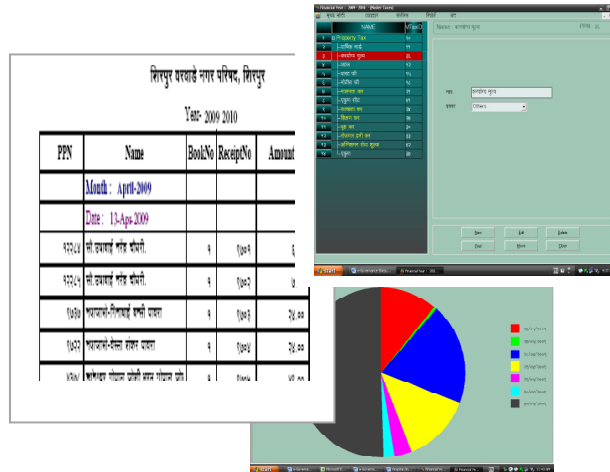


Performance Assessment System for Urban Water Supply and Sanitation

Documentation of Good Practices

Management Information System for Improved Water Supply and Sanitation: An Initiative of Shirpur-Warwade Municipal Council



All India Institute of Local Self Government, Mumbai
May 2010

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**Management Information System for
Improved Water Supply and Sanitation:
An Initiative of Shirpur-Warwade Municipal Council**

By-

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All India Institute of Local Self Government, Mumbai

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Abbreviations

AIILSG	All India Institute of Local Self Government
CEPT	Centre for Environmental Planning and Technology
CRS	Complaint Redressal System
DBMS	Database Management System
DMS	Document Management System
GIS	Geographical Information System
GoI	Government of India
IHSDP	Integrated Housing and Slum Development Programme
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
LAN	Local Area Network
MIS	Management Information System
PAS	Performance Assessment System
SWMC	Shirpur-Warwade Municipal Council
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns

Executive Summary

Shirpur-Warwade has become a town of attention since 1983, for it has earned a name for rapid and planned development within a short span of time. Its development initiatives, particularly in water supply and sanitation are placed among the best practices by policy makers. One of the contributory factors has been early adoption of technology for development of Management Information System (MIS) and its effective utilisation for improved service delivery.

The MIS was developed by Shirpur-Warwade Municipal Council (SWMC) in-house with active participation of users, which has made it very effective and user friendly. Database management of data related to taxation (particularly property and water tax), data related to water connections by types and sizes, document management across all the departments, generation of real time reports on demand and support for compliant redressal lie at core of the system. Currently, the system is also linked with the website and will be integrated with the upcoming Geographical Information System (GIS). This MIS represents not only mechanism for service delivery, but also a symbol of vision and zeal of the council to excel as an institution.

1. Introduction

The Shirpur-Warwade Municipal Council (SWMC), known as one of the proactive and progressive municipal councils had a head start in efficient service delivery particularly in water supply and sanitation sector. One of the contributory factors was the development of Management Information System (MIS). The documentation of this initiative was undertaken as part of Performance Assessment System (PAS) Project at All India Institute of Local Self Government (AIIILSG), Mumbai, supported by Centre for Environmental Planning and Technology (CEPT) to understand the process of development and implementation of the system and its replicability in context of water supply and sanitation.

2. Documentation Methodology

The primary information about MIS at Shirpur was obtained during the pilot phase of data collection process under PAS. Thereafter, further data was collected, which is as follows:

- Discussion with software engineer, who designed and maintains the system.
- Demonstration by the engineer.
- Individual discussion with users.

3. Background of Shirpur-Warwade Municipal Council

The population of the SWMC was 61,694 as per Census 2001 and its current population is approximately 70,000¹. Its modest economy is largely agrarian with partial contribution from recently set up textile mills. The SWMC has been very proactive in adopting and adapting technology for improved public infrastructure, efficient service delivery across the sectors of water supply, sanitation, health, education, sports, recreation and entertainment, environmental conservation, etc. Moreover, the SWMC has been consistently enhancing the quality of services reflected in it gaining accolades like ranking among the first three towns under Sant Gadgebaba Swachata Abhiyan since 2005.

¹ As informed by SWMC

4. Need for Management Information System

During the year 1993, the SWMC wanted to undertake concrete measures to expand and improve basic services in the city. For this purpose, it was necessary to computerise the relevant operations and introduce systems that would aid in systematic implementation of various schemes and programmes. It was also essential to increase efficiency throughout administration and systems for responding proactively to the problems in services. The MIS was implemented after the initial attempts to computerise the departments in 1993 did not meet with too much success. The computers were installed and many records being maintained manually began to be maintained on computer. An external consultant designed a system which could process data and produce statements for taxes, payroll, etc. However, this system was not stable and hence the MIS was designed in 2003. These were the driving factors behind the initiative for developing MIS.

The SWMC's MIS serves an important purpose that it supports the management and service delivery on ongoing basis. Secondly, it has enabled compliance of mandatory reform of establishing e-governance under UIDSSMT and IHSDP under the JnNURM. Compliance with the reform itself increases the chances for mobilisation of funds and ensuring technical support in development programmes.

5. Management Information System

The MIS has been completely developed in-house. At present, it has fully stabilized and is catering to the ever increasing demands of expanding operations. It is contributing to efficient management at all levels. At present, it is being used by the departments of Property Tax, Water Tax, Health, Construction, General Administration and Department of Human Resource. The annual hardware upgradation and maintenance costs

Box 1: Features of MIS

- Developed and maintained in-house
- Sub-components of Database Management System, Document Management System and Complaint Redressal System
- Integration with website and upcoming GIS
- Web-enabled component for Complaint Redressal
- Compliance with e-governance reform for UIDSSMT and IHSDP
- Database of properties linked with services
- Users can configure own reports

amount to Rs.50,000/- (US \$ 1065²). These are met through the internal resources of the SWMC. There is an in-house software engineer, who is responsible for maintenance, hardware and software upgradation.

Objectives of the MIS are as follows:

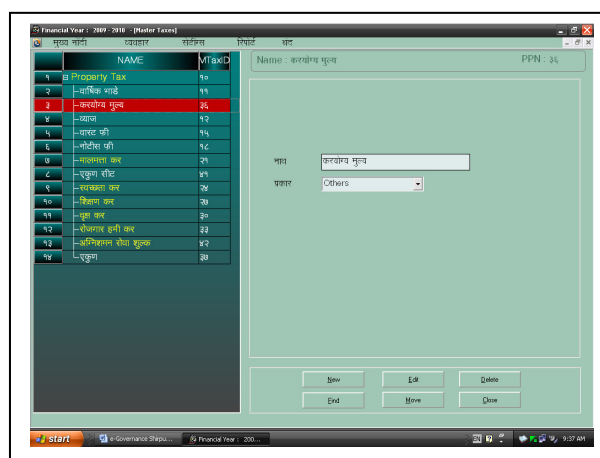
- To maintain data related to taxation, water supply, complaint redressal human resource, etc.
- To generate periodic and real time reports on demand.
- To improve efficiency across line departments.
- To facilitate faster complaint redressal.
- To reduce costs of administration.
- To facilitate decision making.

6. Components of MIS

The MIS is composed of following three subsystems:

i. Database Management System (DBMS)

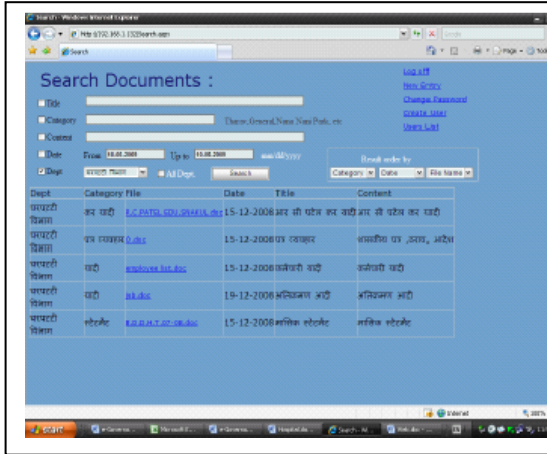
The system maintains the central database related to properties, construction work, water supply (connections by type and size), complaints received and redressed, etc. The database is regularly updated as and when new properties are constructed or connections are given. This is finally used for the purpose of tax recovery. The DBMS is currently linked to the Document Management System (DMS) and Complaint Redressal System (CRS). It is envisaged that once the GIS is operational, database will be linked to the GIS also. (The designing of GIS is presently under progress).



² 1US \$ = INR 46.94 as on 24th May 2010

ii. Document Management System (DMS)

All documents and reports prepared across various departments are maintained on the server, and can be retrieved as and when required.

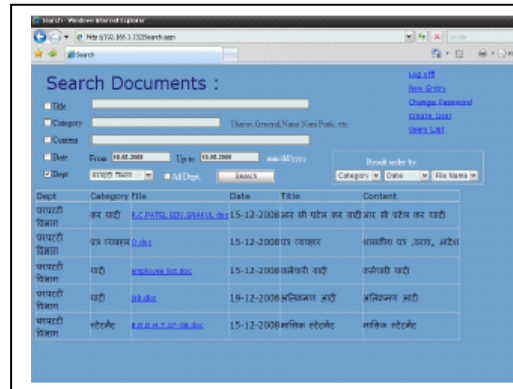


The data from the centralised database can be used for preparation of required documents. Selective access is given to every user from different departments to retrieve documents or reports of other departments. For example, if the reports of water supply are required by construction department, these can be retrieved by the official from the

construction department, who has been given user access. The documents from the DMS can also be utilised for documents to be published on the website.

iii. Complaint Redressal System (CRS)

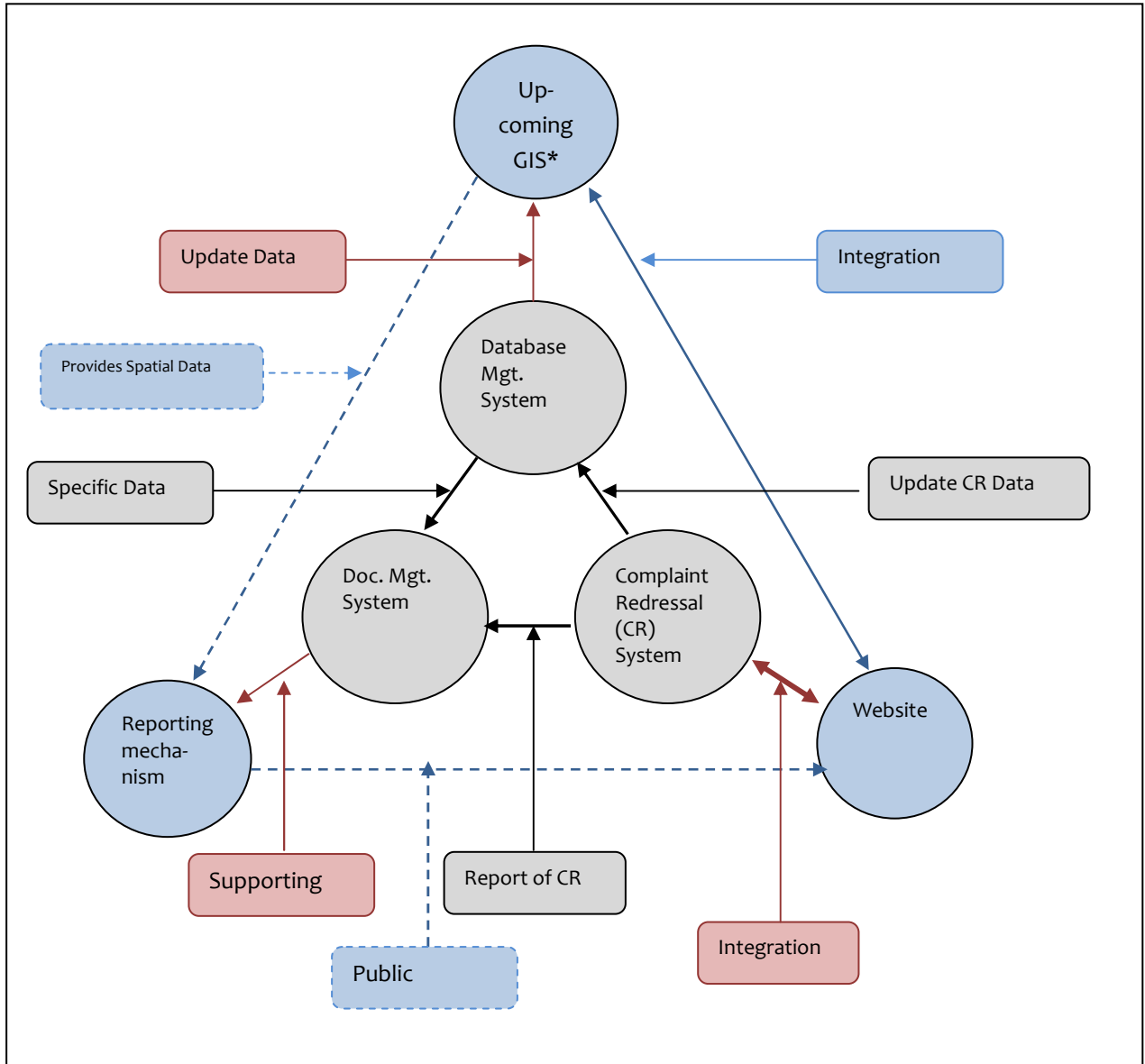
The CRS, an online system, which provides information about complaints received and redressed, which can be updated simultaneously by various departments across SWMC. Separate interface has been designed for entry of information of complaints as and when they are received.



Complaints received at SWMC in person are recorded in register (hard copy) and an entry is also made in the system by the person responsible for recording complaints. If a complaint is received directly by an official from respective department, the official makes entry into the CRS. Since the CRS is linked to the website, the citizens can directly lodge complaints on the website itself, which is immediately updated in CRS and DBMS. Real-time reports can be generated by the concerned official on need basis. All the data

is updated in the central DBMS. The components and functional integration is depicted in figure 1.

Figure 1: Components of Present MIS and Integration Planned



Note: The figure depicts the final integration after GIS is ready.

7. Configuration

- The hardware configuration, system architecture and programmes developed have seamless integration within the sub-system and the website. Once the GIS is ready, it will also be integrated with the MIS. It is believed that the present integrated system is most suited to SWMC as it is very flexible. The programming of MIS is done in SQL and .net. Both these languages are technically flexible for coding. This enables the programmer to modify the system as per changing needs for reporting (which are minor) within short duration and without putting in too much of time or efforts.
- Therefore, it is comparatively easier to conduct analysis of data, consistent (The configuration does not lead to errors and so the results generated are consistent i.e. the reports generated are accurate and as per the records), stable (there are hardly any incidents like 'computer crashed', 'computer gets hanged', 'software gives errors', 'computer is slow', etc) and facilitated modifications in reports without making any significant changes in coding. The MIS is so designed that the hardware and software combinations are appropriate.
- It can handle large amount of data, and is also compatible to the GIS, which is expected to be operationalised in near future. It is compatible with most of other software's and databases of similar types. It also enables designing of user friendly and aesthetic interfaces and provides multiple features. It is very useful for generating reports. Details are presented in Annexure I.

8. Functions of MIS

- **Water Supply: Maintaining Information on Water Distribution Source, Water Connections**

The details of area wise water distribution source, water connections like diameter of the pipes, type of connection (residential, commercial, etc.) are also maintained in the database. This information is retrieved and report is generated as per requirement.

- **Water Supply: Water Tax Recovery**

The entire cycle of water tax billing and recovery is done through the system. The system generates water tax bills on quarterly basis (specifically in July, October and January). These bills are distributed to the citizens in the same period. Thereafter, collection against bills is done and the system is updated daily. Report of all collections is generated on daily basis before 11 am and signature of authorised persons is obtained. The report is filed for record. There is now faster recovery of water tax due to timely generation of demand records in shorter duration. All bills are generated in one day and dispatched within next day in entire city by Property and Water Tax Departments. Thus, this process at SWMC's end takes two days.

The recovery record of every property is updated in the MIS on daily basis (throughout the day) whenever receipts are given and data is entered. This enables the MIS to generate 'Recovery Report' on daily basis until last day of the quarter and final report is generated on the last day. For this reason, the property tax collection currently stands at 95 to 99 percent within stipulated time. Before the MIS implementation in 2003, the tax recovery was upto 90 to 95 %.

- **Administration: Payroll, Pension, Provident Fund Maintenance**

This is also important as the same system generates these details for the staff involved in implementation related to water supply and sanitation (i.e. water tax, health and sanitation, administration and construction). The data of staff is maintained along with loans, deduction values and increment if any, in basic. This is maintained by the Establishment Department. The pay bills, monthly summary, departmental summary, professional tax list and all related reports are generated before seventh of every month. A soft file is generated by the system, which is submitted to the bank before seventh of every month for auto posting in particular accounts of SWMC employees in the bank. The cheques are also deposited before the above date. The employees withdraw their salaries accordingly. Due to this system, all records at SWMC and the bank are updated

immediately. This entire process takes only two to three days. Similar process is followed for PF and pension.

- **Complaint Redressal**

'Single Window Scheme' is implemented at SWMC for accepting complaints, which are maintained department-wise. When a citizen gives a complaint, the information is entered department wise in the system and complaint number is generated. The information is immediately made accessible online to the respective departments. This report is printed by relevant officials at the end of the day and action is taken either on same day or next day, irrespective of whether it is a working or non-working day. Once the problem is solved, the concerned department updates the information in the system, thus updating the database. A report is generated on daily basis in the morning and a hard copy is also filed by the respective departments.

- **Generating Reports**

The standardised reports are generated for all departments both on scheduled time / date and also on real time basis. The formats for these reports are in accordance with the specifications given by Government of Maharashtra and in compliance with the ISO 9001-2000 to maintain quality. Apart from that, users are given facility to choose / filter fields and generate their own report as required. Graphs can also be generated for these reports. A facility to save and retrieve these reports is also available. Due to this, their time is saved and they do not have to depend on the software engineer to customise reports for them.

- **Feeding Data to GIS and Website**

The MIS also provides data for the website. The work on GIS is under progress. Once this is ready, the MIS will be integrated with the GIS also.

- **Facilitating Decision-Making**

The above process facilitates decision-making for all users at all levels and action can be taken. It saves time and action can be taken as per norms defined in the Citizens' Charter, respective Government Resolutions and Bye Laws.

9. Risks Associated with MIS and Vulnerability to Risks

Many important decisions of SWMC management are based on the MIS. Several departments depend on reports, which enable them to take action and maintain records. If the system is ineffective, or not in accordance with the requirements, the decisions based on outputs of the system may increase the risk in number of areas in planning and implementation. The risk can extend to other users disrupting workflow of the SWMC.

However, this is effectively mitigated by sound compliance with the requirements and timely inputs and outputs. Ongoing maintenance and support for software and hardware is available in-house for full time and smallest problem can be sorted immediately. The system has been implemented successfully and no major issues have occurred since last five years in functioning. This indicates that vulnerability of the system to above risks is minuscule.

10. Impact

The impact of MIS is as follows:

- Increase in efficiency in service delivery.
- Reduction in response time in context of complaint redressal from within 48 hours to within 24 hours.
- Faster tax recovery due to timely generation of demand records in shorter duration.
- The property tax collection currently stands at 95 to 99 percent within stipulated time. Before the MIS implementation in 2003, the tax recovery was upto 90 to 95 % – at present, above 95 percent tax is collected within stipulated time.
- Effective documentation practice across all departments.

- Adequate compliance with norms as per Citizens' Charter and reforms required for development programmes specified earlier.

11. Opinion of Users

The users from all the departments find the system very useful and it has reduced their efforts considerably. They do not have to prepare reports manually. It also saves their time, which would have otherwise been spent particularly on tracking outstanding and recovery of taxes and taking action against defaulters.

12. Challenges

The foremost challenge faced in MIS development was that of shortage of appropriate trained human resource. Only one engineer managed all operations – both software and hardware, including laying cables for Local Area Network (LAN). Apart from that, support required in terms of programming, information, etc. was not available. This had to be generated by the engineer, which was tedious and time consuming. However, it helped to have a better control over the process and thorough knowledge regarding the system facilitated its development. Another challenge faced was that user requirements changed several times and modifications had to be made in the system accordingly. This delayed the process of testing and implementation. Moreover, major modifications had to be made in the database when the payment of water tax was changed from annual to quarterly. Accordingly, many procedures had to be modified and changes had to be made in the database and relevant functions.

13. Scope for Upgradation and Upscaling

The system has a capacity to manage large databases and is compatible for seamless integration with other system. Being flexible, it can be customised for requirements of large corporations also with the same hardware and software.

Conclusion

The approach of SWMC to harness technology for improving service delivery and maintaining quality is already rendering results. Given the configuration and potential for integration, it will continue to strengthen the systems for water supply and sanitation in the long term as well.

System Architecture, Specifications, Process of Development of MIS

System Architecture

The system is multi-user and all the data entry and reports generated at client side (i.e. users) and data is maintained on server. It is driven by database server.

Software Specifications

The MIS is an integration of three subsystems.

Database Management System

This subsystem maintains data and reports related to property tax, water tax, payroll, provident fund, pension, rent recording of shopping complexes, and birth and death registration certificates.

Programming: Visual Basic 6

Database : SQL Server 2000

User Interface: Visual Basic 6

Complaint Redressal System

This subsystem maintains data and generates reports related to complaints, inward & outward records (in progress)

Programming: Visual Basic 6

Database : SQL Server 2000

User Interface: asp.net 2.0

Document Management System

This subsystem is meant for documentation management for all departments (maintaining important documents in MS Word, MS Excel, etc). The documents are maintained on server and the user can access and edit documents from any computer in LAN.

Programming: Visual Basic 6

Database : SQL Server 2000

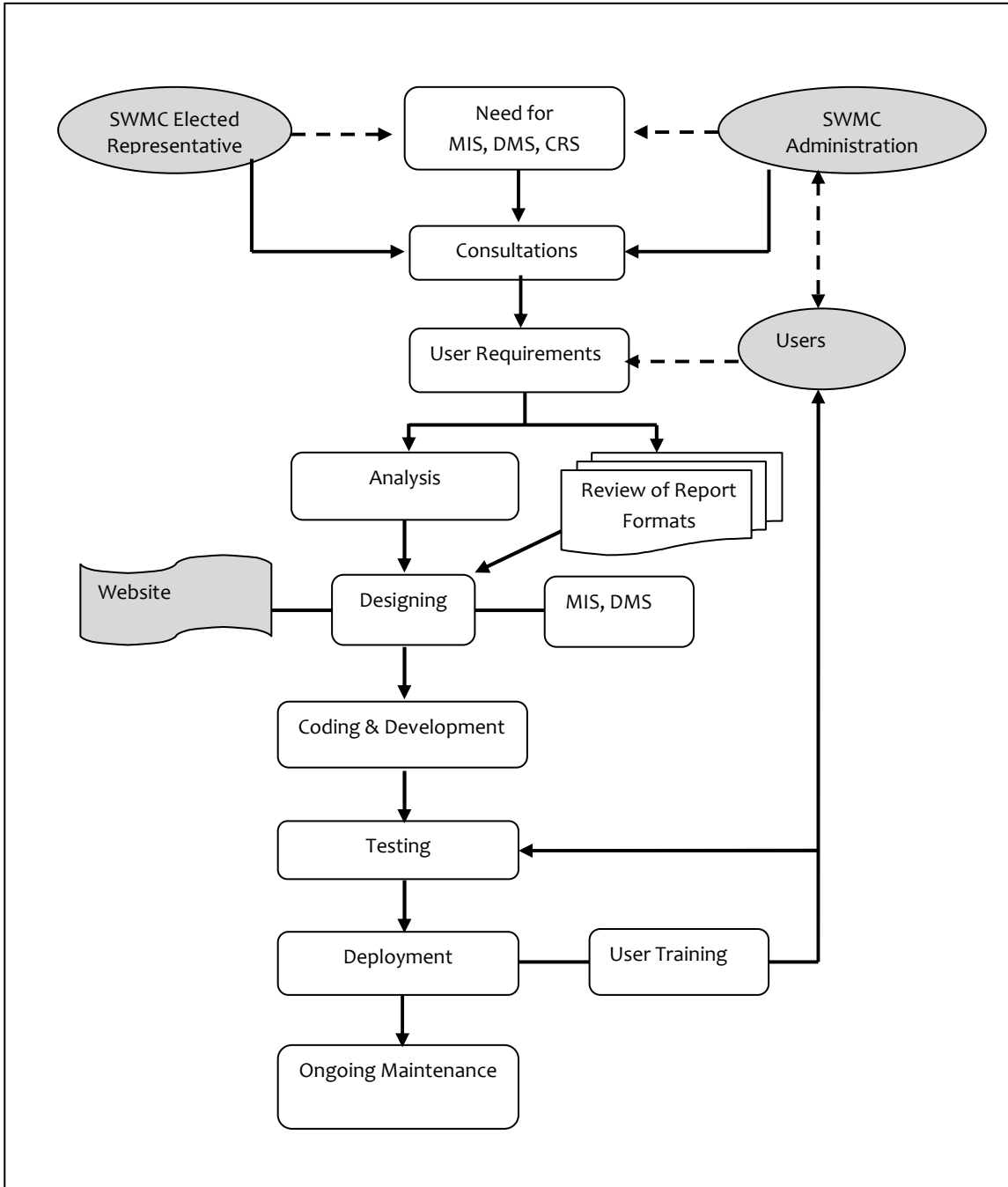
User Interface: asp.net 2.0

Hardware Specifications	
Server	Client (user end)
Processor : G1 3.0	Processor : Pentium Core 2 Duo 2.0
Hard Disk : 80 GB	Ram : 512 MB
RAM : 4 GB	Hard Disk : 80 GM
Other : Giga byte Card	Network : 100 MBPS
	LAN Cabling : CAT 6

Advantages of the specific configuration

It is believed that the present system is most suited to SWMC as it is very flexible, it is comparatively easier to conduct analysis of data, consistent, stable and facilitated modifications in reports without making any significant changes in coding. It can handle large amount of data, and is also compatible to the GIS, which is expected to be completed in near future. It is compatible with most of other software’s and databases of similar types. It also allows user friendly and aesthetic interfaces and provides multiple features. It is very useful for generating reports.

Process of Development of MIS



Technical Stages in Development of MIS

Stage	Particulars	Duration
1. User Requirements	The user requirements were taken by consulting officials from all the relevant departments. These were compiled and categorised.	15 days
2. Analysis	The data fields were mapped and relations were established among the fields. The unstructured information acquired was converted into structured information.	30 days
3. Designing	The tables and dataflow were designed.	30 days
4. Coding and development	Coding and designing of user interface was designed in VB 6.	25 days
5. Testing	The 'Beta Version' of the system was made and tested. Debugging was undertaken.	30 days
6. Implementation	The system was deployed on all the client computers and user training was given. In this case, no specific manuals were prepared. Instead, a hands- on training was given to the users.	10 days
7. Maintenance	Making modifications as required, debugging	On-going