

Information Technology Cell

highlights

The use and application of Information Technology has been a continuous pursuit of the Government. The computerisation in IBM can be traced back to 1970's, when small punch card system in the Mineral Statistics Section, then under the Mineral Economics Division

Existing database modules of the former Mineral Resources Information System were modified and a new system called "Technical Management Information System" (TMIS) was developed.

TMIS Computer Centre works under the supervision of the Chief Controller of Mines. It caters to requirements of all the users at headquarters, regional and zonal offices by developing applications and providing support.

7.5 INFORMATION TECHNOLOGY CELL

7.5.1 Background

The use and application of Information Technology has been a continuous pursuit of the Government. The computerisation in IBM can be traced back to 1970s, when small punch card system in the Mineral Statistics Section, then under the Mineral Economics Division was put into use. When the Mineral Statistics Division was carved out of Mineral Economics Division, a small computer unit was created with two officers and 3-4 Technical Assistants. From this small beginning, the IBM went on to develop six databases — the National Mineral Inventory (NMI), Mining Lease (ML), Mine-cum-Production (MCP), External Trade (ET), Mineral Consumption (MC) and World Mineral Intelligence (WMI).

7.5.2 Development of MRIS and TMIS Database

Under the Indo-French Working Group on Mineral Exploration and Development of the Indo-French Joint Committee on Economic and Technical Cooperation, BRGM France integrated the six databases under a Mineral Resources Information System (MRIS) using the Relational Database Management System supported by Oracle version 6. This activity was completed in November 1998. Simultaneously, a small unit was created under the Mineral Map cell for preparation of mineral maps using a 486 Computer Desktop machine with windows 3.2 Operating System and Microstation-95 software capable of working in GIS environment. Also, computerisation of the activities of the MCCM Division was carried out again as an outcome of the Indo-French Working Group on Mineral Exploration and Development of the Indo-French Joint Committee on Economic and Technical Cooperation in collaboration with BRGM, France. The MCCM module was designed and developed as per provisions of Mineral Conservation & Development Rules, 1988. Existing database modules of the former MRIS were modified and a new system called "Technical Management Information System" (TMIS) was developed. The new system facilitated data capture at source, i.e., at Regional/Zonal Offices of IBM, then data is aggregated in the zonal server and finally imported into the national server at IBM CHQ (pictorial representation of three-tier system of data transmission under the TMIS project is depicted in Figure 7.16. However, this system could not be completely put into operation.

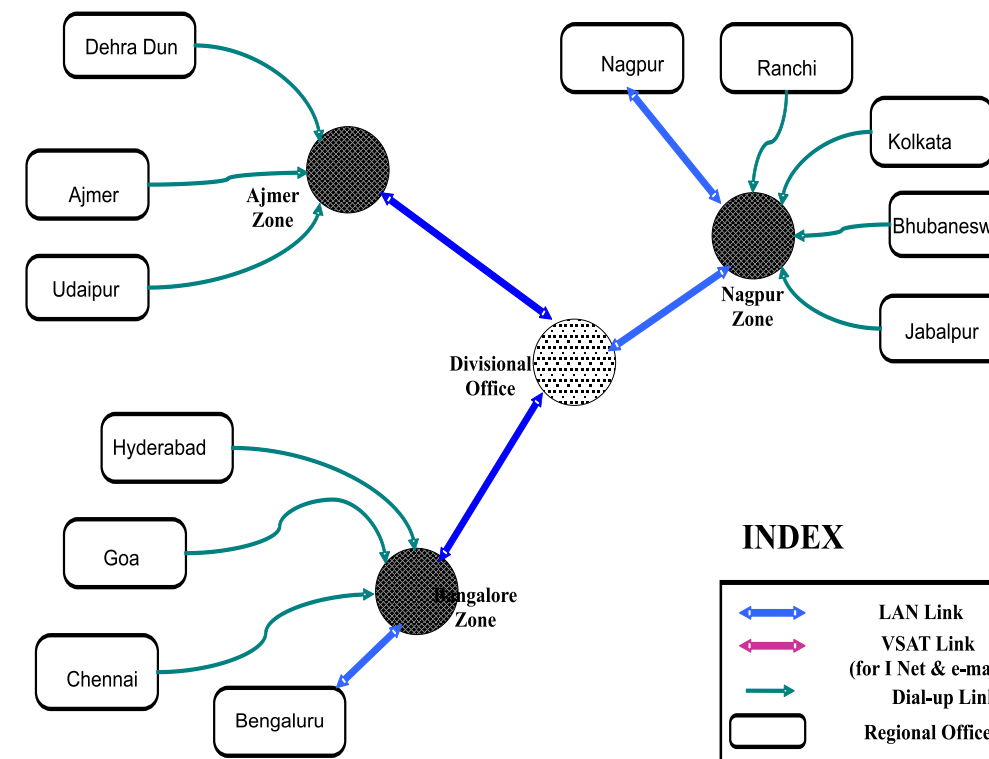


Figure 7.16 : Three-tier Network Under TMIS

7.5.3 Existing IT Scenario in IBM

TMIS Computer Centre works under the supervision of the Chief Controller of Mines. It caters to requirements of all the users at headquarters, regional and zonal offices by developing applications and providing support. In developing the seven database modules as described earlier, the Unit has done commendable work over the years. It is manned by a small group of IBM personnel with IT skills from the Mining Engineering and Geology disciplines.

Table 7.8 : Database Modules in IBM

- **NMI Module:** The National Mineral Inventory (NMI) module provides information pertaining to mineral resources of freehold and leasehold areas as per the United Nations Framework Classification (UNFC). This module contains data pertaining to 16,480 deposits of various mineral commodities and the information is used for planning at national level. The data in respect of freehold deposits is available for sale.
- **ML Module:** The Mining Lease (ML) module is used to store data pertaining to mining lease and prospecting licences granted by the State Governments. This





module contains information on 15780 Mining Leases and Prospecting Licences. The information from this module is used for coordination and planning at national level.

- **MCCM Module:** The Mines Control & Conservation of Minerals (MCCM) module was designed to store the data generated by the Inspecting Wing of IBM. The data entry in this module is carried out in all Regional and Zonal Offices of IBM and finally consolidated in national server at IBM Central Headquarters. This database is mainly developed to monitor the activities of MCCM Division which is also the main function of IBM viz. conservation and systematic development of mineral resources of the country and protection of environment in mining lease area.
- **MCP Module:** The Mines-cum-Production (MCP) module is used for storing data received by IBM on statutory basis through the monthly and annual returns submitted by the mine owners under the MCDR, 1988. This module contains information on mineral production in the country for over 10 years. The information from this module is published in the prestigious publication of IBM i.e. Indian Minerals Yearbook and forms the basis for calculation of royalty rates, etc.
- **MC Module:** Mineral Consumption (MC) module is designed to store the information regarding consumption of minerals in various mineral-based industries or end-users. The information pertaining to this database is compiled on non-statutory basis by sending questionnaires to various mineral-based industries. Information pertaining to 1536 plants is stored in this database. The information from this database is useful in identifying the trends in consumption of mineral raw material and in planning related activities.
- **ET Module:** The External Trade (ET) module serves towards the maintenance of database on export and import of minerals, metals and their products. The time series information received from the Director General of Commercial Intelligence & Statistics (DGCI&S), Kolkata covers 1004 items. The data is regrouped into 200 commodity groups to suit the need of Ministry of Mines. The information from this database is also published in IMYB.
- **WMI Module:** This is the new database included in the MRIS project. It contains information on foreign trade, mineral production, consumption, mineral resources of various countries. The package and set of data for this database was initially supplied by BRGM. WMI database includes commodity name, country, exports, imports, prices, production, consumption, reserves, resources, beneficiation plant, source of information, etc. The information from this database is useful in knowing the potential of other countries in the Mining Sector and framing policies for our country.
- **IBM Module:** The IBM module is designed to store the data of common nature — data which is common to all the remaining database modules and is utilised as lexicons.

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The Mines Control & Conservation of Minerals (MCCM) module was designed to store the data generated by the inspecting wing of IBM.

The Mines-cum-Production (MCP) module is used for storing data received by IBM on statutory basis.

Mineral Consumption (MC) module is designed to store information regarding consumption of minerals.

The External Trade (ET) module serves towards the maintenance of database on export and import of minerals, metals and their products.

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Table 7.9 : IT Infrastructure in IBM

- **Infrastructure available at Regional Offices**
 - Windows NT Server, Oracle database server version 8.05
 - Desktop machines with Windows XP Operating System and Oracle client software
 - Local Area Network (LAN)
 - Leased Line connectivity in case of Ajmer, Bengaluru, Hyderabad and Kolkata Regional Offices and LAN connectivity at Nagpur Regional Office
 - **Infrastructure available at Zonal Offices**
 - Windows NT Server, Oracle database server version 8.05
 - Desktop machines with Windows XP Operating System and Oracle client software
 - Leased Line connectivity in case of Ajmer and Bengaluru Zonal Offices and LAN connectivity at Zonal Office in Nagpur
 - **Infrastructure available at IBM Central Headquarters**
 - Linux Redhat server
 - Internet server
 - Mail server
 - Oracle database server version 10g on Linux Redhat platform
 - Client machines with Windows XP Operating System
 - Oracle client software loaded on each client machine
 - Local Area Network (LAN)
 - Wide Area Network through Lease Lines and VSAT for connecting the Regional and Zonal Offices at Ajmer and Bengaluru, Regional Offices at Hyderabad, Kolkata and Sub-regional Office at Guwahati
- Database Administration like backup and recovery, export/import, etc., are performed by the in-house manpower.

7.5.4 Concerns on the IT infrastructure in IBM

As one of the sub-systems of National Information System of Science & Technology (NISSAT), IBM is the custodian of all the information on mines and minerals. As a regulator, the use of IT is crucial to IBM to facilitate better monitoring of the performance of various mineral concession holders apart from streamlining administrative processes. The use of IT also enables wider dissemination of information to the Mining Industry. Therefore, it is necessary to strengthen the IT Wing of IBM. Computerisation with web-based detailed workflow applications along with sufficient provisions for user's right needs to be created. The Committee in its reviews of the IT infrastructure, observed some issues that need to be addressed immediately. These concerns along with the recommendations of the Committee are given below:

7.5.4.1 Data Collection

IBM receives information through statutory returns, non-statutory returns and independent surveys. The Committee observed that at present the data is collected



physically in hard copy in various formats. There is no mechanism for IBM to receive the data online. The present system requires manpower to physically enter data. The data so entered may also not be available in a standard format. This often resulted in delay in data analysis and publication of reports.

Hence, there is an immediate need for setting up a portal for IBM which would allow interactive online facilities including filing of statutory returns. The filing of statutory data would need to be monitored by Regional Offices. The hitherto non-statutory data like mineral consumption by the industries, data on export-import of minerals and metals should be made statutory. Such data should be given the status of core statistics and non-statutory and survey data would be monitored directly by the concerned Division in the Headquarters.

The Committee also recommends that IBM should clearly specify the type of data it would receive in electronic form, e.g. textual data to be received only in pdf format etc. In order to facilitate small mine owners to file their returns online, the Committee recommends that IBM should conduct workshops to educate them. At the Divisional level, the Committee recommends suitable deployment of Data Entry operators to handle the non-statutory/survey data.

7.5.4.2 Interlinking of Various Database Modules

The Committee observed that at present there are two broad streams of database systems — the Mineral Resource Intelligence System (MRIS) and the MCCM database. The MRIS consists of smaller database systems like NMI, ML, MCP, MC, ET and WMI that are operated from IBM headquarters. The MCCM system operates from the Regional Office, and the data flows to the Headquarters from the Zonal Office. There is limited connectivity between these databases and only NMI, ML, MCP and MCCM databases have some linkage. This hampers not only universal accessibility of databases, but also limits co-relational analysis. The Committee recommends that all the existing databases would need to be interlinked, if possible, failing which a new set of database should be created and the existing database should be linked as archives.

7.5.4.3 Quality of Data

The Committee observed that the quality of data entered into the database systems is monitored only for the purposes of MCCM and for the purposes of preparation of the National Mineral Inventory, which is presently once-in-five-years exercise. There is considerable scope for improvement through regular crosscheck of data, and by establishing mechanism for sample check or audit of data. This would also facilitate timely data analysis. The Committee recommends that the job of ensuring quality of statutory data would entirely be of the Divisional Office. In case of discrepancy, a reference would be made back to the RCOM in-charge to issue a violation letter. In case of non-statutory data and survey data, IBM headquarters would verify the data individually from source agency.

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The Committee recommends that IBM should make available all its publications on its web portal and should also post on its website links to important publications so that other agencies in the Mineral Sector, i.e. GSI, State Directorate of Mining & Geology and Industry Associations could access them.

IBM should also provide details of important Court Judgments on matters pertaining to mining on its web portal.

7.5.4.4 Data Outputs

IBM currently disseminates information collected on statutory, non-statutory basis and independent surveys, through various publications like Indian Minerals Yearbook and other publications under different series. The Committee, however, observed that none of this data is available online. This, it was felt, limited the circulation of information. Globally, the trend is to post information on Mineral Sector online to attract investors. There is a need to attract investments into Mining Sector in India, and so the Committee recommends that IBM should make available all its publications on the web portal of IBM for downloading free of cost to registered users (registration would also be free of cost). Along with this IBM should also post on its website, links to important publications by other agencies in the mineral sector, i.e. GSI, State Directorate of Mining and Geology, and Industry Associations.

7.5.4.5 Dissemination of Other Information on Mineral Sector

The information on the R&D activity in the field of ore beneficiation needs to be disseminated adequately. Similarly, there is a dearth of information on the R&D activity carried out by other National and Regional laboratories. The Committee is of the opinion that metadata pertaining to these R&D activities needs to be posted on the web portal of IBM. Similarly, IBM should also provide details of important Court Judgments on matters pertaining to mining on its web portal. The Committee also noticed that the Central Library of IBM is equipped with a large number of publications and books pertaining to Mining Sector. Some of these publications are rare. In order to increase the accessibility of these books to general public, the Committee recommends that IBM host metadata on reference material available in its library on its web portal.

7.5.4.6 Online Computerized Register of Mining Tenement System

The National Mineral Policy states that in coordination with Geological Survey of India, Indian Bureau of Mines will maintain a database in digitised form comprising both a Resource Inventory and a Tenement Registry. The policy further stated that the Tenement Registry should give information of both Leasehold Areas as well as Freehold Areas in terms of green field, brown field and relinquished areas including areas given up by the GSI and other RP/PL holders as not pursued. The data should be maintained online giving instant information to prospective investors on what is available for reconnaissance, prospecting and mining. Summaries of work done by public agencies will be maintained in the form of metadata in the public domain and detailed reports will be made available to interested investors on cost recovery basis.

Even as IBM undertakes the project on 'Computerised Online Register of Mining Tenement System' (MTS), the Committee is also of the opinion that MTS is essential for efficient regulation of the Mineral Sector. The Committee, therefore, recommends that IBM should develop the software for MTS in order to maintain



uniformity and compatibility of the systems in the country. IBM would be responsible to develop all India spatial and non-spatial databases for use in the Mineral Sector in the national Tenement Registry.

7.5.4.7 Upgradation of ICT Infrastructure for IBM

The Committee observed that the existing hardware infrastructure of IBM is outdated in terms of technology and storage capacity. The computer system and the technology are obsolete affecting the performance of IBM. Capacity of existing machines in IBM needs to be enhanced. The Committee is of the opinion that with revised role of IBM, the following capacity enhancement is necessary:

- Setting up of data centre with state-of-the-art infrastructure in terms of servers & client machines, database, application, web, email and GIS servers, and other peripheral devices.
- Setting up of Local Area Network (LAN) at all the Regional/Zonal Offices of IBM using latest communication equipment.
- Providing high speed connectivity for all the Regional/Zonal Offices of IBM and CHQ.
- Setting up of disaster recovery site in another city, to ensure 24x7 availability and to minimize the chances of data loss.
- Securing IT infrastructure as per requirements of web services by setting up of gateway, firewalls etc.
- Requirement of IT manpower to manage the IT infrastructure and for application development and maintenance. It is essential to provide uninterrupted services and dissemination of information on continuous basis.

7.5.4.8 Maintenance Team in IBM

The Committee observed that a team of six officers was trained by BRGM under the TMIS project in the field of Database Administration and Application Development. This team, at the TMIS centre based in IBM headquarters, is presently responsible for development & maintenance of database. The team develops specialised applications and supports the Regional/Zonal Offices. It also help retrieve database in case of crash. From this team, one officer has retired and two other officers have been transferred. The Committee is of the opinion that a core team is necessary, and it should not only consist of Mining Engineers/Geologists trained in IT, but also IT professionals. The Committee recommends that the possibility of hiring these professionals on contract basis through the NIC could be considered taking into account the high attrition rate in the IT sector. The main role of such IT team would be to act as an interface between the IBM and outsourced companies providing IT services and solutions; to conceptualise, plan and develop IT infrastructure in IBM, including:

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- Setting up of state-of-the-art data centre with disaster recovery site;
- Setting up of LAN and WAN with high speed connectivity;
- Management of IT infrastructure;
- Assessing the IT requirement and prioritising areas for IT induction;
- IT Project Management

To perform the various IT-related functions, the Committee recommends setting up of an 'IT cell' in IBM with dedicated team of IT professionals. The IT persons should also be deployed in the Regional and Zonal Offices. The Committee also recommends that apart from handling of IT projects, the IT Cell should also collaborate with academic institutes/research institutes/IT companies to develop new IT based methods of mineral administration.

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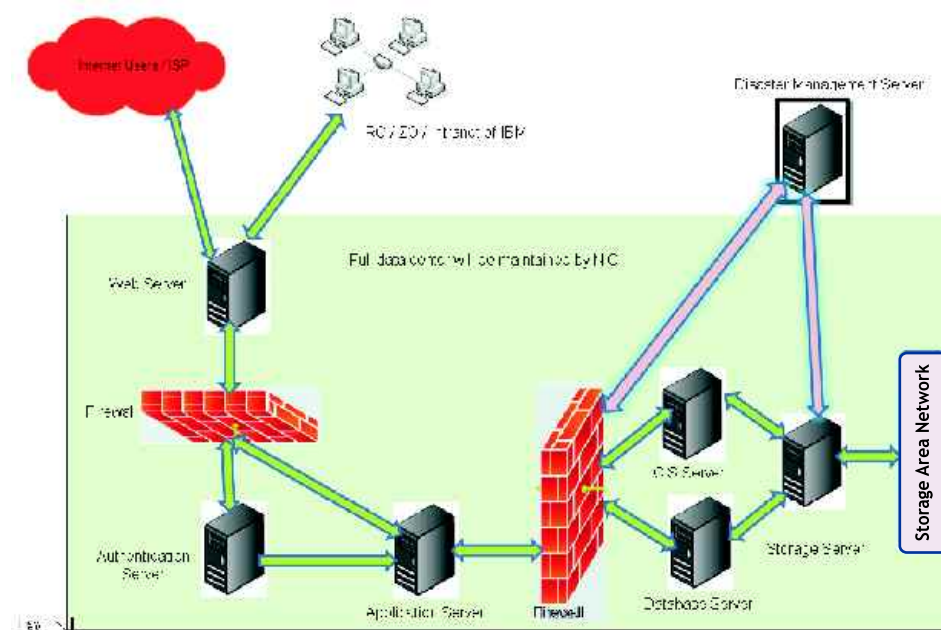


Figure 7.17 : Proposed Structure of Data Flow in IBM