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# Technology Proposal for a Management Information System for the Director's Office

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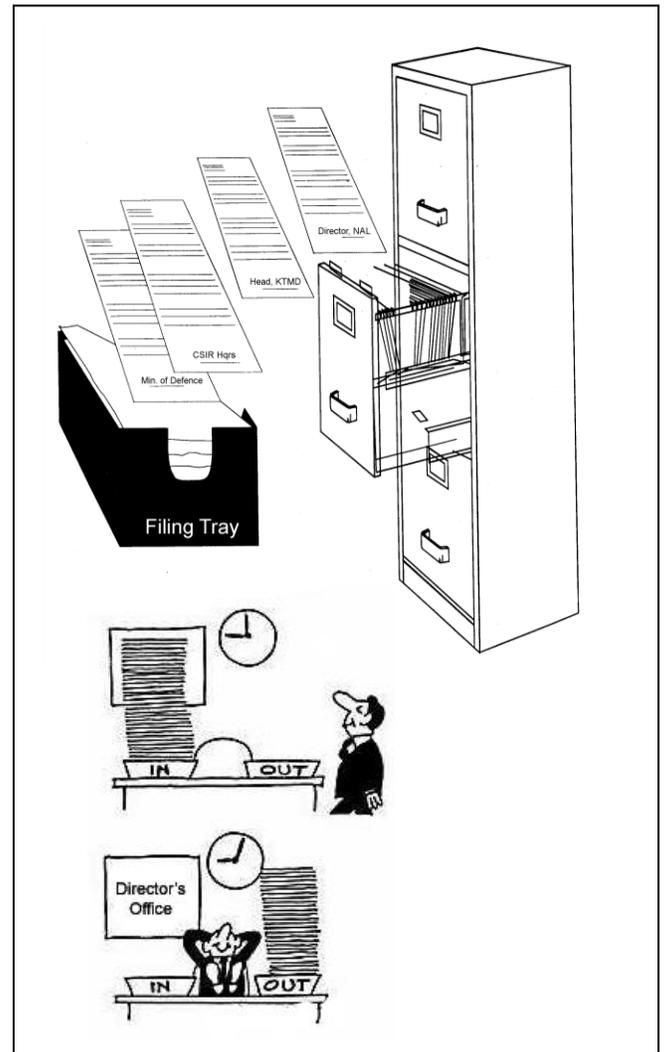
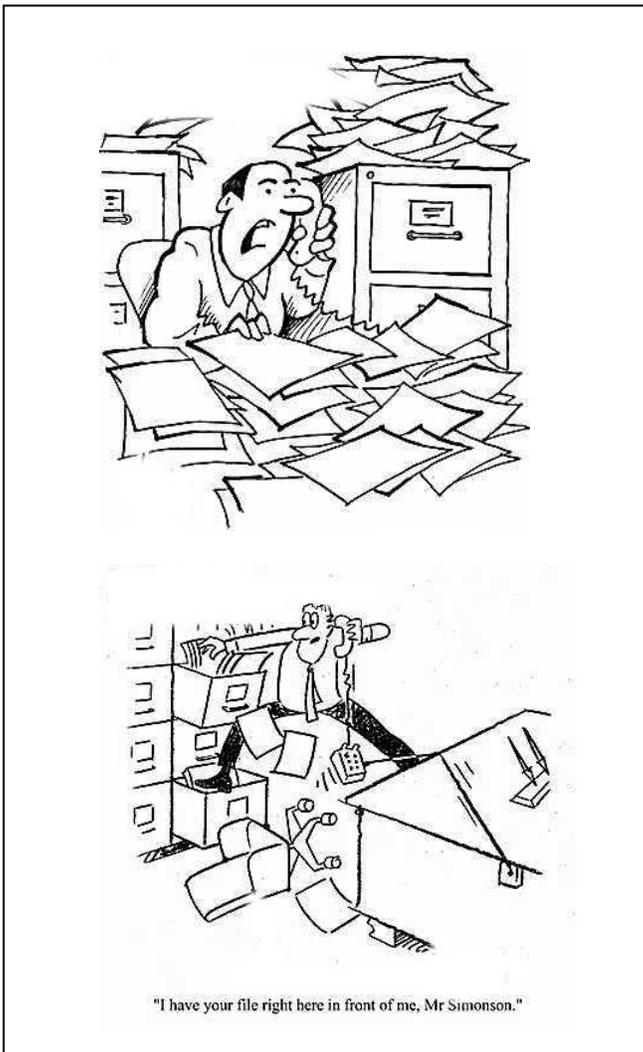
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# A Technology Proposal

## Management Information System for the Director's Office

By

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PRE - IMS

November 2008

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# **A Technology Proposal**

## **A Management Information System for the Director's Office, NAL**

### **/1/ Introduction:**

In today's IT scenario, an organization's success greatly depends on its ability to get accurate and timely data on its operations of varied nature and to manage this data effectively to guide its activities. There is tremendous flow of information or data both within and from outside the organization. The amount of data available to us is exploding by leaps and bounds, *and the value of the data as an organizational asset is being* widely recognized. If the organization does not have the ability to manage and store this vast volume of data, and to quickly retrieve the required information that is most relevant to a given query, then this data tends to become a distraction and liability, rather than an asset. This irony drives the need for an increasingly powerful and flexible *Information Management System*. Although data are the key ingredients used to generate information, not all data provide relevant and timely information. As a consequence, sheer volume of data can be a burden to the organization if it is not processed with clear-cut objectives in mind. To get the most out of this large and complex data sets, users must have the right tools that simplify the tasks of managing the data and extracting useful information in a timely fashion using an effective and efficient user-oriented information system.

To cater to the information needs of an organization, information systems are developed and deployed to gather and process data in ways that produce a variety of information for the users. In a nutshell, any information system can be defined as "an conglomeration of people, machines, ideas, activities and applications that gathers and processes data in a manner that will meet the formal information requirements of an organization. Its purpose is to satisfy the information requirements, accounting and routine operational needs; planning, controlling and decision-making needs of all the levels of management.

Management Information System (MIS), sometimes referred to as Information Management and Systems, is the discipline covering the application of people, technologies, and procedures — collectively called information systems — to solving business problems. Management Information Systems are distinct from regular information systems in that they are used to analyze other information systems applied in operational activities in the organization. Academically, the term is commonly used to refer to the group of information management methods tied to the automation or support of human decision making, e.g. Decision Support Systems, Expert systems, and Executive information systems.

To design and develop such an optimum information system for an organization, it is necessary to identify, analyze and assess the information requirements of the organization and then design, develop and deploy the optimum system.

Once the information system is in place, it will require modifications and improvement from time to time, to meet the ever-changing conditions. As the organizations grow and change and pressures for more information increase, there will be an ever-increasing need for information systems analysts to develop highly cost-effective information systems.

The information that gets generated from such well-defined and functional information systems reflects not only the internal functioning of the organization but also its competitive actions, environmental and sociological interests and financial trends. Infact, any information system must represent *what has happened, what is happening* and, perhaps, most importantly *what will happen*.

Such a well defined Information System is the '*true wealth*' of an organization and this '*Kohinoor*' must be carefully safeguarded at any cost.

## **/2/ What is an Information Management System?**

'Management Information Systems (MIS) are connoted in different ways. Some MIS experts call it 'Information Processing Systems', some prefer to call it 'Organizational Information System, some just prefer it to say it as 'Information System'.

MIS can also be defined as an integrated, user-machine system for providing information to support operations, management, and decision-making functions in an organization. The system utilizes computer hardware and software, manual procedures, models for analysis planning, control and decision-making, and a database. It provides the management with the information it requires to monitor progress, measure performance, detect trends, evaluate alternatives, and make decisions and to take corrective action. One could call it a very highly organized combination of personnel, computers, equipment and facilities, performing data storage and retrieval, data processing, transmission and display, all in response to the needs of the decision makers.

**MIS** in a nutshell, can be defined as a system that:

- (a) provides information to support managerial functions like planning, organizing, directing and controlling.
- (b) Collects information in a systematic manner and a routine manner which is in accordance with a well defined set of rules.
- (c) Includes files, hardware, software and operations research models of processing, storing, retrieving and transmitting information to the users.

**A good and effective MIS basically meets the following Objectives:**

- (a) Facilitates the decision making process by furnishing information in the proper time frame. Hence, helps the decision maker to select the best course of action.
- (b) Provides requisite information at each level of management to carry out their functions.

- (c) Helps in highlighting the critical factors to be closely monitored for successful functioning of the organization.
- (d) Supports decision-making in both structured and unstructured problem environments.
- (d) Provide a system of people, computers, procedures, interactive query facilities, documents for collecting, storing, retrieving and transmitting information to the users.

The **Role of MIS**, in an organization cannot be undermined. *Its role in an organization can be compared to the role of the heart in the body.* One can say that the **Information** is the blood and **MIS** is the heart. In the human body, the heart plays the role of supplying pure blood to all the elements of the body including the brain. The heart works faster and supplies more blood when needed. It fulfills the needs of blood supply to the human body in the normal course and also in crisis situations.

**MIS** plays exactly the same role in an organization. The system ensures that unstructured data is collected from various sources, processed and sent further to all the needy destinations. MIS satisfies diverse needs through a variety of systems such as query systems, analysis systems, modeling systems and decision support systems. MIS also greatly helps in strategic planning, management control, operational control and transaction processing. Basically, MIS satisfies all the three levels of management, namely:

(a) **The Junior management or the lower management level:** MIS helps in providing operational data for planning, scheduling, controlling and further helps them in decision making.

(b) **The Middle Management:** It helps in short term planning, target setting and controlling the business functions.

(c) **The Top Management:** It helps them in goal setting, strategic planning and also evolving the business plans in addition to their implementation.

In a nutshell, MIS plays the role of information generation, communication, problem identification and helps in the process of decision making.

### **Limitations of MIS**

- (a) MIS cannot replace managerial judgements in decision making. It is merely an effective tool for the managers in decision making and problem solving.
- (b) The quality of output of MIS is directly proportional to the quality of input and processes.
- (c) Cannot provide tailor made information packages. It is required to analyse the available information before decision making.
- (d) MIS takes only quantitative factors into account.
- (e) MIS is less useful for making non-programmed decisions.
- (f) MIS is less effective in organizations where information is not being shared with others.

- (g) MIS is less effective due to frequent changes in top management, organizational structure and operational staff.

The design of MIS and the various approaches for MIS development are described in **Annexure – VIII**.

### **/3/ The Director's Office and the Director's Secretariat.**

The head of the Director's Office is none other than the Director of the Institution. Presently, Dr A R Upadhyya holds the position of the Director, National Aerospace Laboratories, Bangalore. The running of the Director's Office is ably supported (apart from its administrative and technical staff) by the Director's Secretariat. The Director's Secretariat earlier comprised of (a) the Director's Office, (b) The Technical Secretariat, (c) Information Management Division, (d) Project Monitoring and Evaluation Division.

In order to have a single point of information access, control, management and dissemination all the individual support units of the Director's Secretariat were merged in September 2006, to form a new division called the Knowledge and Technology Management Division (KTMD). It is presently headed by Dr Ranjan Moodithaya, Scientist-G, who is also Head of NAL's Acoustic Test Facility (ATF). KTMD is in fact very much part of the Director's Secretariat.

### **/4/ Knowledge and Technology Management Division and its Support to the Director**

KTMD is now the "Information Arm of NAL". All the major activities of KTMD now have been broadly brought under major sub-groups with individual identities. The major groups are:

- (a) *Public Relations and Resources Management Group (PRRM)*: Activities centred towards Human Resources, Public Relations, Intellectual Property Rights (IPRs), Guest House Management and Audio-Visual support to the Laboratories.
- (b) *Project and Business Development Group (PBDG)*: Activities centred around Project Management and Business Development, Intellectual Fee Distribution, Testing and Analysis and monitoring of signing of MOU's
- (c) *Media and Publicity Management Group (MPMG)*: Activities centered around bringing out NAL Publications, Web Design, Multimedia presentations and archival, Museum management, Photography of NAL activities and Press releases.
- (d) *Management of Information System Group (MIS)*: Activities centred around Enterprise Resource Planning, Management Information Systems, Software Development etc..
- (e) *Office Support Activities*: The entire office support of KTMD is managed by the secretarial staff of KTMD.

## **/5/ Objectives of this Technology Proposal**

The main objectives of this Information Management System are:

- (a) Provide a web-based, single point Information Management, Information Storage, Information Querying and Information Retrieval interface to the Director and his Office for handling all information traffic flow in and out of the Director's Office.
- (b) Work towards the way in establishing a paperless office.
- (c) Build robust, user-friendly search and retrieval interfaces using **Web Technologies** for all critical information that are required for the Director in the day-to-day running of the Laboratory.
- (d) Build interactive information querying features so that the Director can access vital information right from his desktop.
- (e) Build in security and administrative mechanisms so that the Database is accessible only to the Director and his staff.
- (f) Build in E-Commerce security features like E-Cash, online credit-card transactions, Public Key algorithms, digital signatures and bar-code mechanisms wherever financial transactions are involved directly with International agencies.
- (g) Attempt in providing accurate, timely and easy information to the Director.
- (h) Build in a application systems using the latest web-technologies, server, network and security features and completely browser based.
- (j) Link with other MIS modules already running in the Lab like Payroll, Income-Tax, access to Employee Master, PF, Leave etc..

## **/6/ Need for such a Technology Proposal**

The Director's Office is undoubtedly one of the busiest offices at NAL. Every Head of the Division and every employee of NAL depends on the Director's Office for many of the sanctions and approvals for which only the Director is empowered to approve. On a daily basis, the office witnesses tremendous amount of paper movement—namely, Paper movement both within NAL and outside agencies, file movements, letters from CSIR headquarters, Govt. agencies, Parliamentary starred questions, Govt. confidential information, financial sanction papers, grants, budgetary sanctions and approvals. Apart from this, updated address information need to be maintained on the mailing list. Information storage, presentation creation and archiving and updation of all technical publications of the Director is absolutely necessary. Also, important events like the Director's participation in national/international conferences, keeping track of visitors that regularly come to the Director's Office. Managing Director's Bio-Data and its updation and archiving and updating CV's of outstanding aerospace dignitaries are some of the key activities at the Director's Office. At the moment, there is no single-point computer based information management system to keep track of all these transactions. At the moment there is a great need felt to integrate all these activities and have a single-interface window to the Director for quick information retrieval. Hence, an Information Management System is absolutely required to effectively support the Director in his

speedy decision-making process. This web-based information system would hopefully address all such diverse needs. *Typical information flow and the type of activities that the Director's Office faces on a day-to-day basis are indicated in Annexure – I.*

## 7/ Application Modules Which Would Form an Integral Part of MIS –in the Director's Office



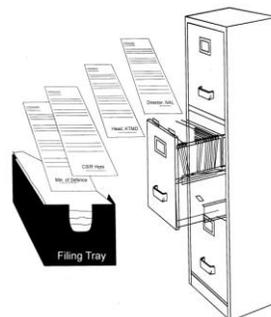
"I have your file right here in front of me, Mr Simonson."

**(a) The Paper Movement and File Movements Database:** This happens to be one of the most crucial and important activities in the Director's Office. Modern day office management greatly depends on a very efficient and Paper Tracking and Filing System. There is a great need for the Head of the Institution to have information at his fingertips, especially such of those papers



which move in and out of the Director's Office. An efficient paper management and filing system is the *sine qua non* of a smooth functioning office. It has been rightly said that "*anybody can file; but the retrieving takes a little doing!*", One of the important modules of this MIS for the Director's Office would certainly need to take care of this aspect. A rough Data Entry Screen for updating, monitoring and searching the Paper Movements / Filing Movements in the Director's Office is indicated in **Annexure – II.**

Some of the broad categories into which the Paper / File Management operation of the Director's Office could be classified are indicated below:



Category Abbreviation	Starting file Rack No.	Meaning of the Abbreviation
DCR	DIR/DIR/10/07	Director's Personal Correspondence
CSH	DIR/CSIR/101/07	CSIR Headquarters Correspondence

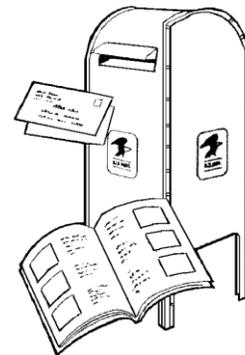
Category Abbreviation	Starting file Rack No.	Meaning of the Abbreviation
<b>NAL</b>	<b>D/NAL/201/07</b>	NAL Divisions
<b>INC</b>	<b>D/IC/301/07</b>	NAL Internal Committees
<b>EXC</b>	<b>D/EC/401/07</b>	NAL External Committees
<b>MDO</b>	<b>D/ORGN/501/07</b>	Ministries /Depts./Organizations
<b>EDI</b>	<b>D/INST/601/07</b>	Educational Institutions
<b>CON</b>	<b>D/CONF/701/07</b>	Conferences / Seminars
<b>EXP</b>	<b>D/EXP/801/07</b>	Exchange Programmes / Collaborations / Agreements
<b>AWD</b>	<b>D/AWD/901/07</b>	Awards / Prizes / Honours
<b>ADM</b>	<b>D/ADMN/1001/07</b>	General Administrative Matters
<b>GEN</b>	<b>D/GEN/1101/07</b>	General Correspondence
<b>GOI</b>	<b>D/GOI/1201/07</b>	Govt. of India Orders / NAL Orders / CSIR Orders
<b>PAR</b>	<b>D/PARL/1301/07</b>	Parliamentary Starred Questions / Starred Questions from CSIR President's Office.

Depending on the further needs of the Director's Office, this module can grow.

(b) **The Mailing List Database Module:** This is another vital area where application



modules need to be developed for maintaining, updating, deleting and entering data onto the Mailing List Database which was earlier in operation at the Director's Office. The broad schema of the Data Entry Screen for this Module is indicated in **Annexure – III**. It is clearly evident



that the Director's Office needs to be in constant touch with already established contacts and newer contacts that get built up whenever a new Director takes charge. It is extremely important a very exhaustive Mailing List Database needs to be developed and constantly updated.

In a work carried out in October 1995, the author had brought a special publication (SP 9511-A,B,C) entitled-“The Mailing List Database at the Director's Office”. This work indicated the magnitude of transactions that the Director's Office generated and also a great need was felt to maintain the mailing list database which facilitated easy letter generation, easy contacting of important personnel and generation of quick address labels to dispatch official correspondences. The work was carried out in the DOS environment using FoxBase (a DOS based relational database management package).

This compilation in 3 volumes greatly facilitated in devising major categories under which the various addresses were updated onto the database. Now, while devising a larger system, this classification schema would greatly come into use.

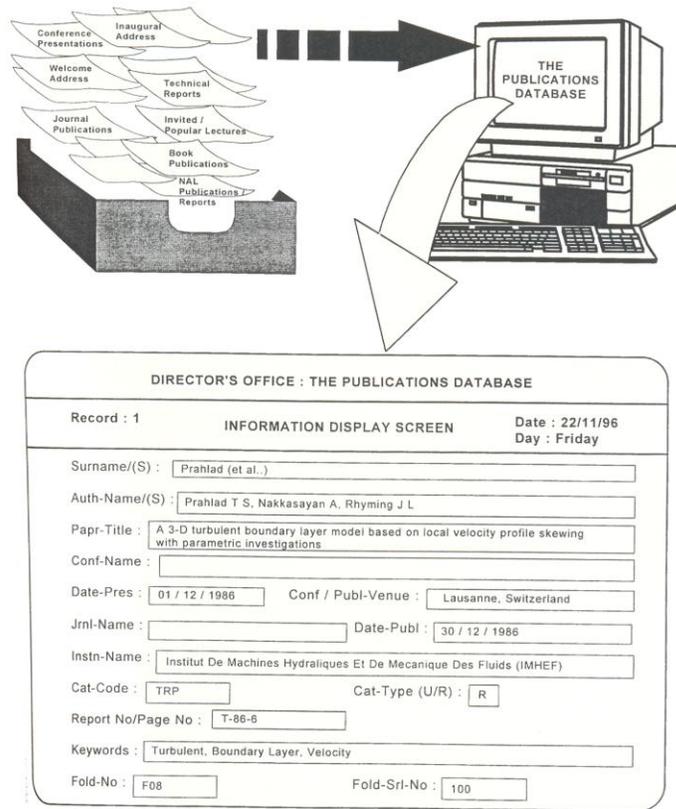
Major Address Classification Categories that were operational in the ErstWhile Mailing List Database Management system in the Director's Office.

<b>Serial Number</b>	<b>Category Abbreviation</b>	<b>Expansion of the Abbreviation</b>
<b>1.</b>	<b>ABD</b>	Scientists / Institutions Abroad
<b>2.</b>	<b>CAPAB</b>	Civil Aviation Programme Advisory Board
<b>3.</b>	<b>CSIR</b>	Officers / Staff at CSIR Hqrs.
<b>4.</b>	<b>CSRLAB</b>	Director's / Scientists of CSIR Labs
<b>5.</b>	<b>DEF</b>	Defence Organizations: Key Personnel
<b>6.</b>	<b>EMB</b>	Personnel in Embassy's / High Commissions
<b>7.</b>	<b>GOVT</b>	Govt. Organizations / Institutions
<b>8.</b>	<b>HOD</b>	Heads of Divisions, NAL
<b>9.</b>	<b>INST</b>	Major Indian Scientific Institutions like: IITs, IISc, IIMs etc.
<b>10.</b>	<b>MC</b>	Management Council Members, NAL
<b>11.</b>	<b>MIN</b>	Personnel attached to various Ministries (Govt. of India)
<b>12.</b>	<b>PER</b>	Personal Friends / Contacts
<b>13.</b>	<b>PRS</b>	Press, Journalists, Media Persons, Editors, Television etc..
<b>14.</b>	<b>PUBL</b>	Public Sector Establishments
<b>15.</b>	<b>PVT</b>	Private Sector Establishments
<b>16.</b>	<b>RC</b>	NAL Research Council Members
<b>17.</b>	<b>SPACE</b>	Personnel attached to Dept. of Space
<b>18.</b>	<b>UNIV</b>	Important persons in Universities / Colleges

Serial Number	Category Abbreviation	Expansion of the Abbreviation
19.	ATOM	Personnel attached to Atomic Energy

Depending on the current nature of operations at the Director's Office, this module can be kept modular and one can keep on adding newer categories.

(c) **The Publication Database Module:** This is another vital area of application in the Director's Office. It's very clear that presenting a paper in a seminar or a conference, writing a technical paper for a journal, writing technical reports, giving an inaugural address, writing a book, making technical presentations, giving invited talks/lectures form an important activity in any Scientific R&D Organization. A key office like the Director's Office, moving towards a paperless office and laying greater emphasis on office automation, must have an efficient way of keeping track of such important activities so that information retrieval on any of these events is easily possible.



In an earlier work by the author, A Publication Database (NAL PD DU 9601- "The Publication Database – A Publication Information System for the Director's Office) was operational in the FoxBase environment during 1996. This database system, which was in operation broadly, classified the entire publication system in operation at the Director's Office under 15 broad categories for data updating and information retrieval. These categories are indicated below:

<b>Serial Number</b>	<b>Category Abbreviation</b>	<b>Expansion of the Abbreviation</b>
1.	CON	Conference / Seminar / Symposium Presentations
2.	WEL	Welcome Addresses
3.	ING	Inaugural Addresses
4.	JRL	Journal Publications
5.	PDS	NAL Project Documents
6.	TMS	NAL Technical Memorandums
7.	SPS	NAL Special Publications
8.	TPR	All Technical Presentations of the Director
9.	TRP	All Technical Reports of the Director
10.	RCP	Director's RC Presentations
11.	MCP	Director's MC Presentations
12.	BOK	Director's Book Publications
13.	INV	Invited Lectures
14.	POP	Popular Lectures
15.	PRF	List of Professional Societies of which Director is a Member
15.	OTH	Others / Miscellaneous

A typical record of the Publication Database contained the following details. A typical data entry screen on the Publications Database is indicated in **Annexure – IV**.

Record No.1

Surname_S	Prahlad (et al.)
Auth_Names	Prahlad T S, Nakkasayan A, Rhyiming J L
Title_Ppr	A 3-D Turbulent Boundary Layer Model Based on Local Velocity Profile Skewing with Parametric Investigations
Conf_Name	-----
Press_Date	01/12/86
Venue	Lausanne, Switzerland
Jrl_Name	-----
Dt-Publn	30/12/86
Instn_Name	Institut De Machines Hydraulics Et De Mechanique Des Fluids (IMHEF)
Cat-Code	TRP (meaning Technical Presentations)
Cat_Type	R (meaning Restricted)
Rptno_Pgno	T-86-6

Keywords	Turbulent, Boundary Layer, Velocity
Fold_No	F08 (refers to a particular folder number allotted to each category for easy retrieval)
FSNo	(refers to incremental serial number within each folder number for the number of papers within a particular category)

This DOS based database management system had provisions for appending, counting and information retrieval options.

A typical query on this database retrieval system looked like this:

List all the technical papers of Dr T S Prahlad: # Disp all Surname\_s,  
Title\_ppr for Surname\_s='Prahlad'

**(d) Eminent Indian and Aerospace Scientists Database (Profiles and CV):**

A compilation of the brief profiles of eminent scientists / personalities was carried out during the author's tenure at the Director's Office. This proved to be a very useful reference document both to the Director and mainly the Office whenever profiles of eminent aerospace scientists were required by the Director whenever these personalities visited NAL for other scientific and academic purposes.

This compendium in 2 volumes was carefully put together from various reference sources like: (i) Collections from Shanti Swarup Bhatnagar Prizes for S&T, (ii) Profiles in Scientific Research, INSA publication, Delhi, (iii) Fellows of INSA (past and present) and (iv) Bhatnagar Laureates, 1958-1991 compiled by CSIR.

As the proposal is being put up for an Information Management System for the Director's Office, all these records should be carefully digitized (preferably chronologically) so that the Information System could pull out the required record quickly during information retrieval. A sample data entry screen for this database module is indicated in **Annexure – V**.

**(e) Linking of Other Possible Application Modules into the MIS System:**

<b>Sl.No.</b>	<b>Category Abbreviation</b>	<b>Expansion of the Abbreviation</b>
<b>1.</b>	<b>EMPL-MASTER</b>	Link to the Employee Master Database for querying on information like: (a) Name, (b) Designation, (c) Gender, (d) Group, (e) Office/Residential Addresses, (f) Phone, (g) Email, (h) DOB, (i) Dt.Joining NAL, (j) Dt.Last Promotion, (k) Retirement, (l) Resignation, (m) Additional Qualification acquired
<b>2.</b>	<b>FROM EMPL-MASTER</b>	(a) Leave Details, (b) PF Details, (c) Income Tax Details, (d) Coop and Hou.Socy.Details (e) Medical Details (claims: in and out-patient) details.
<b>3.</b>	<b>PROJECT Management Information</b>	(a) Type of Project, (b) In-House, (c) Grant-in-Aid, (d) Proj.Duration, (e) Budget details, (f) List of Projects / Leaders, (g) Sponsored Projects, (h) Cash Flow, (i) Automatic generation of Excel Charts on Project Information (e.g. Manpower details, Budget Details, Grant Details, Retirement, list of contractors, trainees, NAL participation in training programmes, scientific productivity of NAL etc..).

<b>Sl.No.</b>	<b>Category Abbreviation</b>	<b>Expansion of the Abbreviation</b>
<b>4.</b>	<b>PURCHASE-MASTER</b>	All relevant information regarding Capital/Consumable procurement in the Director's Office (Year-Wise statistical information and amount spent on Modernisation, computer and other Office infrastructure at Director's Office) + Link to Lab Purchase Module
<b>5.</b>	<b>DIRECTOR'S OFFICE: FVC's / Revolving Funds Operation / Cash Purchases / Special Financial Approvals / Director's Tour Programmes, TA/DA Adjustments of the Director etc./Consumable Procurement through CASH</b>	All relevant particulars for data updation and retrieval and status generation of these vital activities.
<b>6.</b>	<b>SKILL ENHANCEMENT OF DO STAFF</b>	All relevant details reg.number of training programmes attended during current and previous years: Generation of statistics
<b>7.</b>	<b>OTHER RELEVANT MODULES</b>	**** To be incorporated into the MIS system as and when newer activities get generated at the Director's Office.

### **/8/ Web Technologies or the Application Development Platform**

This application could be developed using any of the following or the combination of the following web-based application tools or Web Technologies:

**(a) The JAVA Platform or J2EE**

Java is a programming language expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page. Applets make it

possible for a Web page user to interact with the page. There were five primary goals in the creation of the Java language.

- (a) It should use the object-oriented programming methodology:
- (b) It should allow the same program to be executed on multiple operating systems.
- (c) It should contain built-in support for using computer networks.
- (d) It should be designed to execute code from remote sources securely.
- (e) It should be easy to use by selecting what were considered the good parts of other object-oriented languages.

Java was introduced by Sun Microsystems in 1995 and instantly created a new sense of the interactive possibilities of the Web. Both of the major Web browsers include a Java virtual machine. Almost all major operating system developers (IBM, Microsoft, and others) have added Java compilers as part of their product offerings.

The Java platform is a fundamentally new way of computing, based on the power of networks and the idea that the same software should run on many different kinds of computers, consumer gadgets, and other devices.

With Java technology, you can use the same application from any kind of machine -- a PC, a Macintosh computer, a network computer, or even new technologies like Internet screen phones.

Java Platform, Enterprise Edition (Java EE) is the industry standard for developing portable, robust, scalable and secure server-side Java applications. Building on the solid foundation of the Java Platform, Standard Edition (Java SE), Java EE provides web services, component model, management, and communications APIs that make it the industry standard for implementing enterprise-class service-oriented architecture (SOA) and next-generation web applications.

## **(b) Microsoft .NET**

The Microsoft **.NET Framework** is a software component that can be added to or is included with Microsoft Windows operating system. It provides a large body of pre-coded solutions to common program requirements, and manages the execution of programs written specifically for the framework. The .NET Framework is a key Microsoft offering, and is intended to be used by most new applications created for the Windows platform.

The pre-coded solutions that form the framework's Base Class Library (BCL) cover a large range of programming needs in areas including: user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network communications.

Programs written for the .NET Framework execute in a software environment that manages the program's runtime requirements. This runtime environment, which is also a

part of the .NET Framework, is known as the Common Language Runtime (CLR). It is included with Windows Server 2003 and Windows Vista, and can be installed on most older versions of Windows.

In a nutshell, .NET is:

- .NET is Microsoft's new Internet and Web strategy
- .NET is NOT a new operating system
- .NET is a new Internet and Web based infrastructure
- .NET delivers software as Web Services
- .NET is a framework for universal services
- .NET is a server centric computing model
- .NET will run in any browser on any platform
- .NET is based on the newest Web standards

### **/9/ Data Base Tools As The Backend:**

Essentially, a database management system, more popularly known as DBMS helps the user in a database system to access their data and assists them in transforming the raw data into useful information. Some of the popular database systems include dBASE, Paradox, FoxBASE, Oracle. More recently, MySQL and SQL Server. These database systems essentially allow users to create, update and extract information from the respective databases. With all the disadvantages of a cumbersome manual mailing system, the greatest advantage of a computerized database system are speed, accuracy and accessibility.

Coming to what is a database. 'It is nothing but a structured collection of data. Data can simply refer to characteristics of people, things, and events. For example, Oracle stores each data item in its own field. For example, a person's first name, date of birth and postal code are each stored in separate fields. The name of a field usually reflects its contents. Each DataBase Management System (DBMS) has its own rules for naming the data fields. Usually, during an Oracle database design project, the analysis of the business is needed to identify all the fields or attributes of interest. If it needs change over a time, one has to define additional fields or change the definition of existing fields. Oracle tables are nothing but records relating to each other stored in the table. Unlike a spreadsheet consisting of vertical columns and horizontal rows, a table is easily visualized as a tabular arrangement of data. A table consists of a number of records. The field names of each record in the table are the same, although the field values may differ. Each field occupies one column and each record occupies one row. In each column of the table, you put a specific category of information for the employees, (ID-number, first name etc..). Each row in the table contains the information relating to a specific employee, together as one record. Each record in the table is a unique entry and is independent of any other record in the table. Usually, after the analysis of the business requirements, the database design team defines the necessary tables. Different tables are created for the various groups of information. For. e.g. an EMPLOYEE table (for empl.information), a DEPARTMENT table (for department information) etc., Related tables are grouped together to form a *database*.

### **Primary Keys and Relational Databases:**

Every table in Oracle has a field or a combination of fields that uniquely identifies each record in the table. This unique identifier is called the primary key, or simply the key. This primary key provides the means to distinguish one record from all the others in a table. It allows the user and the database system to identify, locate and refer to one particular record in the table. The database design team determines the best candidate field for the primary key (e.g. the employees first and last name could be primary keys). Once the table has been assigned a primary key, Oracle won't allow more than one record in the table with the same value for the primary key. Now two employees can have the same ID number.

Relational Databases: More often, although, business applications involve many tables. In a typical personnel application, there might be one table for employees, another for information about their hours of work, and another for the departments in the company. Oracle makes it easy to link the data in multiple tables: matching an employee to the department in which they work is one example. *This is a key feature of a Relational Database Management System, or RDBMS.* They store data in two more tables and enable you to define relationship between the tables. The link between the tables is based on one or more field values common to both tables'

To make this Information Management System functional and operational, one needs to depend on some of the most popular database tools which serve not only as a powerful backend to store data, but also greatly enhances information retrieval capability.

Some of the database tools on which this Information Management System could be developed are:

**(a) ORACLE:**

Oracle (in ancient Greece, someone in touch with the deities; from Latin, *oraculum* or divine announcement) says it is the world's leading supplier of software for information management but it is best known for its sophisticated relational database products (notably Oracle9i), which are used in Fortune 1000 corporations and by many of the largest Web sites. Oracle's relational database was the world's first to support the Structured Query Language (SQL), now an industry standard. When CEO Lawrence J. Ellison and a few associates formed Oracle in 1977, they were out to prove wrong the prevailing theory that relational databases could not be commercially viable. Today, as proof of their success, they've parlayed an initial \$2,000 investment in the company into an annual revenue exceeding \$9.7 billion.

Oracle targets high-end workstations and minicomputers as the server platforms on which to run its database systems. Along with Sun Microsystems, Oracle has long been a champion of network computers. It now boasts that it was the world's first software company to develop and deploy 100 percent Internet-enabled enterprise software across its entire product line: database, server, enterprise business applications, and application development and decision support tools. In fact, Oracle CEO Ellison has

said, "If the Internet turns out not to be the future of computing, we're toast. But if it is, we're golden."

Based in Redwood Shores, California, it has more than 43,000 employees worldwide and does business in over 150 countries. Oracle (ORCL) is publicly traded on the Nasdaq.

**(b) MySQL (from MySQL Labs):**

The world's most popular open source database. MySQL 5.0 represents a huge leap forward for the world's most popular open source database management system. While MySQL has been the database of choice for managing high-volume web sites and embedded database applications for years, version 5.0 provides exceptional new functionality that paves the way for larger adoption at the enterprise level. Advancements in the areas of application development, transactional processing, data integrity, and manageability put the MySQL database server on par with proprietary database vendors whose costs are many times more.

**MySQL** is a multithreaded, multi-user SQL database management system (DBMS) which has, according to MySQL AB more than 10 million installations. The basic program runs as a server providing multi-user access to a number of databases.

**(c) Microsoft's SQL Server:**

**Microsoft SQL Server** is a relational database management system (RDBMS) produced by Microsoft. Its primary query language is Transact-SQL, an implementation of the ANSI/ISO standard Structured Query Language (SQL) used by both Microsoft and Sybase. Microsoft SQL Server uses a variant of SQL called T-SQL, or *Transact-SQL*, an implementation of SQL-92 (the ISO standard for SQL, certified in 1992) with many extensions. Microsoft SQL Server also supports Open Database Connectivity (ODBC). SQL Server includes support for database mirroring and clustering. A SQL server cluster is a collection of identically configured servers, which help distribute the workload among multiple servers. All the servers share an identical virtual server name, and it is resolved into the IP address of any of the identically configured machines by the clustering runtime. Automatic failover clustering is also available, in which the workload of a server is transferred to another system in the event of a system failure. SQL server also supports data partitioning for distributed databases. Database mirroring, introduced in SQL Server 2005, allows creation of mirrors (or replicas) of database contents, along with transaction logs, on another instance of SQL Server, based on certain predefined triggers. SQL Server 2005 also allows creation of *snapshots*, which are like backup images that can be reverted back to when needed.

SQL Server supports data replication, spanning three different scenarios:

1. **Snapshot replication:** Snapshots of a database are pushed out to all replication subscribers of a server.

2. **Transaction replication:** Changes to the database are continually published out to clients.
3. **Merge replication:** Synchronizing the database with other servers participating in the replication. Changes to all databases happen independently and during replication, the changes are synchronized among all databases. Merge replication includes in-built support for conflict resolution.

## **/10/ The Hardware Platform:**

The hardware (**Annexure – VI**) centers around a NASD (network attached storage device). The NAS appliance may be the easiest solution to adding more storage to your network. The hardware for this MIS system is centred around the HP Proliant NAS 950 GB Storage Server which is a Intel Dual Core Xeon Processor, and built on the RAID architecture are 6 x 160 GB SATA Drives and the main software being Windows Storage Server 2003. Provision for additional RAM of 1GB is provided. This tower to rack conversion unit kit is mainly there to accommodate all hardware devices onto a single rack. HP Proliant 150G3 is the application server. Oracle application can be hosted here. In case we are going for the 3<sup>rd</sup> Party Oracle's Enterprise Content Management Suite (which would be covered in Section /11/), then the Content Management Suite would be hosted here. All the users will access this server. There won't be any data on this server. Only MS Windows Standard 2003 Server version (OS), the necessary Oracle applications and Oracle's Content Management Suite (if we procure it). Apart from a DVD writer, the application server would also consist of 160 GB x 2 SATA (pluggable) drives. The backup unit that would be attached to this system would be the HP DAT Drive (20/40 GB-I/E) for all critical backups. HP Compaq Dx 220 are the standard application workstations with 80 GB Hard Disk and 17" TFT monitors. 52X CD-ROM drive could be replaced with a COMBO Drive instead.



## **/11/ Off-the-Shelf 3<sup>rd</sup> Party Enterprise Content Management Tool**

The entire application could be written using in-house talent and contractual staff using the JAVA/J2EE, Microsoft.NET domain as the Web technologies and using Oracle, MySQL or SQL Server for the database applications. The end application would be web-based with GUI interfaces and Object Oriented Programming concepts.

Looking at the off-the-shelf 3<sup>rd</sup> party, one could look at either Oracle's Universal Content Management Suite (for Document Management) or on a larger scale if such a solution is required for the Enterprise, then one could have a look at Oracle's Enterprise Content Management *Platform*. Please see **Annexure- VII**.

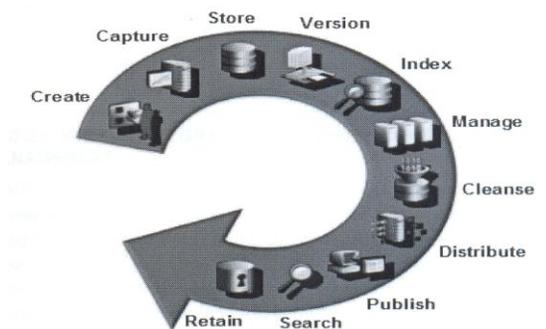
**Oracle's Universal Content Management (Document Management Tool)** has these salient features:

- (a) Author and capture digital or paper-based content
- (b) Contribute content using Windows Explorer, Web Browsers, or e-mail applications.
- (c) Support Oracle Database and third-party repositories
- (d) Search and retrieve content using full-text or metadata
- (e) Archive and dispose of content, including backup and recovery support
- (f) Share and distribute content with Web-based access from anywhere in the world.
- (g) Helps Organizations save money and improve operational efficiencies by streamlining communications, automating routine tasks, and lowering costs related to printing, shipping, and storage of business documents.
- (h) Store content in a centralized system, distribute content to individuals in the appropriate format, and preserve or dispose of content to control the content lifecycle.
- (i) Effectively uses Java architecture and hence provides the required flexibility.
- (j) Ability to capture, secure, and share digital and paper-based documents and reports directly from a Web-browser.

### **Solution to Manage the Enterprise's Content:**

- (a) Enterprise Content Management (ECM) provides Organizations with a platform to house unstructured content and deliver it in the proper format to multiple enterprise applications.
- (b) With this technology, you can efficiently build content-rich business applications, re-use content, and integrate hundreds of content services with other business applications.
- (c) ECM helps to decrease costs, automate processes, reduce resource bottlenecks, share content effectively, minimize the number of lost documents and better manage risk.
- (d) Unified ECM provides the full array of content management functionality-including document and imaging management, Web content management, digital asset management, and records and retention management-one one platform.
- (e) All ECM applications can be deployed on the same platform, and specific content management capabilities are interchangeable, extensible, and complementary to each other.
- (f) ECM technology "understands" the entire lifecycle of content, applies the appropriate amount of control, and adds additional support support for

### **Content Management Lifecycle**



- users during each phase. This means your content is managed during creation, capture, and storage.
- (g) ECM technology also applies features such as version control, indexing for search, content cleansing to minimize risk, metadata, and security.
  - (h) Content services are also added to help distribute, publish, classify and retain, expire, and delete content.
  - (i) ECM allows organizations to turn their unstructured content into assets and implement a cohesive strategy for securely managing content across their enterprise.
  - (j) ECM allows organizations to control access to content, maintain audit trails and histories, and automate the disposition of content based on consistent policies, it helps to minimize risk and apply control around the content lifecycle.
  - (k) Additionally, one of the key aspects of ECM is content sharing. ECM allows content to be delivered to the right people at the right time on the right device in the right format.
  - (l) ECM is a unified approach, which puts applications on a single platform and in a single interface, enabling effective content re-use and simple upgrades, maintenance, and training (enterprise records, digital assets, web content and document management and imaging, put under one single application – a unified approach).
  - (m) End user organizations consolidating multiple existing applications from different vendors onto one platform – to help manage all content types within the Organization. One can say that this was the birth of ECM.

## 12. Application Development Time and Manpower Cost Details:

Developing such an intense Information Management application for the Director's Office would involve at least 12-16 months towards development, testing and implementation of this integrated module.

The Manpower details are as follows:

- (a) **Team Leads / Project Heads** from KTMD regular strength to monitor the progress of this project and give feedback: **1-2 persons on rotation basis.**
- (b) **Application Development Team:** 2-3 persons holding qualification of minimum MCA/BE(Computer Science)/B.Tech(Computer Science), MS (Computer Science with minimum 3 years development experience in Java or .NET and RDBMS platform: Salary Rs. 6,000 (initial 6 months, then raise to Rs. 7500 till completion of the project). **16 Months Contract**
- (c) **Data Entry, Validation and Checking Team:** 2 persons with minimum qualification of +2/BSc(Comp.Science)/BSc./Diploma in Computer Science with minimum 2 years of data entry and validation experience. Knowledge of Java, Oracle is an added advantage. Salary: Rs. 3,800 initial

6-8 months, then raise to 4,500 till completion of the project. **16 Months Contract.**

### **13. Acknowledgements**

The authors would like to profusely thank Dr R A R Upadhya, Director, NAL for granting us permission to bring out this technology proposal towards aiming at establishing an Information Management System at the Director's Office, thereby moving towards a paperless office. An office where all major operations are controlled by computers and where different applications are brought would be brought under a single window interface thereby aiming to achieve faster and accurate information retrieval and information dissemination. The authors would like to profusely thank M/s Future Business Tech India, Pvt. Ltd. Bangalore for participating in several technological discussions and their support in arriving at the optimum hardware platform on which to house this application. The authors would also like to thank M/s Oracle for sparing with their White Papers on their Enterprise Content Management module. Sufficient inputs have been taken from the white papers.

**14. Disclaimer:** The authors are extremely clear while preparing this proposal that sufficient care has been taken to pen down the most optimum hardware configuration and the software development platform. However, this need not be taken as the 'ideal-benchmark'. Keeping a very open-ended software platform support, and a modular client-server hardware platform with a robust network platform, the authors feel that this should more than solve the present information crunch.

However, at the actual time of implementation, the MIS group of KTMD would be playing a more intensive role during the application development process. At that time suitable decisions could be taken as to whether any additional hardware or software components need to be added or not.

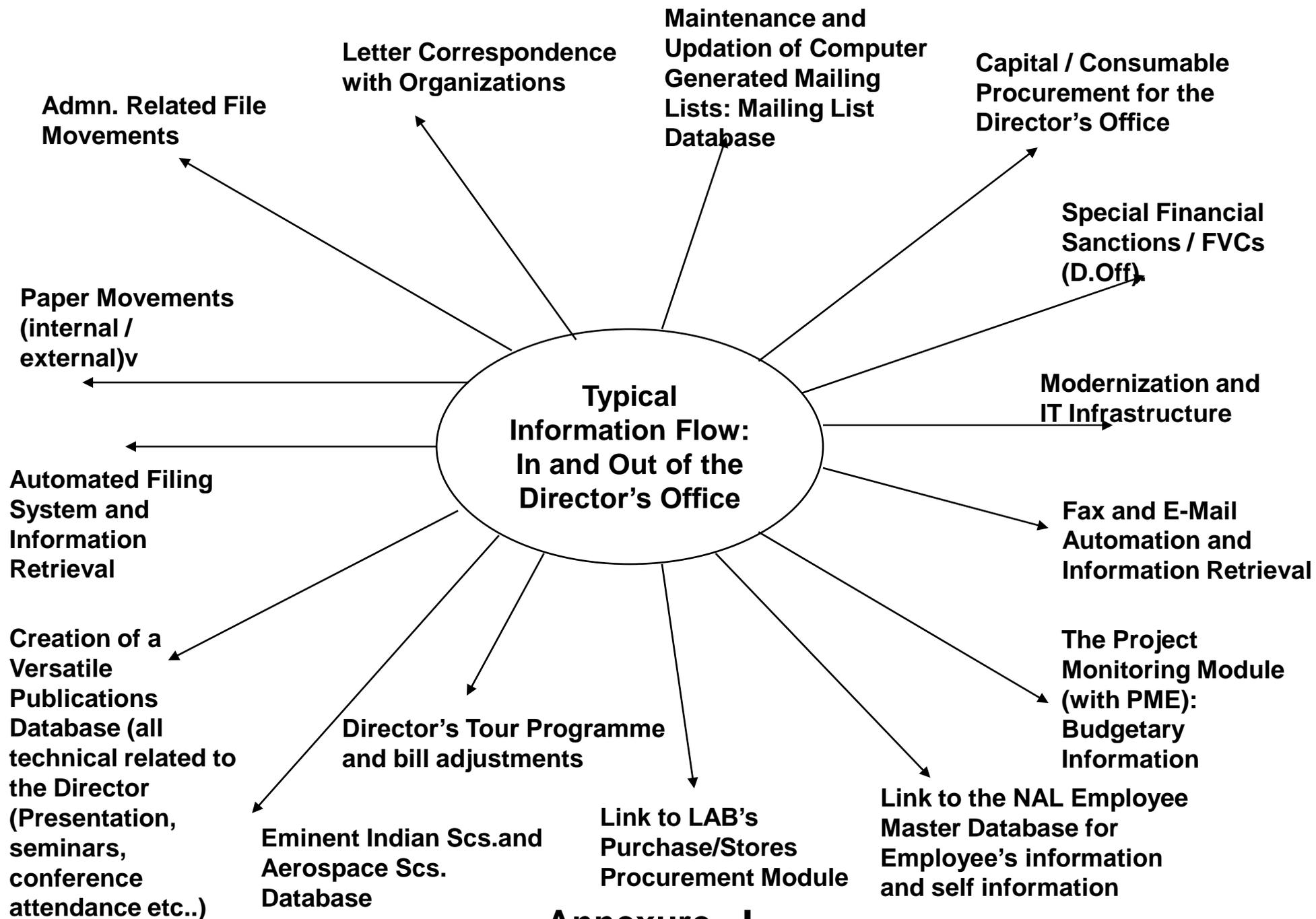
The report has been prepared purely with the intention that an Information Management System is absolutely required for an office like the Director's Office. Eventually, for the whole Organization.

### **15. References**

- /1/ R Guruprasad and Y Asokan, Automated Filing System for the Director's Office: PD DU 9401, August 1994./
- 2/ R Guruprasad, The Publication Database (A Publication Information System for the Director's Office): PD DU 9601, December 1996.
- /3/ R Guruprasad, The Mailing List Database at the Director's Office: NAL Special Publication.
- /4/ <http://java.sun.com/java2/whatis/1996/>
- /5/ [http://en.wikipedia.org/wiki/.NET\\_Framework](http://en.wikipedia.org/wiki/.NET_Framework)

- /6/ <http://www.proace.com/definitions.aspx>
- /7/ <http://www.webopedia.com/TERM/O/Oracle.html>
- /8/ [http://www.mysql.com/why-mysql/white-papers/mysql\\_wp\\_inside50.php](http://www.mysql.com/why-mysql/white-papers/mysql_wp_inside50.php)
- /9/ <http://en.wikipedia.org/wiki/MySQL>
- /10/ K Hemalatha, S K Rajavelu and S Sridhara Murthy, MIS-STR: The Management Information System of the Structures Division: PD ST 0333, November 2003.
- /11/ Management Information Systems: (a) Notes from M.Sc.(IT) course Material, KSOU; (b) MBA course material notes from KSOU, IGNOU, Symbiosys, Manipal.
- /12/ The Benefits of a Unified Enterprise Content Management Platform: An Oracle White Paper, February 2007.
- /13/ R Guruprasad: Compilations of the Brief Profiles of Eminent Scientists / Personalities (Vol.1and2).

**The End.**



**Annexure - I**

# The Paper Movement / File Movement Database

## Director's Office: A Typical Data Entry Screen

Record No:  Record-Date:  Letter No:  Letter Dt.:

Category-Code:  /CSH/NAL/INC/EXC/MDO/EDI/CON/EXP/AWD/ADM/GEN/GOI/PARL

Name and Desig:  Div / Org:  City / Place:

Subject:

Sent\_To:  Date Sent:  Div/Sect/Orgn:

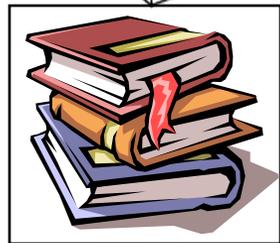
Dir-Remarks:

CC To:  Remind On:  Response:

Date:  Transaction Complete:

Comments from Div:

Digitized Document/Page Available/Scanned



Do You Want to Continue:

# The Mailing List Database

## *A Typical Data Entry Screen*

SurName:

FirstName:

Design:

Affiliation:

Category Codes:

ABD/CAPAB/CSIR/CSRLAB/DEF/EMB/GOVT/HOD/INST/MC/MIN/PER/PRS/PUBL/PVT/RC/SPACE/UNIV

Address-1:

Address-2:

City-State:

Address-3:

Pin:

Country:

Phone-(O):

Telex:

Telegram:

Fax:

E-Mail1:

E-Mail2:

Address-R:

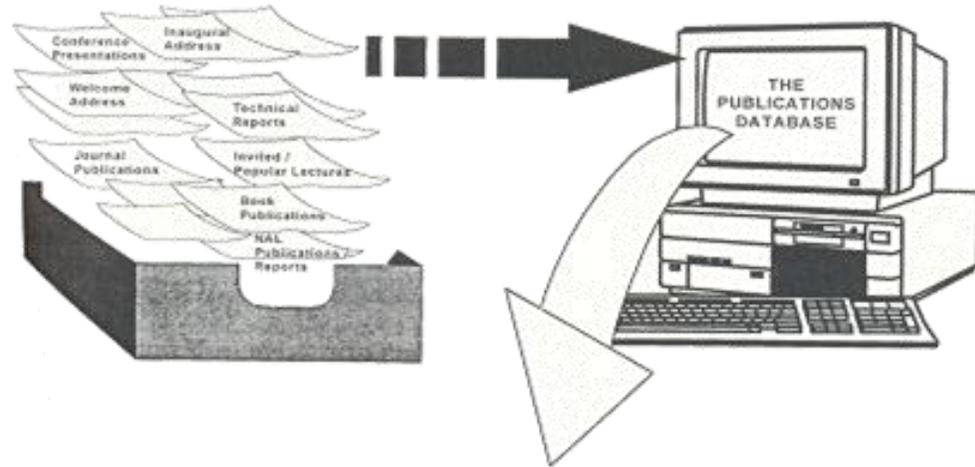
Phone-( R):

Remarks:

Y/N

# The Publication Database at the Director's Office

## A Typical Data Entry Screen



### Publications Category Codes

- CON** : Conference/seminar/Symposium Presentations
- WEL** : Welcome Addresses
- ING** : Inaugural Addresses
- JRL** : Journal Publications
- PDS** : NAL Project Documents
- TMS** : NAL Technical Memorandums
- TRP** : Technical Reports
- SPS** : NAL Special Publications
- TPR** : Technical Presentations
- RCP** : NAL Research Council Presentations
- MCP** : NAL Management Council Presentations
- BOK** : Book Publications
- INV** : Invited Lectures
- POP** : Popular Lectures
- OTH** : Othes / Miscellaneous
- PRF** : Membership of Professional Societies

DIRECTOR'S OFFICE : THE PUBLICATIONS DATABASE		
Record : 1	INFORMATION DISPLAY SCREEN	Date : 22/11/96 Day : Friday
Surname/(S) :	<input type="text" value="Prahlad (et al.)"/>	
Auth-Name/(S) :	<input type="text" value="Prahlad T S, Nakkasayan A, Rhyming J L"/>	
Papr-Title :	<input type="text" value="A 3-D turbulent boundary layer model based on local velocity profile skewing with parametric investigations"/>	
Conf-Name :	<input type="text"/>	
Date-Pres :	<input type="text" value="01 / 12 / 1986"/>	Conf / Publ-Venue : <input type="text" value="Lausanne, Switzerland"/>
Jrnl-Name :	<input type="text"/>	Date-Publ : <input type="text" value="30 / 12 / 1986"/>
Instn-Name :	<input type="text" value="Institut De Machines Hydrauliques Et De Mecanique Des Fluids (IMHEF)"/>	
Cat-Code :	<input type="text" value="TRP"/>	Cat-Type (U/R) : <input type="text" value="R"/>
Report No/Page No :	<input type="text" value="T-86-6"/>	
Keywords :	<input type="text" value="Turbulent, Boundary Layer, Velocity"/>	
Fold-No :	<input type="text" value="F08"/>	Fold-Srl-No : <input type="text" value="100"/>



### Hardware Configuration for Setting Up the Proposed Information c

HP ProLiant ML350G5 Storage Server					
SI No.	Part No.	Description	Quantity	Unit Price	Extended Price
1	AE419A	HP ProLiant ML350 G5 <b>960GB</b> Storage Server/ Intel Dual Core 5150 Xeon Processor 2.67 GHz/ 1333MHz FSB standard - 4MB L2 Cache / 1GB/ H/W RAID/ 6 x 160GB SATA Drives/ Windows Storage Server 2003 R2, Standard Edition	1	201,734	201,734
2	397409-B21	1 GB FBD PC2-5300 2X512 Kit for DL140G3/DL180/DL360G5/DL380G5/ ML150G3/ML350G5/ML370G5/ BL20pG4/BL460c/BL680c/BL480c	1	16,328	16,328
3	412640-B21	Tower to Rack Conversion ML350 G5 Kit	1	18,516	18,516
				<b>Total:</b>	<b>236,578</b>

(1) **AE419A:** ML350 G5 950GB is the **NASBOX** (which is the storage server). Built on RAID with 6x160 GB SATA Drives. The entire database resides on this. This NASBOX will also house the Windows Storage Server 2003, R2, Standard Edition.

(2) **397409-B21:** Additional 1GB Memory for better performance.

(3) **412640-B21:** This is the tower to rack conversion unit kit to accommodate all hardware devices onto a single rack.

HP ProLiant ML150G3					
SI No.	Part No.	Description	Quantity	Unit Price	Extended Price
1	438786-371	HP ML150G3 HP-SATA / (1)Quad-Core Intel® Xeon® processor E5310 (1.60 GHz, 1066 FSB,80W) / Integrated 2x4MB L2 cache / 1 GB PC2-5300 Fully Buffered DIMMs (DDR2-667) / Embedded HP NC7781 Gigabit Server Adapter 10/100/1000 WOL / HP 8 Internal Port SAS Host Bus Adapter with RAID / 48x CD-ROM	1	80,966	80,966
2	397409-B21	1 GB FBD PC2-5300 2X512 Kit for ML150G3	1	16,328	16,328
3	349238-B21	HP 160GB SATA 7.2K Hot Plug 3.5" HDD for ML150G3	2	6,072	12,144
4	409179-B21	MS W2003 Std Svr Reseller Opt Kit SW IN R2	1	28,750	28,750
5	383974-B21	HP DVD+R/RW 16X Half Height for ML115 / ML150G3 / 370G5	1	9,231	9,231
6	PX850AA#ACJ	L1906 - 19" TFT - Display Screen	1	18,990	18,990
				<b>Total:</b>	<b>166,410</b>

(1) **438786-371: ML 150 G3** is the application server. You can host your Oracle application here or Oracle's proprietary Enterprise Content Management Suite. Users will be hooked onto this server. All the users will access this server. No data on this server. Only OS (MS-Windows 2003 Standard Server), Content Mgt. Suite and the necessary Oracle application.

(2) **397409-B21:** is the additional 1 GB RAM for up-gradation.

(3) **349238-B21:** are two pluggable 160 GB SATA Drives for your application server.

(4) **409179-B21**: is the Microsoft 2003 Standard Server OS, Release 2.

(5) **383974-B21**: is the HP 16x DVD Writer.

(6) **PX850AA#ACJ**: 19" TFT Monitor for your application server.

(7) **HP-DAT Drive (20/40 GB)**: Internal or External (not indicated in Quote: approx. Rs. 25,000) for all critical backups.

HP Compaq dx2280					
SI No.	Part No.	Description	Quantity	Unit Price	Extended Price
1	GN966PA#ACJ	Dx2280/PD925(3.0Ghz/2X2MB/800FSB)/512MB/80GB @7200rpm/No FDD/ <b>No CD-ROM</b> /XPP/1-1-1 Warranty/15"CRT	5	39,990	199,950
2	PX849AA#ACJ	L1706 - 17"TFT - 3/3/3 warranty and Grade A Panel	5		
3	AG041AA	52X Max CD-ROM Drive (Carbonite)	5		
				<b>Total:</b>	<b>199,950</b>

(1) **HP Compaq dx2280 (GN966PA#ACJ)**: These are the standard configuration application workstations with 80 GB Hard Disk.

(2) **PX849AA#ACJ**: 17" TFT Monitors for the application workstations.

(3) **AG041AA**: 52X Max CD-ROM Drive (Carbonite). Instead suggested 52X Combo Drive.

**Grand Total of the total proposed Hardware: 2,36000+ 1,66,000+ 1,99,000 = Rs. 6,01,000 (or approx. Rs. 6 L)**

## Annexure - VII

### ORACLE'S CONTENT MANAGEMENT SOFTWARE PRICING

#### Oracle Universal Content Management and Enterprise Content Management Suite:

A:	Pricing: Oracle Application Server, Enterprise Edition	Rs. 2,42,300 for 10 users
B:	Software Update License and Support:	Rs. 53,300 for 10 users
C:	UCM Suite, Licensed Cost :	Rs. 80,760 per suite
D:	Software and Support Cost:	Rs. 17,760 per year

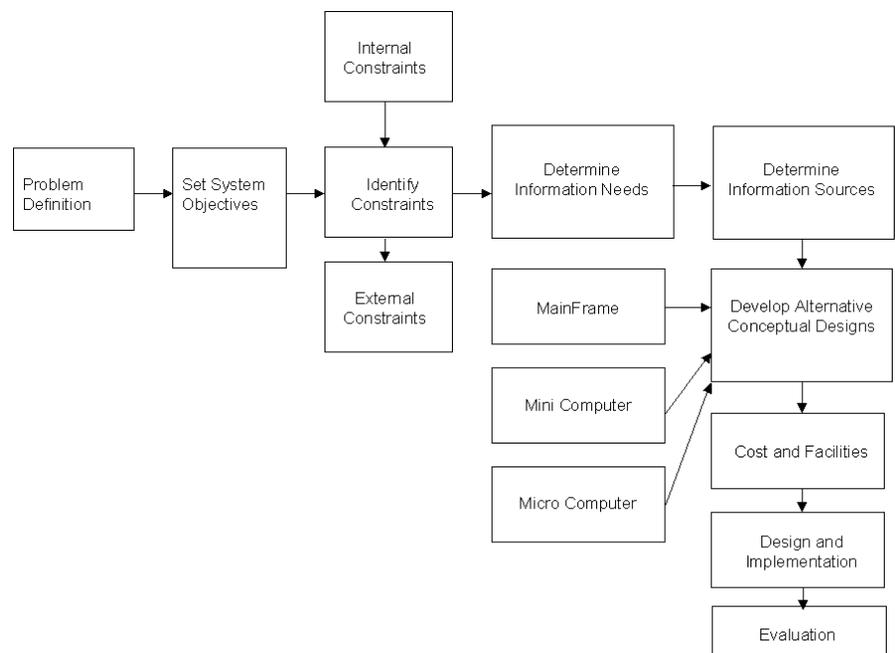
**Total Cost of the Software (approx.) : Rs. 3,94,000**

## Annexure - VIII

### Design of MIS and Various Approaches for MIS Development are described in greater detail in this Annexure

**Design of MIS:** While designing a Management Information System, a general approach has to be followed so that a suitable system can be devised to cater to the needs of different organizations (in some places, different departments) as per their functions and decision making requirements. Irrespective to the organization in question, the data generated at various levels of the management. These data when processed and analyzed become information which, when properly communicated in time to the decision maker, helps in making decisions and taking actions.

#### *Basic Steps While Designing a MIS System*



Generally, the following steps are taken in the design of an MIS:

**(a) Identifying Information Needs at all Levels of Management:** Any growing organization is bound to face problems. Most of the time, a clear definition of the problems and a priority system for their solution is not known. Identifying the problems is the first step in MIS.

**(b) Listing Objectives of MIS and Anticipated Benefits:** The system objective should be defined in terms of what a decision maker can do and how effectively he would be able to function after his information requirements have been complied with. The basic type of questions which are asked, while listing down the objectives of the MIS system design are:

- (i) What is the purpose of the system?
- (ii) Why is it needed?
- (iii) What is it expected to do?
- (iv) Who are the users and what are their objectives?

(c) **Identifying System Constraints (Internal and External):** The systems constraints are also called problem boundaries or restrictions under which objectives may be achieved. The internal constraints are generally viewed in terms of: (i) top management support, (ii) organizational policy, (iii) manpower needs and availability, (iv) cost and resource and (v) acceptance. The external constraints are mainly concerned with the customer. The external constraints with regard to an R&D organization are more their business partners, the special visitors that come into the Laboratories and the buyers of your niche products.

(d) **Determining the Information Needs and Resources:** The system design must begin firstly, in determining the real information needs of the management: Information that can increase the perception of the managers in critical areas such as problems, alternatives, opportunities and plans. In other words, if a decision maker can define his objectives and spell out the items of information that are needed to attain the objectives, then he/she is at least half way through in a good system design. After estimating the need of information and clearly defining the objectives, the next step in MIS is to determine the sources of information. Generally, Information Sources may be categorized as follows: **(i) Internal Sources:** It is in the form of written materials like file records, letters, reports containing information about the existing system etc., **(ii) External Sources:** It may be in the form of trade and government publications, personal interviews of managers and personal interactions with decision makers.

(e) **Developing Alternative Conceptual Design and Selecting One:** The conceptual design of the MIS is considered as a skeleton of the MIS, which guides and restricts the form of the detailed design. The concept of design of an MIS consists of patterns of information flow, channels of information, role of decision makers and competitors etc.. The alternative concepts of a system can be evaluated on the basis of the following:

- (i) Compare anticipated performance of the conceptual design with respect to objectives of the system developed earlier.
- (ii) For quantified comparison amongst systems, prepare a preliminary cost-effectiveness data for the system.
- (iii) Examine the quality of databases and information to be made available: Study the number of operations, dispersions and duplication of files, and potential breakdown breakdown points
- (iv) Expand the conceptual designs in greater detail if none of these provide a preferred design.

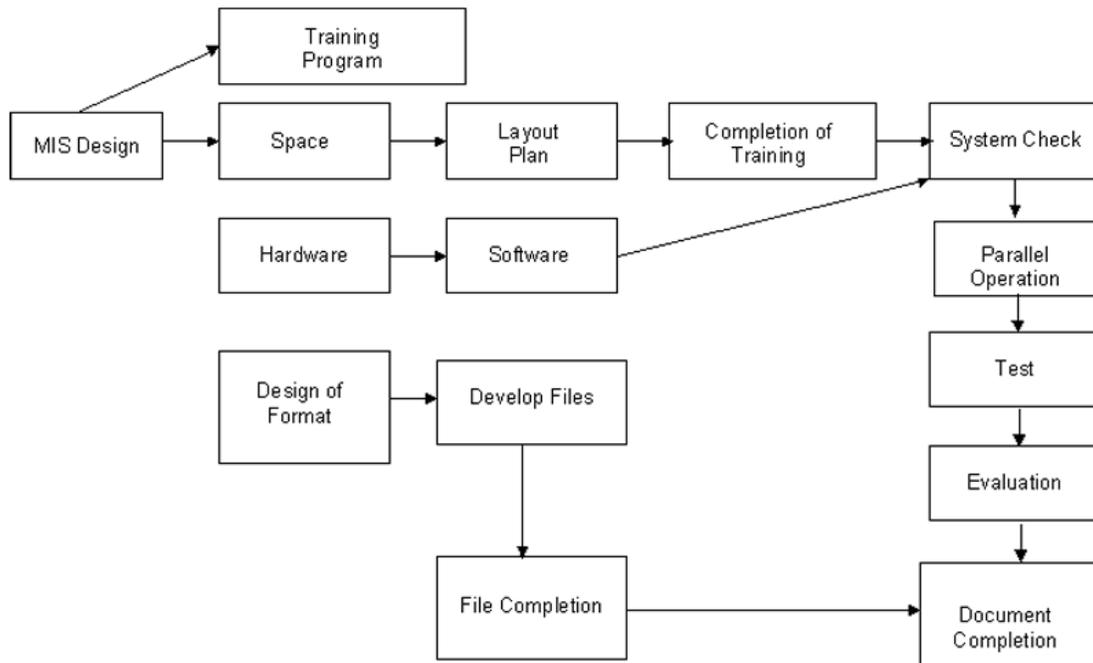
(f) **Preparing the conceptual design report:** The conceptual design report is a proposal prepared for the expenditure of funds and possible changes in the organizational set-up. Since this report is submitted to the management, it must contain the summary of problems that necessitate the system, the objectives, the general nature of

the system, reason why this concept was selected over others, and time and resources required to design and implement the system.

**Implementation of MIS:** Before installing a new MIS in any organization, it is desirable to know whether there is already an old MIS in operation. If so, then the old system is allowed to run in parallel, till the new system is fully operational. Generally, the implementation of MIS goes through these following steps:

- (i) Preparing Organizational Plans, (ii) Planning the Work Flow, (iii) Training of Personnel, (iv) Development of Software, (v) Acquiring Computer Hardware, (vi) Designing the format for data collection, (vii) Construction of data files, (viii) Operation of new and old systems in parallel, (ix) Phasing out the old system and inducting the new system, (x) Evaluation, maintenance and control of the new system.

The outline of implementation phase of an MIS is shown in the figure below:



### The 7 Approaches of MIS Development:

(i) **Top Down Approach:** This approach develops a corporate plan as a guide for designing the information system. It's clear that the top management takes the lead in formulating objectives, policies and plans and communicates them down the line to middle and supervisory management for translating the objectives into reality.

(ii) **Bottom Up Approach:** This approach basically consists of the following five important steps: (a) Individual functional applications are planned separately

consisting of transaction processing, updating of files and simple reports, (b) Files of various functional applications are integrated by means of indexing and chaining into a database, (c) Various functions are added to operate on the database at the management control level, (d) Integration of models into a model base having a wide variety of analysis,

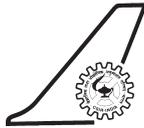
**(iii) Integrative Approach:** In this approach, it permits managers at all levels to influence the design of the information system. Here evaluation, modification and approval of top management continues, till a final design is acceptable at all levels.

**(iv) Traditional Approach:** In this approach, activities are performed in sequence. Each activity is undertaken only when the previous activity is completed. Managers and users, consider and review the work performed by MIS professionals during each stage of processing in order to ensure accuracy and completeness.

**(v) Prototyping Approach:** This approach is used to avoid any possible delay. The goal is to develop a small or Pilot version, called a Prototype, which is built quickly and at lesser cost, with the intention of modifying it whenever the need arises.

**(vi) End User Development Approach:** With the increasing availability of low cost technology, end user development is popular in many organizations. Here the end user is responsible for the system development.

**(vii) Systematic Approach for Development in Small Organizations:** In a very small organization, many a time no MIS professional will exist. This does not mean that they cannot develop the MIS. These groups develop MIS through: (a) Identifying requirements, (b) Locate, evaluate and secure software development, (c) Locate, evaluate and secure hardwares, (d) Implement the systems.



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**Abstract:** This technology proposal attempts in giving a viable solution for a Management Information System (MIS) for the Director's Office. In today's IT scenario, an Organization's success greatly depends on its ability to get accurate and timely data on its operations of varied nature and to manage this data effectively to guide its activities and meet its goals. To cater to the information needs of an Organization or an Office like the Director's Office, information systems are developed and deployed to gather and process data in ways that produce a variety of information to the end-user. MIS can therefore can be defined as an integrated user-machine system for providing information to support operations, management and decision-making functions in an Organization. The system in a nutshell, utilizes computer hardware and software, manual procedures, models for analysis planning, control and decision-making and a database. Using state-of-the-art front-end and back-end web based tools, this technology proposal attempts to provide a single-point Information Management, Information Storage, Information Querying and Information Retrieval interface to the Director and his office for handling all information traffic flow in and out of the Director's Office.