's Pioneering Efforts**

**ONGC is the only fully-integrated petroleum company in India, operating along the entire hydrocarbon value chain:**

- Holds largest share (57.2 per cent) of hydrocarbon acreages in India.
- Contributes over 84 per cent of Indian's oil and gas production.



## IT in Process Automation Case Study ONGC

- Every sixth LPG cylinder comes from ONGC.
- About one-tenth of Indian refining capacity.
- Created a record of sorts by turning Mangalore Refinery and Petrochemicals Limited around from being a stretcher case for referral to BIFR to among the BSE Top 30, within a year.
- Owns 23% of Mangalore-Hasan-Bangalore Product Pipeline (MHBPL), connecting MRPL to the Karnataka hinterland.

### 7.5 ONGC Group

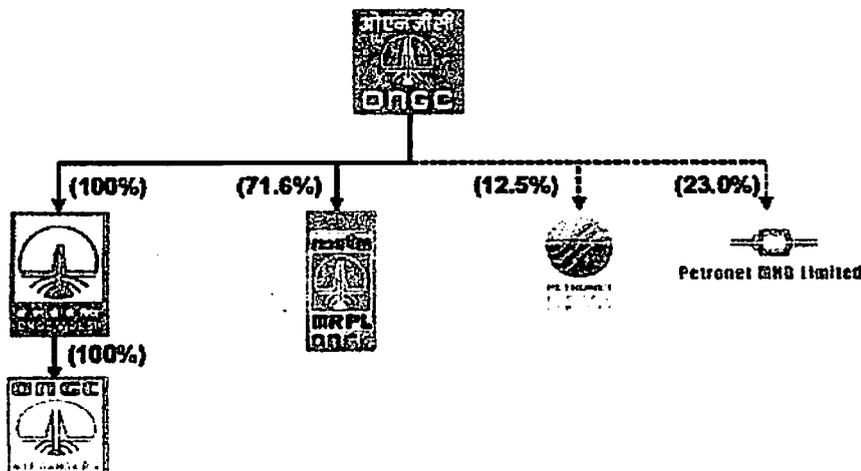


Figure 7: ONGC Group

### 7.6 Competitive Strength

- All crudes are sweet and most (76%) are light, with sulphur percentage ranging from 0.02-0.10, API gravity ranging from 26°-46° and hence attracts a premium in the market.



## IT in Process Automation Case Study ONGC

- Strong intellectual property base, information, knowledge, skills and experience.
- Maximum number of Exploration Licenses, including competitive NELP rounds.
- ONGC owns and operates more than 11000 kilometers of pipelines in India, including nearly 3200 kilometers of sub-sea pipelines. No other company in India, operates even 50 per cent of this route length.

### 7.7 Organization Chart

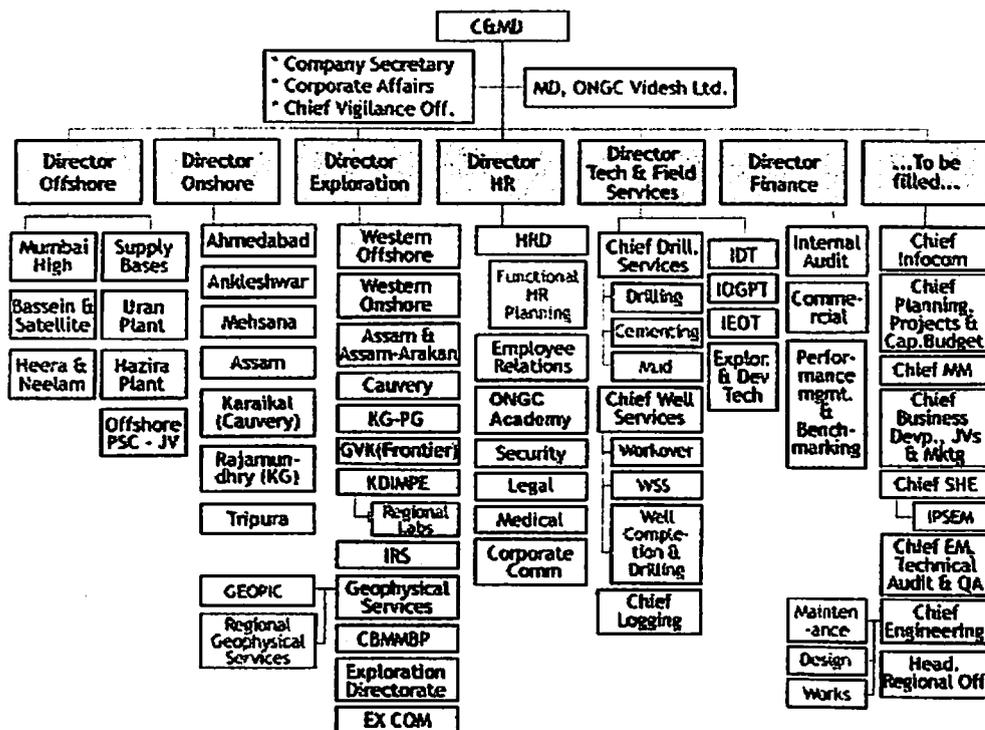


Figure 8: Organization Chart



**Strategic Vision: 2001-2020**

**Focusing on core business of E&P, ONGC has set strategic objectives of:**

- Doubling reserves (i.e. accreting 6 billion tonnes of O+OEG) by 2020; out of this 4 billion tonnes are targeted from the Deep-waters.
- Improving average recovery from 28 per cent to 40 per cent.
- Tie-up 20 MTPA of equity Hydrocarbon from abroad.
- The focus of management will be to monetise the assets as well as to assetise the money.

The focus of management will be to monetise the assets as well as to assetise the money.

**Sagar Samriddhi: Biggest Global Deepwater Campaign**

ONGC launched 'Sagar Samriddhi', the biggest deep-water exploration campaign ever undertaken by a single operator, anywhere in the world.

- Strategic plan to accrete 4 billion tones of reserves by 2020.
- US\$0.75 million per day investment.
- Integrated Well Completion approach.
- Plans to drill 47 deepwater wells up to water depths of 3 kms.

**Leveraging Technology**

To attain the strategic objective of improving the Recovery Factor from 28 per cent to 40 per cent, ONGC has focused on prudent reservoir management as well as effective



IT in Process Automation Case Study ONGC  
implementation of technologies for incremental recovery to maximize production over the entire life cycle of existing fields

Improved Oil Recovery (IOR) and Enhanced Oil Recovery (EOR) schemes are being implemented:

- In 15 fields including Mumbai offshore
- At a total investment exceeding US \$2.5 billion.
- Yielding incremental 120 MMT of O+OEG over 20 years

### 7.9 Sourcing Equity Oil Abroad

ONGC's overseas arm ONGC Videsh Limited (OVL), has laid strong foothold in a number of lucrative acreages, some of them against stiff competition from international oil majors.

OVL has so far, acquired 15 properties in 14 foreign countries, and striving to reach out further. OVL's projects are spread out in Vietnam, Russia, Sudan, Iraq, Iran, Libya, Syria, Myanmar, Australia, and Ivory Coast. It is further pursuing Oil and gas exploration blocks in Algeria, Australia, Indonesia, Nepal, Iran, Russia, UAE and Venezuela.

#### OVL in 12 Countries

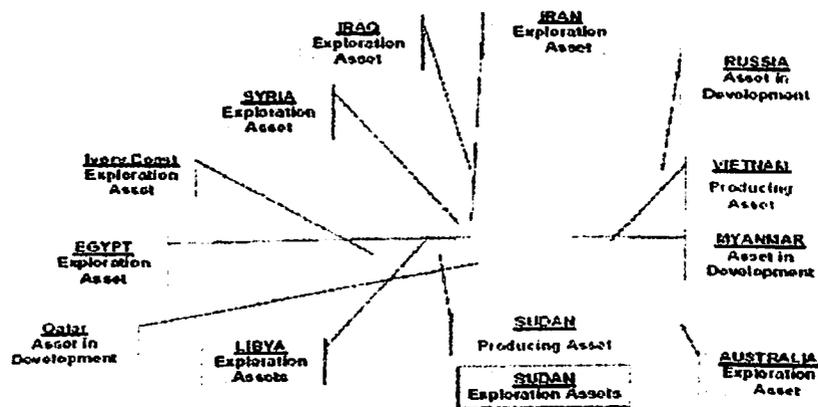


Figure 9: OVL spans across the globe



### 7.10 Frontiers Of Technology

- Uses one of the Top Ten virtual Reality Interpretation facilities in the world.
- Rolled out ICE, one of the biggest ERP implementation facilities in the world.

### 7.11 Best In Class Infrastructure And Facilities

- ONGC's success rate is at par with the global norm and is elevating its operations to the best-in-class level, with the modernization of its fleet of drilling rigs and related equipment, at an investment of around US \$ 400 million.
- ONGC has adopted Best-in-class business practices for modernization, expansion and integration of all Info-com systems with investment of around US \$ 125 million.

### Onshore

- Production Installation - 225
- Pipeline Network (km) - 7900
- Major Offshore Terminals (including CFU, LPG, Gas, Sweetening plants, Storage Tanks) - 2
- Drilling Rigs - 75
- Work Over rigs - 66
- Seismic Units - 33
- Logging Units – 35



## Offshore

- Well Platforms - 131
- Well-cum-Process Platforms - 5
- Process Platforms - 28
- Drilling/ Jack-up-Rigs - 18
- Pipeline Networks (km) - 3200
- Offshore Supply Vessels - 32
- Special Application Vessels - 4

## Financial (2003-04)

- Highest-ever dividend paid to shareholders (US\$ 930 million)
- Practically zero debt Corporate
- Contributed over US \$ 20 billion to the exchequer

## The Road Ahead

ONGC is entering LNG (regasification), **Petrochemicals, Power Generation**, as well as **Crude & Gas shipping**, to have presence along the **entire hydrocarbon value-chain**. While remaining focused on its core business of oil & gas E&P, it is also looking at the future and promoting an applied **R&D in alternate fuels** (which can be commercially brought to market). These efforts in integration is basically to exploit the core competency of the organization – knowledge of hydrocarbons, gained over the five decades.



## **New Business**

ONGC has also ventured into Coal Bed Methane (CBM) and Underground Coal Gasification (UCG); CBM production would commence in 2006-07 and UCG in 2008-09. ONGC is also looking at Gas Hydrates, as it is one possible source that could make India self-sufficient in energy, on a sustained basis.

## **Continuing On The Growth Trajectory**

The ONGC Group has doubled its turnover from 5 billion US dollars to 10 billion US dollars (from Rs 23,238 Crore to Rs 48,368 Crore) in the last 3 years (2001- 2004); and it aims to go to 50 billion US dollars in the next 5 years. As this implies a commendable annual growth rate (compounded) of 40-50 per cent, this objective of ONGC, when realized, would be an outstanding achievement, by any standards.

## **ONGC Is Now Geared To Meet Its Vision**

To be an Indian Integrated Energy Multinational (PSU);

Target: A Turnover of 50 Billion US dollars in 5 years.

## **7.12 ONGC History**

### **1947 - 1960**

During the pre-independence period, the Assam Oil Company in the northeastern and Attock Oil company in northwestern part of the undivided India were the only oil companies producing oil in the country, with minimal exploration input. The major part of Indian sedimentary basins was deemed to be unfit for development of oil and gas resources.

In 1955, Government of India decided to develop the oil and natural gas resources in the various regions of the country as part of the Public Sector development. With this objective, an Oil and Natural Gas Directorate was set up towards the end of 1955, as



IT in Process Automation Case Study ONGC  
a subordinate office under the then Ministry of Natural Resources and Scientific Research.

Soon, after the formation of the Oil and Natural Gas Directorate, it became apparent that it would not be possible for the Directorate with its limited financial and administrative powers as subordinate office of the Government, to function efficiently. So in August 1956, the Directorate was raised to the status of a commission with enhanced powers, although it continued to be under the government. The main functions of the Oil and Natural Gas Commission subject to the provisions of the Act, were "to plan, promote, organize and implement programmes for development of Petroleum Resources and the production and sale of petroleum and petroleum products produced by it, and to perform such other functions as the Central Government may, from time to time, assign to it ". The act further outlined the activities and steps to be taken by ONGC in fulfilling its mandate.

#### **1961 – 1990**

Since its inception, ONGC has been instrumental in transforming the country's limited upstream sector into a large viable playing field, with its activities spread throughout India and significantly in overseas territories. In the inland areas, ONGC not only found new resources in Assam but also established new oil province in Cambay basin (Gujarat), while adding new petroliferous areas in the Assam-Arakan Fold Belt and East coast basins (both inland and offshore).

ONGC went offshore in early 70's and discovered a giant oil field in the form of Bombay High, now known as Mumbai High.

This discovery, along with subsequent discoveries of huge oil and gas fields in Western offshore changed the oil scenario of the country. Subsequently, over 5 billion tonnes of hydrocarbons, which were present in the country, were discovered. The most important contribution of ONGC, however, is its self-reliance and development of core competence in E&P activities at a globally competitive level.



### **After 1990**

The liberalized economic policy, adopted by the Government of India in July 1991, sought to deregulate and de-license the core sectors (including petroleum sector) with partial disinvestments of government equity in Public Sector Undertakings and other measures. As a consequence thereof, ONGC was re-organized as a limited Company under the Company's Act, 1956 in February 1994.

After the conversion of business of the erstwhile Oil & Natural Gas Commission to that of Oil & Natural Gas Corporation Limited in 1993, the Government disinvested 2 per cent of its shares through competitive bidding. Subsequently, ONGC expanded its equity by another 2 per cent by offering shares to its employees.

During March 1999, ONGC, Indian Oil Corporation (IOC) - a downstream giant and Gas Authority of India Limited (GAIL) - the only gas marketing company, agreed to have cross holding in each other's stock. This paved the way for long-term strategic alliances both for the domestic and overseas business opportunities in the energy value chain, amongst themselves. Consequent to this the Government sold off 10 per cent of its share holding in ONGC to IOC and 2.5 per cent to GAIL. With this, the Government holding in ONGC came down to 84.11percent.

In the year 2002-03, after taking over MRPL from the A V Birla Group, ONGC diversified into the downstream sector. ONGC will soon be entering into the retailing business. ONGC has also entered the global field through its subsidiary, ONGC Videsh Ltd. (OVL). ONGC has made major investments in Vietnam, Sakhalin and Sudan and earned its first hydrocarbon revenue from its investment in Vietnam.



### **7.13 Vision & Mission**

"To be a world-class Oil and Gas Company integrated in energy business with dominant Indian leadership and global presence."

- Dedicated to excellence by leveraging competitive advantages in R&D and Technology with involved people.
- Imbibe high standards of business ethics and organizational values.
- Abiding commitment to safety, health and environment to enrich quality of community life.
- Foster a culture of trust, openness and mutual concern to make working a stimulating and challenging experience for our people.
- Strive for customer delight through quality products and services.

#### **Integrated In Energy Business**

- Focus on domestic and international oil and gas exploration and production business opportunities.
- Provide value linkages in other sectors of energy business.
- Create growth opportunities and maximize shareholder value.

#### **Dominant Indian Leadership**

Retain dominant position in Indian petroleum sector and enhance India's energy availability.



## LEVERAGING IT

### 8.1 Integration Across The Organization

With major expansion plans on the anvil, including a foray into oil retailing, India's most valuable company, ONGC, is **integrating** all its functions under one all-encompassing IT system.

In today's competitive business environment, even the most successful organizations have to build reliable information systems. And the importance of this foundation is not lost on the Oil & Natural Gas Corporation (ONGC), India's most valuable company with a market cap of over Rs 1 lakh crore.

Subir Raha, CMD, ONGC, points out the value of IT to a business: "The differentials in quality of information, and in speed of access to such quality information, make or break your future in business."

Deriving business benefits from IT is not new to ONGC. As far back as 1996, the company undertook **Project Kuber**, wherein it implemented SAP R/3 ERP (Enterprise Resource Planning) system for its **finance function**. Thereafter, in Dec 1999, ONGC started another project, **Project Shramik**, where it deployed SAP for **automation of all HR modules** including **payroll and administration**. Implementation started in mid 2000 and it is expected and went live by mid 2004

But piecemeal implementations such as these were never going to be enough. And Raha, was intent on integrating all the functions of the company under one umbrella. His motto: "**One data, one system**".



IT in Process Automation Case Study ONGC  
But despite the earlier implementations, the company suffered from **lack of availability of *real-time information***. Monthly reports generated were not enough to take forward-looking managerial decisions.

And so was born ***Project ICE (Information for Consolidation and Efficiency)***. A six-month study, undertaken by software major SAP, recommended that all operations and offshore business operations of ONGC be integrated into one, single ERP system. Besides core activities such as drilling, this also sought to include associated activities such as ***mudding and cementing***, which most global energy companies tend to outsource.

Project SCADA is the next major IT initiative, to optimize operations from wellhead to custody-transfer. Like Project ICE, here also the motto *is "One organization-One Data-One Process"*. This also being implemented on turnkey basis, building total commitment in vendor relationship.

## **8.2 ONGC IT ROADMAP**

Since 1997, ONGC has embarked on following IT projects

### **8.2.1 Project KUBER**

#### **Up-gradation of Financial System of ONGC (UFSO)**

Brief: Automation of Finance department

Started: 1997

Live: Mid-1999

ONGC has implemented CO module of SAP R/3, to consolidate its costing data for various activities.

The **CO** module of SAP R/3 supports ***Activity based Costing (ABC)***. Cost Center Accounting is used to determine where costs occur in the organization. Costs are assigned to those organizational sub-areas where the costs occurred and where they may be influenced the most. This posting and assignment of costs not only makes



IT in Process Automation Case Study ONGC  
cost controlling possible, they are also vital steps for the other sub-categories in the SAP R/3 System's Controlling application components (such as cost object accounting).

Energy Costs are Primary costs and as Primary cost elements reflected in the chart of accounts with corresponding general ledger (G/L) accounts in Financial Accounting. Once the Costing reports for the individual Cost centers, starts pouring in Managers in these Costs centers will have accurate data at their disposal to analyze and look for the *deviance in all related cost groups* including energy.

### **8.2.2 Project SHRAMIK**

#### **(System of HR Automation & Management information for Kaizen)**

Brief: Automation of human resources department

Started: Mid-2000

Live: Mid-2004

**SHRAMIK** is a transactional website development project for ONGC HR Department. It has a centralized application and database server. User log in through various location for keying in their transactions. Modules of SWAN integrate with SAP R/3 to provide feedback on financial transactional data. SHRAMIK SWAN includes computerization of four sections of personnel dept viz. *Hospitality, Estate and Housing, Industrial Relations* and *Welfare*.

Site's design was based on MVC architecture and development was done using J2EE elements: JSPs, Servlets, Request Processor, Bean Maager, DataBeans, DAOs, which were deployed on Oracle9iAS.

### **3. Project ICE (Information Consolidation for Efficiency)**

Brief: Automation and Integration of the entire enterprise

Started: October 2002

Live: December 2004



#### 4. Integrated Materials Management System (IMMS)

The scope of this project is to develop systems to integrate purchase and inventory of raw materials across 15 distant locations of ONGC spread all over the country. At each location, a typical store handles about 1,50,000 different items, valued at around Rs.1400 crores.

This project was implemented across 15 locations across India viz – Johrat, Silchar, Sibsagar, Nazira, Agartala, Calcutta, Ankleshwar, Mehsana, Ahmedabad, Rajamundhri, Kariakal, Chennai, Mumbai, Dehradun, and Delhi.

Gateway's involvement covered requirement study, SRS, design, development, preparation of test-cases and test-data, conducting acceptance tests, porting, training and implementation of the software solution at three major locations. All the documentation in this project confirmed to the IEEE Standards. The size of the application was about **400 transactions and 500 reports**.

Duration: 18 months

Technology used: Developer 2000, Oracle

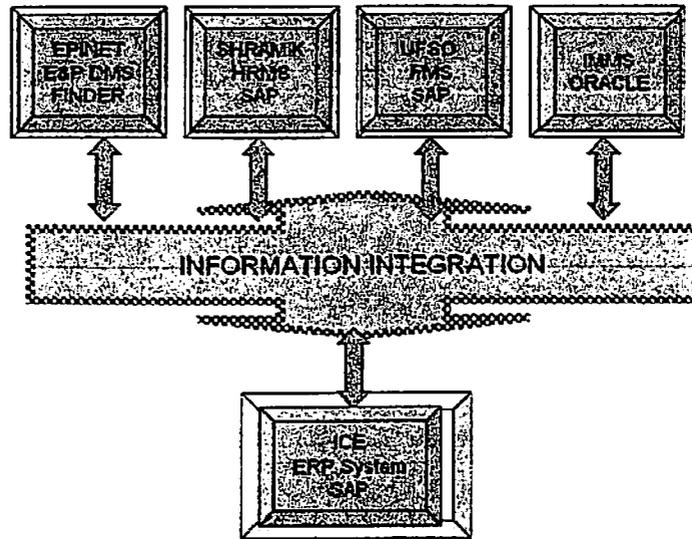


Figure 10: Project ICE integrating all Departments

### ICING ON THE CAKE

This **ICE Project** is aimed at consolidating the IT efforts in the implementation of Enterprise Resource Planning (ERP) package on SAP. The main objectives of this Project are to **optimize** and **automate the business processes** for integrated information availability, availability of information on real time basis and elimination of duplication of activities across business processes by capturing data at source point. The benefits expected out of this Project are better decision support, better operation control and efficient cost management.

**Project ICE** includes the implementation of the entire mySAP business suite, with 26 modules to be implemented across ONGC and its overseas arm, ONGC Videsh Limited (OVL) in a 30-month period. The first phase of the project, started on Oct 22, 2002, went live on Oct 1, 2003. This included 2,500 users in the western offshore business. On April 1, 2004, the western onshore business went live, which added



IT in Process Automation Case Study ONGC  
another 2,000 to 2,500 users. By end-December 2003, all other regions went live, and then **Project Kuber** and **Shramik** were also integrated with it.

After the implementation, ONGC realized that the system was helpful in eliminate redundant data, standardize business processes and facilitate greater managerial control. The investment is estimated at As 100 crore. A. Kaviraj, Executive Director, Corporate Planning & Chief, Project ICE, ONGC, says that's reasonable: *"As 10,000 crore is our total annual budget. If we don't get timely information, even 1 per cent slippage can cost us As 100 crore."*

Besides, with its current drive towards globalization, and plans to rollout its retail initiative within the next three years, ONGC will need its systems to be up to global standards the SAP implementation will go a long way in serving the future business needs of his organization.



Figure 11: First Off The Blocks - The western offshore business division of ONGC was the first to go live in its exhaustive ERP deployment



### 8.2.5 Digital Oil & Gas Fields in ONGC

**Oil and Natural Gas Corporation (ONGC)** has awarded a US\$ 215.35-million contract to Australian company **Clough Engineering** for developing G1-GS15 fields in the Krishna-Godavari offshore for producing 1 million tonnes of low-sulphur crude oil and 6 bcm of natural gas over 15 years.

The development of these two fields will create India's first '**Digital Oil and Gas Field**', incorporating remotely monitored and controlled '**Smart**' wells.

The project is being developed by the company with consultancy from INTEC. Five production wells will be drilled with sub-sea completions and the well-fluids will be transported by dual sub-sea pipelines rising from water depths of 429 m to the processing facilities onshore.

The ONGC board has approved the investment decision on the understanding that the gas produced will be sold at market rates, as this investment is not viable under the prevailing controlled pricing of natural gas.

The mega corporation has decided to invest over Rs 10 billion in hardware and software technology related to its exploration and production businesses, over the next few years.

This includes Rs 1.4 billion in implementing the full suite of enterprise resource planning software like SAP titled Project ICE, which stands for Information Consolidation and Efficiency and another Rs 6 billion in **project Promise**, a communication and control network. The rest of the amount will be spent on **EPNet**, its exploration and production network, being implemented in two phases by Schlumberger.



### 8.3 mySAP ERP Implementation in ONGC

#### Project ICE (Information Consolidation for Efficiency)

##### 8.3.1 Challenge: Transform Business Operations

In 2001 Raha announced plans for “One Organization, One Data, One Information” to integrate data and transform operations. According to Raha, “The ERP package will enable the availability of information on a real-time basis and the elimination of duplicate activities across business processes by capturing data at the source point. This will, in turn, facilitate decision support, better operation control, and efficient cost management.”

To ONGC, *information is as valuable as oil* and sometimes harder to locate. Collation, consolidation, and analysis of operational data was difficult and time-consuming. Raha unveiled Project ICE – Information Consolidation for Efficiency – to achieve global standards in operations and introduce new business processes. It would require retraining thousands of people, all without interrupting daily work that spans 10 countries outside India – from Russia to Venezuela.

By 2005, Raha’s vision was a reality for ONGC’s 36,000-plus employees. The result took shape in less than 30 months – using the mySAP™ Business Suite family of business solutions that enables **automation of business processes** and information sharing **quickly, reliably, and effortlessly**.

##### 8.3.2 New Platform Integrates Existing SAP® Solutions

The cornerstone of Project ICE was a comprehensive implementation of mySAP Business Suite and the SAP for Oil & Gas solution portfolio, including the SAP® Strategic Enterprise Management (SAP SEM®) application, SAP Business Information Warehouse component (part of the SAP NetWeaver® Business Intelligence component), and SAP portal technology (now found in the SAP



IT in Process Automation Case Study ONGC NetWeaver Portal component). The implementation also included other SAP solutions, such as the Collaboration Projects suite, as well as supplier relationship management and upstream oil and gas exploration and production solutions.

Begun in 2002, this enterprise-wide project was designed to **integrate** with existing **SAP financials** and **human resource solutions** used in more than 500 ONGC locations. SAP solutions support ONGC's *exploration, production, maintenance, procurement, finance, payroll, sales, offshore logistics, joint ventures, treasury, and quality management processes, including the monitoring of key performance indicators.*

### **Moving Beyond Paper and Legacy Systems**

ONGC's new computing platform introduced technology to many job functions that had relied on *paper or legacy computing* applications. More than 200 end-to-end, daily business processes were replaced, yielding unparalleled insights into operations, real-time reporting on oil exploration and production, inventory, financial analysis, and accurate and efficiently delivered data.

Solutions had to meet stringent regulatory controls considering its state ownership, yet remain adaptable enough for users throughout the company. Redefinition of work roles and duties meant greater transparency and accountability for expenditures. *Daily and weekly reports replaced quarterly data and facilitated real-time reconciliation.*

### **8.3.3 Ensuring New Procedures Adopted at Remote Sites**

One crucial area was ensuring the adoption of new processes at remote sites, such as offshore drilling platforms and seismic field parties. The project management group quickly grasped the importance of training employees to use the single-window views of daily reporting activities. However, merely shifting existing reports on surveys,



IT in Process Automation Case Study ONGC drilling, and well services to new tools would not be enough; achieving acceptable adoption rates would depend on consistent use and ensuring that workers could not bypass the new tools.

The project management group also excelled in meeting the logistical challenge of connecting hundreds of sites across India even on nomadic drilling rigs and seismic field parties. ***Innovative solutions included secure satellite and radio-based communication network access*** to offshore locations and other remote locations deployed through a tightly coordinated schedule between the ONGC project team and service providers.

### **Improvisation: Key to a Successful Project**

Facing its first deadline just months away, the Project ICE team adapted its methodologies for project management and education to make optimum use of its own personnel, third-party providers, and ONGC staff. Merging technology with an operational understanding of ONGC was critical. ***The first rollout was for 3,000 users in the company's offshore operations centered at Mumbai.*** By the time the project was completed in May 2005, the project team had added other geographical locations and functions to the implementation, making new solutions available to a total of 13,000 users – 65% more than the user base originally planned.

### **8.3.4 Improving Access Across Corporate Network**

Although ONGC had been among the earliest users of **IT solutions**, the company had **some legacy applications that could not be easily integrated** – and an **average ratio of seven people per computer** limited access to the corporate network. Project ICE raised this ratio to an almost **even ratio of one PC per person**.

“A prerequisite for those six people who made do without computers before was training them and making them IT-savvy,” said Jamestin. ***The electronic payment***



IT in Process Automation Case Study ONGC  
**system for vendors or direct payments for employees to their banks was a 'metachange.'** That's a lot of cultural change for someone who now has data entered at one point and has it seamlessly integrated and visible all across the company."

### 8.3.5 Collaboration and Sharing Best Practices

Teaming SAP Consulting project management with ONGC executives produced a combination of **technical expertise and operational knowledge**. Identifying power users in every location to assist with data migration and training helped validate and share best practices. Logistical planning and course scheduling grew more complex as the number of users requiring classroom training expanded to nearly double the initial estimate - at one point requiring 14 classrooms in Mumbai (Bombay) to manage the flow of students.

### 8.3.6 Growing User Acceptance, New Lexicon at Work

The project management team charted the number of users and interactions with various aspects of the new system. Within two months of rollout, usage patterns showed **increasing popularity of the system**, a desired result of the introductory training. Momentum continued to grow, in part because it was easier for users to perform daily work and also because project management had set deadlines for change.

As a result, ONGC benefited from the knowledge transfer. In addition to the knowledge transfer itself, another indicator of the success of the ONGC project was that some of the **key phrases and methodologies introduced by Project ICE** became part of the everyday lexicon at ONGC.



### 8.3.7 Using Built-In Checks to Ensure Compliance

Despite the time and money they invest in new IT platforms, companies often find that employees *inevitably resist change* and often try to find ways to continue daily work without adapting. However, *at ONGC the new solution meant that paper-based contracts and vendor payments were complemented by electronic transactions* workers had to begin using the new system. Also, to ensure *compliance and data integrity*, the project team implemented *built-in checks* to make sure users followed the correct procedures when entering data and identifying themselves.

*For example, in the area of procurement – using SAP business intelligence functionality – the team built in validations to ensure that users could place a purchase order only with an approved requisition and available budget. In addition, the company now sends out payments for purchased products only after invoice verification. Likewise, payments for services are made only after service entries have been completed and the project’s progress has been updated.*

In addition, system design included detailed *transaction monitoring reports*. These reports – for review by the project management team, operations heads at live locations, and members of the executive committee – showed progress of usage and adoption and bottlenecks.

#### **Raising the Visibility of Critical Data**

A key benefit of the new solution is that it creates *high visibility for critical data*. The new solution ensures that critical operational data is available online for all levels of management.

Benefits extend well beyond the bottom line to new capabilities for designing and conducting end-user training, *in-house competencies for mapping new business*



IT in Process Automation Case Study ONGC  
***processes to the SAP system, managing business expectations, managing critical areas during data migration, and the management of post-go-live issues and queries.***

Over the last two years, a lot of expertise has been gained with the new ***knowledge management*** functionalities. ONGC's plant maintenance solution now has a service history and a method of capturing the ***total cost of ownership***. Decisions are made faster and are more informed by data from across the entire organization.

### **Award-Winning Multidisciplinary Team**

Other companies in India and abroad have contacted ONGC project management for reference visits and to seek their views about selecting a solution and how best to implement it. SAP Consulting team's recommendation considers an approach that integrates processes and blends financials, operations, technology, and culture with management responsibility and commitment.

The successful efforts of the Project ICE team have been recognized far beyond the boundaries of the ONGC organization. In fact, the International Project Management Association chose Project ICE as one among the nine finalists for its prestigious International Project Management Award for excellence in project management practices. The award – based on a rigorous, on-site evaluation by experienced assessors drawn from different nations and a cross section of industry and academia – focuses on the project management methodology, practices, and tools adopted in the project.

### **Ready to Explore New Frontiers**

The potent combination of a new business culture supported by a ***new IT tool*** and the flexibility to adopt new business innovations, along with an in-house leadership capability, prepares ONGC to explore new frontiers, including joint ventures



IT in Process Automation Case Study ONGC overseas. ONGC has also implemented the **employee self-service (ESS)** functionality of the **mySAP ERP solution**, thereby expanding it to reach to cover 36,000 users, making it one of the **largest ESS implementation in India**. ESS christened "**SAMPARC**," meaning "**connect**" facilitates employees to **apply for leave, submit their claims, and view their payment details online**. For ONGC, SAP solutions have equipped the world's second-largest oil exploration and production company with the reliable, available data it needs to manage the magnitude of the 21st century challenges it will face.

## **Project HIGHLIGHTS**

### **Implementation Partner**

SAP Consulting organization

### **Existing Environment**

PC-based legacy system for material management, project monitoring, and maintenance planning

### **Database**

Oracle

**Hardware** HP, Compaq, IBM, and Sun

**Operating System** Microsoft Windows NT, Sun Solaris, and UNIX



## 8.4 ONGC's Communication Networks

**8.4.1 ICNET** is a voice and data network, based on satellite and digital microwave communication to provide an information highway to all enterprise-wide IT systems, viz, **IMMS**, **UFSO**, **EPINET**, **SHRAMIK** etc covering 21 onshore locations, including existing 8 **satellite earth stations (SESSs)** of telnet. One transponder (33 MHz) has been hired on INSAT-2DT satellite. The Project uses bandwidth efficient **DAMA (Demand Assigned Multiple Access)** SCPC technology for voice, with **Network Management System) NMS** at URAN and **PAMA (Permanent Assigned Multiple Access)** for Data channels, which has flexibility to operate at programmable data rates from 9600 bps to 2 Mbps. The BER (Bit Error Rate) achieved on daat channels is of the order of 1 in 109 bits and the links are very stable.

### **EPINET (Exploration and Production Information Networking project)**

- Distributed databases involving 18 servers
- A 3-Tier database approach for data flow:
  - Field level: Asset/Forward Base Database
  - Regional level: Basin Database
  - Corporate level: Corporate
- Covers Well, Production, Drilling, Seismic, Logging & Physical Asset data utilizing
  - Online Master Database
  - Log Archival Database
  - Seismic Archival Database



### **Softwares**

- FINDER
- LOGDB
- SEISDB
- DRILLDB
- ASSETDB
- GEOFRAME GEOLOGY
- GEOFRAME PETROPHYSICS
- DECISION POINT DATA ACCESS

### **EPINET- Salient Features**

- Client-Server computing environment
- User friendly database application S/W
- POSC compliant data model
- Extensive GUI capabilities
- Fast data communication Network
- Concurrent data accessibility
- Multilevel data security
- Integration with Seismic & Asset database

### **Physical Gains & Cost Benefits**

- Common E&P Data Model throughout ONGC.
- Time saving in interpretation projects
- Improved integrated interpretation
- Faster & focused decision making
- Reduced exploration risk & cost
- Avoidance of data degradation
- Intellectual gains in terms of data management skills
- Uniform techno-economic evaluation, forecasting, prioritization

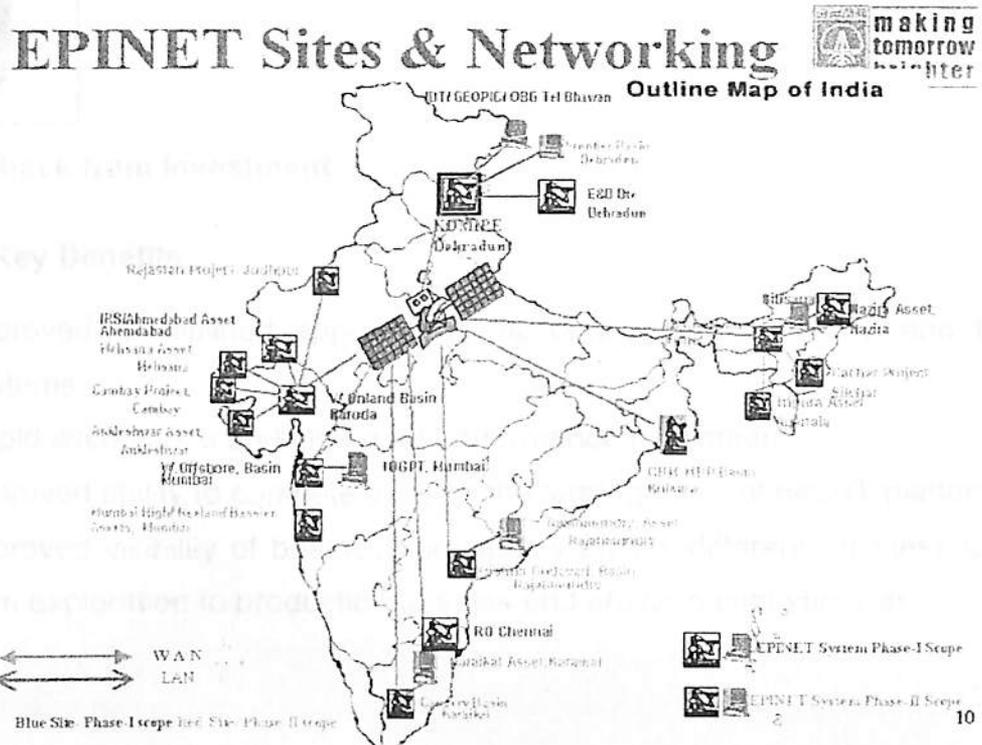


Figure 12: EPINET Sites & Networking all over India

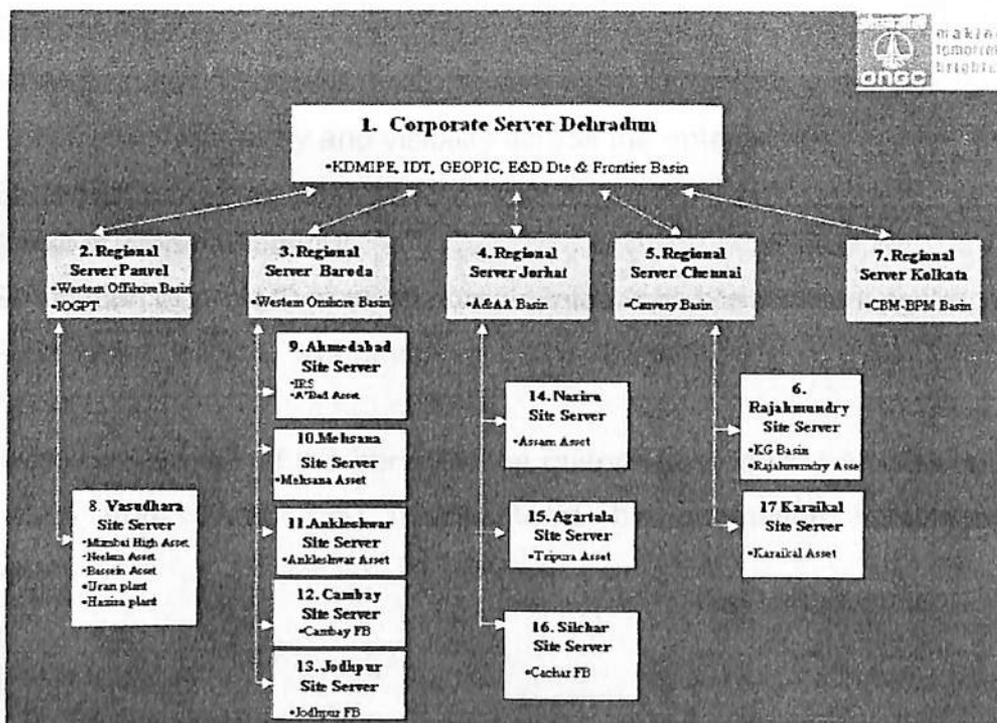
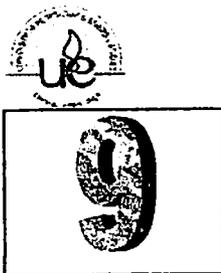


Figure 13: Corporate Server Dehradun connected with all servers from all over India



## High Payback from Investment

### 9.1 ERP Key Benefits

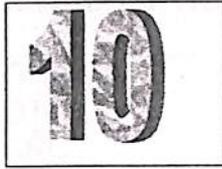
- Improved, disciplined approach to accounting, procurement, and financial systems.
- Rapid acceptance and improved performance by workers
- Improved ability to compete through the strategic use of new IT platform
- Improved visibility of business processes across different business functions from exploration to production to sales and offshore joint ventures

### 9.2 Other IT benefits

ONGC's has realized the following benefits from IT projects.

- Elimination of redundant data
- Standardization of business processes
- Single point data entry and visibility across the enterprise
- Easier corporate consolidation
- Better managerial control
- Elimination of need to manually create interfaces b/w different systems.
- Faster adoption to IT systems as per future needs

To cite but one example of the benefits, the materials code list has been reduced by **nearly 80%** from some 1.40 million items by eliminating redundancies and duplications.



### **Conclusion & Future Scenario**

Business in the 21st century is complex, fluid and customer-centric. It requires stringent, yet flexible processes and communications systems that extend globally and respond instantaneously. The processes and systems must be integrated. No part of the enterprise can escape the pressure to deliver measurable results.

Integration has become the big issue. Knowledge within a majority of organizations currently resides in silos that are maintained by a select few, without the ability to be shared across the organization. Today's business leaders need information to be more readily accessible. They want real-time views into their businesses so that decisions can be made when they need to be, without the added time of tracking data and generating reports. Managers want to monitor key metrics in real-time to actively track the health of their business.

ONGC has taken up major information management initiatives not only in **exploration and production domains**, but also in **supporting functions** i.e. **material management, HRD & finance systems**.

Considering ONGC as the case study for Dissertation there was a huge scope of learning and study. ONGC Efficiently using **Information Technology tools** and solutions to **Integrate and automate their business processes** so as to compete with the increase complexity of E&P business.

***"IT will continue to pave the path for success"***



**ABBREVIATIONS**

ONGC LTD	Oil and Natural Gas Corporation Limited
OTP	Organization Transformation Project
CRC	Corporate Rejuvenation Campaign
ICE	Information Consolidation for Efficiency
SAP	System Application and Product in DATA Processing
IMPETUS	Implementing Maintenance and Procurement Efforts Through Upgraded System
PROMISE	Professional Review of Major Info-com System and Equipment
MMS	Integrated Material Management System
SHRAMIK	System of Human Resource Automated Management Information for Kaizen
EPINET	Exploration and Production Information Network
IINS	Integrated Internet Services
MDT	Multi Disciplinary Team.
NELP	New Exploration Licensing Policy
OISD	Oil Industry Safety Directorate
HSE	Health Safety Environment
IERS	International Environment Rating System
IQRS	International Quality Rating System
ISRS	International Safety Rating System
OISD	Oil Industry Safety Directorate
DGMS	Director-General of Mines Safety
BDP	Book of Delicate Power
BEC	Bid Evaluation Criteria
PBC	Pre-Bid Conference
TC	Tender Committee
ED	Excise Duty
CST	Central Sales Tax
CD	Customs Duty
EMD	Earnest Money Deposit
LPG	Liquefied Petroleum Gas
LNG	Liquefied Natural Gas
NCG	Natural Compressed Gas
CBM	Coal Bed Methane
EOR	Enhanced Oil Recovery
VAP	Value Added Product
EBT	Energy Business Technology
GGG	Group Gathering Station
CTF	Central Tank Farm
GCS	Gas Collecting Station
EPS	Early Production System
SAE	Society of Automotive Engineer



## IT in Process Automation Case Study ONGC

API	American Petroleum Institute
NPT	National Pipe Thread
FPR	First Person Responsible
IMO	International Marine Organization
EPA	Environmental Protection Agency
PCRA	Petroleum Conservation Research Agency
SWOT	S-strengths, W- weaknesses, O- opportunities, Threats
E-MAIL	Electronic-mail
EDP	Electronic Data Processing
ISI	Indian Standard Institute
LBG	Liberalization, Globalization and Privatization
ISO	International Organization for Standardization
SMP	School of Maintenance Practice
IMD	Institute of Management Development
IDT	Institute of Drilling Technology
IPT	Institute of Oil and Gas Production Technology
IEOT	Institute of Engineering and Ocean Technology
MMT	Million Metric Tonnes
BCM	Billion Cubic Metres
IRS	Institute of Reservoir Studies
OCC	Oil Coordination Committee
IPSEM	Institute of Petroleum Safety and Environment Management



## **Bibliography**

### **Books**

- ONGC Annual Report 2002-2003
- Business Line Internet Edition - Financial Daily from THE HINDU group of publications
- World Energy Council 18th Congress, Buenos Aires, October 2001
- Business Today, March 2004
- SAP All in One solution For Oil & Gas Industry 2005-06 India Summit : pdf

### **Web Sources**

- [www.exactamerica.com](http://www.exactamerica.com)
- [www.indiabudget.nic.in/es99-2000/chap77.pdf](http://www.indiabudget.nic.in/es99-2000/chap77.pdf)
- [www.gipi.org.in/state\\_policy/action\\_plan\\_1.pdf](http://www.gipi.org.in/state_policy/action_plan_1.pdf)
- [www.dst.gov.in/about\\_us/ar04-05abbreviations.htm](http://www.dst.gov.in/about_us/ar04-05abbreviations.htm)
- [www.indiatodayconclave.com/sponsor.htm](http://www.indiatodayconclave.com/sponsor.htm)
- [www.microsoft.com/resources/energy](http://www.microsoft.com/resources/energy)
- [www.microsoft.com/sharepoint](http://www.microsoft.com/sharepoint)
- [www.patni.com](http://www.patni.com)
- [www.itpaper.com](http://www.itpaper.com)
- [www.techrepublic.com](http://www.techrepublic.com)
- [www.ongcreport.org](http://www.ongcreport.org)
- [www.relevant.com](http://www.relevant.com) Relevant Business Systems CA
- [www.sap.com/contacts.ap](http://www.sap.com/contacts.ap)
- [www.ongcindia.com](http://www.ongcindia.com)
- [www.hp.com/go/manufacturing](http://www.hp.com/go/manufacturing)
- [www.erpwhitepapers.com](http://www.erpwhitepapers.com)
- [www.posc.org/news/release20011010.html](http://www.posc.org/news/release20011010.html)
- [www2.standardandpoors.com/spf/pdf/media/CRISIL\\_Overallsectimpact.pdf](http://www2.standardandpoors.com/spf/pdf/media/CRISIL_Overallsectimpact.pdf)