USAID
FROM THE AMERICAN PEOPLE

Assessment of E-Governance in Municipalities, India

Final Report

Indo-USAID Financial Institutions Reform and Expansion Project—Debt & Infrastructure Component (FIRE-D Project)

USAID-TCGI Contract No. 386-C-00-04-00119-00

April 2005

This publication was produced for review by the United States Agency for International Development. It was prepared by The Communities Group International (TCGI), in partnership with AECOM.

Indo-USAID Financial Institutions Reform and Expansion Project—Debt & Infrastructure Component (FIRE-D Project)

USAID-TCGI Contract No. 386-C-00-04-00119-00

National Mission Mode Project

e-Governance in Municipalities

ASSESSMENT PHASE

Synthesis of Principal Findings and Conclusions and Inputs for Design of NMMP

Final Report

April 2005

INDO-USAID FIRE(D) PROJECT
NCR CONSULTANTS LIMITED

Executive Summary

Background

The quantum leap in Information Technology (IT) has provided an exciting platform for making rapid strides in providing better quality municipal services to citizens. Hence the avowed concept of 'good governance' has been facilitated by IT much more than other administrative philosophies of the past centuries. Electronic governance has become the ultimate mantra for enabling good governance in its truest sense.

NCR Consultants Limited (NCRCL) was appointed by USAID FIRE (D) as consultants for the Assessment Phase of the National Mission Mode Project for e-Governance of Municipalities. The study was conducted between January and March 2005. The study plan of FIRE (D) consists of two phases: Assessment Phase, resulting in this assessment report, and a Design Phase, which will follow the present study.

Dimensions of Assessment

The assessment was conceptualized with six key dimensions:

- Linkages between government (GOI/State) policies and the initiatives at the ULB level.
- ULB organization with respect to the introduction of e-Governance.
- Key municipal functions, their processes and reengineering as part of e-Governance activity.
- e-Governance infrastructure.
- System suitability/experience, ease of deployment, and costs.
- Lessons learnt.

The above tasks were carried out by visits to four state headquarters (Tamil Nadu, Karnataka, Andhra Pradesh & Maharashtra) and seven Urban Local Bodies (ULB) namely Hyderabad, Vizag, Coimbatore, Trichy, Bangalore, Kalyan and Mumbai. This assessment report is compiled based on the learning from these visits.

Deliverables

In addition to addressing the above six dimensions, the terms of reference for the study specifically required the following eight deliverables:

- Prioritized list of candidate core processes for reform and BPR.
- Broad overview of functional architecture requirements.
- Broad overview of any changes to laws and/or regulations required by implemented solutions (i.e., governing municipal laws, sector regulation, information security and privacy issues, etc.).
- Broad overview of approaches to deployment of technology.
- Preliminary change management plan.
- Broad implications of project development costs for NMMP design.
- TOR for Design Phase.
- Input(s), if any, required by MoUD for preparation of the scheme for NMMP.

Methodology

At the state level, discussions were held with the Secretary of Urban Development Department and the Secretary of IT, besides the Secretary of e-Governance, wherever available. IT Policy initiatives and the long-term plans figured in these discussions. The obstacles faced by the state and the lessons learnt there in also came out in these discussions. The Director of Municipal Administration (or equivalent) was the point of contact in the area of e-Governance in municipalities. At this level, more direct inputs impacting e-Governance were obtained. At the ULB level the interactions commenced with the Commissioner of the municipality. This was followed by detailed visits to the individual departments concerned. This provided an understanding of the current situation regarding e-Governance in the ULBs. As a downstream benefit, the knowledge and commitment levels of the staff were also observed.

The study team visited the service centers and participating bank, as appropriate, where the e-Governance facilities were offered to the public. This is the place of ground level citizen-ULB interface and valuable lessons were learnt at this stage. Detailed discussions with bank officials were held to get a clear understanding of the contractual agreements between the ULBs and the banks. The teams also met various service providers (including NGOs) involved in areas such as hardware maintenance, software development, etc.

Apart from the primary data collection made during the visits, secondary sources for the study consisted of various publications of Government of India, World Bank and other institutions/agencies, as well as books by eminent authors. Some source literature like budgets, and support documents pertaining to various technical aspects were also obtained during the visits.

Framework for the Study

NCRCL adopted a two-stage framework, one for the assessment and the other for developing the TOR for the Design Phase. While the assessment framework helped to understand current e-Governance practices, the design framework contributed to structured development of the Design Phase TOR.

The **assessment framework** took a holistic view for the study and approached the assessment through a three-pronged approach for analyzing:

- **Policy framework** to understand policy directions and regulatory supervision for the e-Governance initiatives.
- **Process elements** consisting of technology, HR, regulatory, citizen interface and interfaces with external agencies like banks and service providers.
- **Implementation aspect**s taking into account activities in implementation and sustainability.

The **design framework** for the development of the TOR for Design Phase consists of the following elements:

- **Policy -** the foundations upon which e-Governance is built. It provides the basis for the other three elements.
- **Process** - involving existing practices, re-engineering and migration to the proposed system.
- **Technology** - covering three aspects namely design, adoption, and absorption.
- **Human Resource** – the key element, which contributes to the success of these initiatives.
- **Implementation** – aspects relating to deployment of various initiatives.

Findings

The findings of the Assessment Phase are discussed in two chapters. Chapter 2,"**Synthesis of Assessment',** provides a state/city-wise snapshot of the current situation with respect to e-Governance in four states and seven cities. Chapter 3, **'Principal Findings'**, extrapolates from the specific state/city-wise findings of the previous chapter and presents them in a summary format under the broad themes of Policy, Process, Technology, Human Resources and Implementation.

Synthesis of Assessment

The *linkages* between the three tiers of government (central/state/ULB) play a crucial role in the implementation of e-Governance initiatives. In some states there is a focused approach to e-Governance (AP/TN) and in others it is emerging (Karnataka). In the case of Maharashtra, the initiatives at the state level are yet to take a formal shape.

Certain ULBs have made significant progress with a comprehensive e-Governance plan, which becomes (or could become) the eventual state model (Hyderabad/Kalyan). Some ULBs have added their own unique models to the state initiative (Vizag). Statewide accounting reforms (TN) and ULB–specific accounting systems (Bangalore/Hyderabad) have had a favorable impact on governance initiatives.

Unfortunately, in almost all the states visited there is absence of integration of e-Governance modules, specifically as relates to accounting.

Besides the governmental initiatives, certain NGOs and citizen forums have played a crucial part. Mention must be made of NISG, CGG (Hyderabad), PRAJA (Mumbai), and BATF (Bangalore) in this context. Besides, certain favorable *Public-Private Partnerships* have provided added dimensions to e-Governance endeavors. For example EGF (Bangalore) is supporting the Nirmala Nagara Project by providing free software development support under an open source model. Banks have extended support to run service centers to widen service delivery points.

Leadership and drive are two significant aspects deciding the success of this exercise. Some heads of ULBs have provided the above qualities with alacrity, which contributed to the success of the e-Governance missions. The flip side is that long-term planning does not figure prominently in these initiatives, perhaps due to the relatively shorter terms of office of the top bureaucrats.

A comparative assessment of the states/ULBs under major parameters provides scope for a quick 'snapshot' of these entities. The following Table A provides a synopsis of macro planning, technology deployed, HR issues, and other relevant aspects for three state level e-Governance initiatives studied. . Table-B covers some of the specific aspects of the ULB initiatives, including progress achieved, for leadership, funding, citizen focus, technology and Disaster Recovery (DR) and BCP issues.

Table A: State-level e-Governance Initiatives

Aspects	Andhra Pradesh	Karnataka	Tamil Nadu
1. Macro Planning	SUVIDHA: a DMA initiative for computerizing all ULBs in AP	State level plan Nirmala Nagara under progress, BATF & ADB funding	Early initiatives for computerization of all ULBs and migration to double entry accrual accounting system
	e-SEVA: a state level initiative for providing citizen interface	Separate department for e-Governance but initiatives in infant stage	Policy for using IT as a tool with clear focus on better governance
2. Infrastructure	Hardware infrastructure, connectivity, etc., have been well planned Data center for ULBs established – integrated with APSWAN	Data centers yet to be established	Hardware infrastructure, connectivity, etc., have been well planned
3. Development Approach	Contracting development of software	Novel approach to PPP through involvement of NGO for development; use of open source based application development	Under World Bank funding for TNUDP, computerization of all ULBs has been done
	Computerization of all processes carried out without major BPR	The state level program addresses BPR issues as a part of implementation of accounting system	Computerization of all processes carried out without major BPR
		Involvement of credible government agencies like Survey of India in the e-Governance initiatives	
4. Human Resources	No state level HR approach – arrangements on case to case basis	HR plan well made, proper legislative changes in the areas of IT staff, accountants, engineers, etc.	Qualified computer professionals appointed through competitive selection procedure
			Extensive training facilities in the areas of computer operations (under TNUDP) and accounting (CA firms)
5. Citizen Interface	eSeva counters have been established	Yet to be decided	This aspect is left to the individual ULB for the usage of a combination of facilitation counters and banks
Note: Maharashtra has not been represented in this table, as study is restricted to OCMS in Mumbai, and KDMC			

Table B: ULB level e-Governance Initiatives

Sl	Parameters	Hyderabad	Vishakapatnam	Bangalore	Coimbatore	Trichy	Kalyan	Mumbai
1	Leadership	Strong leadership and commitment during design stage; the leadership continues	Strong leadership and commitment during design stage; the leadership continues	Participative leadership style with excellent response from the staff	Strong leadership and commitment during design stage, the leadership continues	Strong leadership and commitment during design stage, the leadership continues	Participative leadership style with excellent response from the staff	
		Continuity in leadership at the Commissioner level during implementation	Continuity in leadership at the Commissioner level during implementation	Continuity in leadership at the Commissioner level during implementation	Continuity in leadership at the Commissioner level during implementation	Continuity in leadership at the Commissioner level during implementation	Continuity in leadership at the Commissioner level during implementation	
2	Funding	Self-funded by ULBs – no major external assistance	Funding through a combination of self and market forces	External funding by BATF initially, then self-funding	Mix of State and self-funding	Part of State initiatives	Self-funding	Self-funding
3	Citizen Focus	Citizen service counters established; extremely popular	Citizen service counters established; extremely popular	Citizen counters and kiosks established with positive response	Citizens facilitation centers operating well	The response from citizen e-Governance initiatives is high	Citizen facilitation centers established	Grievance – logging system well understood and extensively used
		Integration of both state level and city level services for citizens through e-Seva	Integration of both state level and city level services for citizens through e-Seva	Transparent public review through PROOF		Extensive coverage of the city by banks and facilitation centers		Grievance communication to concerned departments done immediately
4	Technology	Technology plan evolving	Exhaustive information on web promoting transparency and friendliness	Technology plan evolving after implementation	Adequate provisioning of Hardware		Adequate provisioning of hardware	Contractual obligations of the system providers differ
5	Disaster recovery, BCP issues	Disaster recovery, BCP issues yet to be addressed	Disaster recovery, BCP issues yet to be addressed	Disaster recovery, BCP issues yet to be addressed	Disaster recovery, BCP issues yet to be addressed	Disaster recovery, BCP issues yet to be addressed	Disaster recovery and BCP not really implemented	Disaster recovery, BCP issues yet to be addressed

Principal Findings

Policy

This chapter presents policy issues as they relate to e-Governance at the state and ULB levels. The state initiatives studied indicate a lack of clarity among various stakeholders on various aspects relating to e-Governance. Guidance, for example, on norms for data standardization and financial support for good initiatives are found wanting. Lack of an IT Cell at the state government level and a supportive IT policy addressing municipal issues have delayed implementation of the initiatives. Regulatory matters and integration of various ULB level initiatives have not normally been addressed at the state level. Issues related to comprehensive plans, leadership continuity, top management initiatives, outsourcing, and funding have emerged in this context at the ULB level.

Process

The key process issues relate to the quality of data and the data collection effort for digitization. Lack of data standardization negatively impacts state level and even district level summarization. Clear documentation for confirmation of ownership of data is an important issue at the ULB level. Security and privacy issues in relation to data seem to be the least addressed issues.

The integration between functional modules and accounting is a key issue that has not been addressed in most cases. Various modules (property tax, building plan approval, works module, etc.) exist as stand-alone modules. This coupled with lack of integration with the accounting module, undermines the integrity of data and reliability of MIS for the proper management of the ULBs. Also, various aspects in relation to computerization, reports for enabling decision-making, and appreciating the need for correct and complete data are not clearly understood by the concerned officials. Except for a few specific cases like Bangalore and Kalyan planned reengineering has not been attempted.

Except in a few cases, proper legal and technical arrangements at the ULB level for associating with NGOs and service providers like suppliers, banks, etc. were found wanting. Participation of citizens in planning and review of e-Governance initiatives (as contemplated under the 74th Constitutional Amendment) was not seen except for a few instances. However, citizen interaction with respect to their grievances was seen to have improved with the introduction of grievance redressal modules.

Technology

Technology is the backbone for any e-Governance initiative. Proper efforts with respect to infrastructure, planning, development and deployment have played a major role in all the successful initiatives. Appropriate infrastructure for e-Governance, models of infrastructure provisioning, and the suitability and ease of deployment have provided the basis for successful deployment of e-Governance technology.

Basically 2-tier (TN, Hyderabad) and 3-tier (Karnataka, AP) software architecture was observed in the design of various e-Governance modules. Varied deployment architecture was noticed. Most of the systems used Pentium/Xeon models for server and Pentium for clients. Issues noted in relation to adoption of technology, maintenance, planning for capacity, evaluation of software and systems (including open source options), and setting up of data centres have influenced successful implementation. Connectivity, for enabling speed and high volume data transfer, is emerging as a major issue. Various types of connectivity like radio frequency (Coimbatore), optical fibre cables (Kalyan), apart from leased lines and ISDN options were observed. State Wide Area Networks (SWANs) have been set up in a significant way in one of the states (AP). Integration of the e-Governance application with external systems like GIS or EDMS was not observed in any case; in future, this could become a very crucial factor for success of integrated applications. Most of the ULBS have established websites, which vary with regard to the content offered to the citizens. Use of interactive voice technologies was also observed. Citizens service centres, kiosks for providing service interfaces (e-Seva in Hyderabad) and call centres for taking citizen complaints were observed. Documentation with regard to technical aspects and business continuity planning/disaster recovery system has not been addressed agendas part of e-Governance initiatives.

Funding of the initiatives has been done in different ways. While some have been funded through specific state level projects (World Bank - TNUDP) in TN, self-funding (Kalyan), PPP funding through NGO (Bangalore), in general ULB funds and state/central scheme funds have been used for these initiatives. Several models of infrastructure provisioning including provision of manpower, etc. are also emerging (e-Seva in AP), A true and clear picture of actual cost of initiatives has not emerged due to lack of data, multiple funding sources, and varying fund flow periods. Also there is significant variation in the cost details obtained.

Suitability and ease of deployment depend on the system development process, which in general has not been very systematic or structured. Except in the case of TN, use of local language has not been a priority, though in some of the recent initiatives this aspect is being taken up. The extent and level of vendor dependence varies with the in-house capacity (as observed in the case of TN, Hyderabad, Vizag). In several instances delays in implementation are due to such over dependence on the vendors, caused by lack of in-house knowledge in this regard. Intellectual property rights issues are gaining importance in

relation to the ownership of software and its design. System auditing will decide the extent of controls/robustness of the software.

Human Resources

HR plays a significant role in developing a good governance culture. It calls for mind set change with 'champions' to execute the same. HR management is not addressed in a focused manner. Apart from lack of technically qualified staff, the low levels of commitment and literacy coupled with a mismatch between qualifications and job profile reduce the effectiveness of employees. Inadequate planning is a bane of all HR activities. An almost total lack of capacity building initiatives and training programmes has come in the way of the rapid progress of e-Governance plans. Training programmes do not address issues relating to governance and become ineffective. Lack of knowledge on technical matters and too much dependence on external help have resulted in delays in internalization of the initiatives.

Implementation

In the implementation stage, project planning is almost totally absent. Lack of proper project management tools (like PERT charts) and structured review mechanisms have contributed to implementation-related problems. Understanding of issues in implementing software projects (especially on such a huge scale), and above all absence of project champions have been identified as major bottlenecks in this regard. Change management as an issue has not been taken up in any of the initiatives, resulting in inadequate or no communication with various stakeholders (except for cases like Bangalore/Kalyan). This possibly could result in resistance to change, which has been identified as a factor in this regard. Lack of planned communication strategies and methods have also contributed to problems in relation to implementation.

Input for Design of NMMP

Based on the findings during the Assessment Phase, inputs for the design of NMMP have been identified under five broad groupings of policy, process, technology, HR and implementation.

Policy

Policies provide the framework for e-Governance design. Institutional readiness for e-Governance in municipalities is of prime importance and has to be dealt with at all levels of the governance setup (central, state & ULB). At the central level standards for ensuring data correctness/uniformity, design and deployment of various modules need to be addressed. Such standards should be supported by guidelines on technology, implementation, and change management aspects in order to provide uniformity and clarity at the national level. These along with the National Accounting Manual, Model Municipal Law, etc. would provide excellent inputs at various levels for implementing the e-Governance initiatives. Certain legal/regulatory changes may also be required (Annex 1 provides a broad overview of possible regulatory changes in respect of human resource recruitment and retention, addressing of e-procurement in the transparency laws, provision for maintenance of electronic records, enabling legal acceptance of digital signatures and e-forms, provision for modern audit tools, aspects relating to right to information and certain jurisdictional issues.)

At the state level, consolidation of ongoing parallel initiatives in various ULBs is very important; otherwise resources are wasted due to a lack of a common plan and supervision. Continuity of the leadership at the ULB level and a well structured recruitment and retention policy with regard to human resources are key issues that need to be addressed by the state. Dovetailing of state level IT policy/initiatives with those of the urban sector and having a municipal e-Governance policy would help in quality design and implementation of these initiatives. On the infrastructure front, the states have to address connectivity (SWANs and broad brand connectivity); connectivity issues can possibly create a bottleneck in cascading the benefits of the e-Governance to citizens.

At the ULB level, where the actual e-Governance initiatives are implemented, the management of the ULB needs to be proactive and provide policy directives to various levels for implementation. Appropriate policies and clear documentation for PPPs and modern payment methods (e-payments) enhance the quality of implementation. HR is a major issue at the ULB level and an internal team (with suitable staff appropriately trained and well guided) needs to be involved from the initial changes of implementation. Continuity of the implementation team should be ensured for achieving a planned success. Reviews and controls during implementation and operational/financial/security controls post-implementation need to be maintained.

Process

Process robustness contributes to the achievement of e-Governance objectives. Issues relating to data and functional efficiency of e-Governance modules define the robustness. In relation to data, ownership, creation, and security issues are the key. Unreliable inputs, lack of integrity in data resulting in incorrect outputs and possible hacking of database can result if these are not addressed.

The functionality of identified e-Governance modules and their sequencing play a very important role in the successful implementation of the NMMP. The assessment has identified 11 different modules and outlined their functionality. These modules are in order of their sequencing:

- Property tax
- Financial accounting system
- Personnel management system
- Birth and Death Certificate
- Food license
- Water supply
- Citizen grievance monitoring
- Project/works management
- E-procurement
- Building plan approval
- Solid waste management.

The rationale for sequencing is dependent on the need and preparedness of various ULBs. However, establishment of reliable database, enabling increased revenue for the ULB, linkage to accounting software, addressing the issues of various stakeholders like citizens/suppliers, etc. have determined the sequencing of the modules. Thus, based on the actual ground realities the implementation of these modules needs to be planned with these inputs. Annex 2 provides details/rationale for sequencing.

The assessment has also identified the functionalities of these modules. For each of the modules, objectives, functionality (including documents, registers, reports, etc.), MIS aspects, regulatory/compliance issues and key data attributes (key fields required in the software) have been identified (Annex 3).

Technology

The technology backbone for e-Governance initiatives in the context of the assessment needs to address issues related to establishment of IT standards and policies with regard to: security, privacy, database formats/design, use of local language, technology integration and usability of the software. A generic reference information architecture for e-Governance is discussed, taking into account applications, software infrastructure, hardware infrastructure and others like data centers and connectivity.

Detailed considerations for design of information systems have also been examined, including consideration ubiquity, durability, interpretability, robustness, security, performance,

scalability/replicability and integration aspects. Establishment of SWANs with appropriate connectivity and guidelines for proper convergence of technologies are required at the state level. Adoption of correct technology platforms, providing proper hardware with an appropriate data backup strategy will provide the required robustness for the implementation. (Annex 5 provides a comparative profile of open source and proprietary systems.) Adoption of suitable software development life cycle, establishing security and audit trails will ensure good quality and controlled development of various software. Annex 4 provides details of software architecture design and data centre deployment. Testing of the software for its functionality with involvement of credible agencies like STQC will ensure quality of software. Provision of various integration protocols and interfaces, and integration with GIS will provide access to various users and external systems (Annex 6). Business Continuity Planning and Disaster Recovery issues need to be taken up seriously; issuing guidelines for various types of disasters (technical/physical/environmental) has to be addressed (Annex 7).

The need for deployment methodologies and guidelines for various technologies based on best practices has been highlighted. In this regard database creation and digitization, data maintenance, set-up and maintenance of data centers, set-up/installation/maintenance of software/hardware, use of existing infrastructure, and access control security have been identified as priority issues that need to be dealt with in municipal e-Governance initiatives. Indicative cost estimates for deployment of technology have been provided assuming that the states will share the cost of software development and certain other major infrastructure relating to BCP/DR, etc. The details are given in Annex 8.

Human Resource

Municipal staff is the vehicle to achieve the objectives of e-Governance initiatives. Hence there is an urgent need to redefine HR policies with new job descriptions, recruitment procedures, outsourcing, etc. Capacity building emerges as a major tool in building institutional abilities to deliver high caliber services to citizens. Training is an integral aspect of this activity. The support of institutions like NISG could be sought to provide robust training to the concerned officials involved in the initiatives.

Implementation

Implementation aspects address project planning and management, and change management issues. (Annex 10 addresses conceptual aspects of change management and identifies key phases and e-Governance implementation activities.) Both project planning and change management offer crucial inputs for the success of an e-Governance project. Apart from the preparation of plans, MOUs/service level agreements (SLA) provide clarity on the roles and responsibilities of various parties concerned with implementation. (Annex 9 provides an overview and content of various MOUs/SLAs covering aspects relating to software procurement services, hardware/network procurement and implementation services, service agreements with banks/private service providers, agencies for support/verification of data and testing of software, and annual maintenance/support contracts.) Review mechanisms based on feedback of the status of implementation would provide opportunities for troubleshooting issues as and when they arise. Communication of information and issues during implementation has to be made clearly, making use of various technological options available (phone, internet, paper, CD, etc.). Internalization of various activities using the ULB staff as far as possible (through proper training and orientation) will ensure not only success, but also sustainability of the initiatives.

Study Output

The Assessment Phase provides a platform to amalgamate the learning arising out of various individual e-Governance initiatives. Such an exercise has identified core aspects of e–Governance and provided a guide for the subsequent Design Phase.

The assessment study has developed Terms of Reference (TOR) for the Design Phase. The deliverables of the Assessment Phase provide a gamut of inputs for the Design Phase.

The TOR focuses on four specific tasks for the Design Phase. They are:
Task #1: Designing Functionality of e-Governance Modules and BPR
Task #2: Establishing Standards, Guidelines and Recommendations
Task #3: Designing e-Governance Architecture
Task #4: NMMP Program Implementation and Management

The overall objective of the NMMP Design is to make optimal use of technology and infrastructure to improve the efficiency and accountability of government agencies in order to provide citizens with efficient and effective services and information. The various groups focused upon are:

1. Citizens
2. Executives/staff of ULB
3. Service providers/suppliers
4. Funding agencies/NGOs/PPP actors/media
5. Policy makers

To achieve the above, the Design Phase Consultants need to perform four key tasks that have been identified for the Design Phase. They are summarized as follows (see Chapter 5 for details):

Task#1: Designing the functionality of e-Governance modules and BPR: The Design Consultants will develop functional design and Business Process Reengineering guidelines for the nine e-governance modules identified. The detailed functional design for the modules will be based on their priority and sequencing. It will address issues like functionality, maintenance of records, reconciliation of items between modules, control and audit issues, etc. Since the ULBs in various states follow various processes and practices, the Design Consultants should identify certain common state-level approaches to redesigning the various process modules to be implemented in the ULBs. This should take account of similarities at the local level; define standard features for the core business processes; identify key approaches and methods for enabling process changes based on requirements of various modules; study intra- and inter-process relationships; carry out data analyses to map functions to data and identify types, sources and ownership of data for processes under various modules; identify controls for various processes; identify process documentation and procedures for recording and establishing any changes in the processes (in future) in operating environment, and so on.

Task#2: Establishing data standards and conventions: The Design Consultants will develop macro-level META-DESIGN, which will have an over-arching influence on the remaining tasks under both the Design Phase and the Implementation Phase of the NMMP. The Consultants should prepare standards, guidelines and recommendations, wherever appropriate, around the following broad areas:

- Standards for Data/Database
- Standards and Guidelines for Security
- Guidelines for Privacy
- Guidelines for Software Architecture
- Standards, Guidelines and Recommendations for Technology Infrastructure
- Guidelines and Recommendations for Disaster Recovery & Business Continuity Planning
- Standards and Guidelines for Adoption of Local Language
- Standards for Integration Technologies
- Standard Software Development Lifecycle

Task#3: Designing e-Governance architecture: The Design Consultants will formulate the detailed design of the e-Governance solution based on the proposed functionality as envisaged in Task #1 and as per standards identified in Task #2. The ultimate design of the system will be in accordance with the standard framework of information systems which includes

- Application software
- Infrastructure software
- Hardware
- Other infrastructural components

Apart from the above mentioned deliverables, the macro-level considerations/outputs of the system would have to include features like ubiquity, durability, robustness, scalability, applicability, and so on.

Task#4: NMMP program implementation and management. The Design Consultants should recommend a detailed NMMP Program Implementation and Management Plan that address key components such as organizational aspects, tools for implementation, and support arrangements for implementation and sustainability.

- *Organizational aspects*:
  The Design Consultants will formulate organizational aspects that relate to administrative and institutional relationships, and costing and fund flow arrangements. Well thought through organizational arrangements are essential to provide required administrative and managerial support during the implementation and post-implementation period.
- *Tools for implementation:*
  The Design Consultants will formulate the following plans that will address key aspects of the implementation stage: Roll-out Plan; Project Management Plan; Change Management Plan; and Monitoring & Evaluation Plan.
- *Support arrangements for implementation and sustainability*:
  The Design Consultants will develop arrangements that will support and complement the organizational aspects and tools for implementation and contribute to the long-term impact and sustainability of the NMMP. These will be in the form of legislative changes and reforms and training/capacity building guidelines.

Table of Contents

List of Figures

List of Tables

Abbreviations

ADB	Asian Development Bank
AP	Andhra Pradesh
APUSP	Andhra Pradesh Urban Services for the Poor
ASPWAN	Andhra Pradesh State Wide Area Network
BATF	Bangalore Agenda Task Force
BCP	Business Continuity Planning
BIA	Business Impact Analysis
BMP	Bangalore Mahanagara Palike
BPR	Business Process Re-engineering
CA	Chartered Accountant
CARE	Complaints And REdressal System
CCMC	Coimbatore City Municipal Corporation
CDMA	Commissioner and Directorate of Municipal Administration
CGG	Centre for Good Governance
CM	Chief Minister
CMA	Commissionerate of Municipal Administration
CMP	Change Management Plan
DCB	Demand Collection Balance
DD	Demand Draft
DEGov	Department of e-Governance
DFID	Department for International Development
DIT	Department of Information Technology
DMA	Directorate of Municipal Administration
DR	Disaster Recovery
EGF	eGovernments Foundation
FAS	Financial Accounting System
FBAS	Fund Based Accounting System
FIRE-D	Financial Institutional Reforms Expansion – Debt
GIS	Geographic Information System
GO	Government Order
GOAP	Government of Andhra Pradesh
GOI	Government of India
GOK	Government of Karnataka
GOTN	Government of Tamil Nadu
GPL	General Public License
HR	Human Resources
IT	Information Technology
KDMC	Kalyan Dombivli Municipal Corporation
KM	Knowledge Management
LAN	Local Area Network

LIC	Life Insurance Corporation
MCH	Municipal Corporation of Hyderabad
MIS	Management Information System
MIT	Ministry of Information Technology
MML	Model Municipal Law
MMP	Mission Mode Program
MOU	Memorandum of Understanding
MOUD	Ministry of Urban Development
NAM	National Accounting Manual
NEGAP	National e-Governance Action Plan
NGO	Non-Governmental Organisation
NICNET	National Informatics Centre NETwork
NISG	National Institute for Smart Governance
NIUA	National Institute of Urban Affairs
NMMP	National Mission Mode Project
OCMS	Online Complaint Management System
OSS	Open Source Software
PF	Provident Fund
PFA	Prevention of Food Adulteration
PIC	Project Implementation Committee
PICC	Project Implementation & Co-ordination Cell
PPP	Public Private Partnership
PROOF	Public Record of Operations and Finance
PT	Property Tax
ROME	Result Oriented Monitoring and Evaluation
RPO	Recovery Point Objectives
RTO	Recovery Time Objectives
RUP	Rational Unified Process
SDLC	Software Development Life Cycle
SLA	Service Level Agreement
STQC	Standardisation, Testing and Quality Certification
SWAN	State Wide Area Network
Trichy	Thiruchirapalli
TN	Tamil Nadu
TNUDP	Tamil Nadu Urban Development Programme
TOR	Terms of Reference
UDD	Urban Development Department
ULB	Urban Local Body
USAID	United States Agency for International Development
Vizag	Vishakapatnam
WAN	Wide Area Network

1. Introduction & Assessment Framework

1. Introduction

Economic growth and advancements in technology have added new dimensions to the size and approach of governments at all levels. Wagnor's **'Law of Increasing State Activities'** states that there are inherent tendencies for the activities of the various tiers of government to increase. As a result the government sector grows faster than the economy.

Thus the compulsions of increasing demands of the citizens, coupled with rapid growth, make government the biggest service provider in any society. In this role, it is required to interact closely with its citizens. It not only has to be efficient, but also must be really effective in service provision. Osborne and Gaebler, authors of the popular book *"Reinventing Government"* emphatically state "civilized society can not function effectively without effective government"[1]. Hence good governance becomes the bottom line of all state activities. This is true for the urban sector also. Municipalities come under the third tier of government and have all the ingredients of a national or a state government; they also have the same governance and service delivery problems. The major roadblock in providing efficient service is the problem of bridging the gap between government and its stakeholders. **Possibly e-Governance provides the answer**.

The term 'Governance' has been defined in various contexts in different tenors. A comprehensive definition of 'Governance' given by the World Bank states that Governance is "the manner in which power is exercised in the management of a country's economic and social resources for development".[2] The term assumes greater relevance in the context of a developing nation like India. Thus 'governance' becomes the sum and substance of all the activities of a government. Right from the times of Kautilya and Plato, this issue has engaged the horizon of thinking men globally.

'e' stands for 'electronic'. Thus IT is the enabler for achieving the goal of **good governance**. Hence the role of e-Governance is to provide public services in a more customer oriented, cost effective and convenient manner. In this way, services are provided in an altogether different and better way.[3]

This Assessment Report on the e-Governance in Municipalities for the National Mission Mode Project (NMMP) of the Ministry of Urban Development (MoUD) is based on the study conducted during the period January 2005 to March 2005 by NCR Consultants Limited (NCRCL). This study is based on the specific terms of reference (**Annex –1.1**) and contract between USAID FIRE-D Project and NCRCL.

2. National e-Governance Action Plan

The Government of India has approved the National e-Governance Action Plan for implementation during the years 2003-2007. The Plan seeks to lay the foundation and provide the impetus for long-term growth of e-Governance within the country. The plan seeks to create

[1] Osborne D and Gaebler T, "Reinventing Government", Prentice Hall India P Lts, 1992 p xviii
[2] 'Development in Practice: Governance – The World Bank's Experience', World Bank, 1994 p xiv
[3] Holmes D., '*e.gov e-business strategies for government',* Nicholas Brealey Publishing, London, 2001, p2

the right governance and institutional mechanisms, set up the core infrastructure and policies, and implement a number of Mission Mode Projects at the centre, state and integrated service levels to create a citizen-centric and business-centric environment for governance.

In August 2002 the Government of India announced that it would implement a comprehensive programme to accelerate e-Governance at all levels of the government to improve efficiency, transparency and accountability at the government-citizen interface. As an initial step, the Prime Minister's Office set up a high-powered Task Force on IT and Software Development.

The National E-Governance Action Plan was presented to the Hon'ble Prime Minister on 6th November 2003. The Plan has been approved in-principle and endorsement has been given by the government to the overall programme content, implementation approach and governance structures. However, for budgetary outlays separate approvals from Planning Commission/ Ministry of Finance are envisaged.

Key observations made while endorsing the Plan:

1. Adequate weightage must be given for quality and speed of implementation in procurement procedures for IT services.
2. Incorporation of a suitable system for incentivization of states to encourage adoption.
3. Trend of delivery of services through common service centres should be encouraged and promoted.
4. Wherever possible services should be outsourced.
5. Full potential for private sector investment should be exploited.
6. Connectivity should be extended up to block level through NICNET/SWANs.

3. Progress in e-Governance Initiatives

Many state governments have taken innovative steps to promote e-Governance. The state of Andhra Pradesh has undertaken the large Suvidha project, an e-Governance initiative across 100 municipal bodies, whose scope includes designing and developing 15 application software modules, including property tax, vacant land tax, trade license fees, building permissions, works and projects, and finance and accounting. Another popular state program is the Chief Minister's Information System set up in Andhra Pradesh, Madhya Pradesh and Rajasthan, which aims to monitor a range of activities from developmental programs to redressal of public grievances. Tamil Nadu has been extremely successful in modernizing the accounting system in all its municipalities including introduction of accrual based double entry accounting system and computerization of the same. Further, the Government of Kerala has introduced the RD Net Project to connect all 152 block offices in the state with a view to transform local bodies into genuine institutions of self-governance. In terms of delivery of public services, several other states, including Kerala, Maharashtra, Rajasthan and Tamil Nadu, provide online services such as registration of property transactions, vehicles and land records, issue drivers licenses, and offer single-window/one-stop delivery of public services. While some of these are not directly related to municipal governance, they provide the backbone for integration of municipal service delivery to citizens.

Various urban local bodies in India have started e-Governance initiatives that aim to provide services of the Urban Local Bodies in a transparent and more accessible manner to all citizens. In fact, the experiences of some of the progressive local bodies have been the precursors for various state level initiatives. Vishakapatnam, which has taken the lead in these efforts, has many basic services online, including tap connection status, status of garbage pick-ups, sanitation tenders, and building plan status. Hyderabad has introduced accrual based accounting and management information systems, and has also implemented initiatives with regard to

property tax, grievance redressal and e-procurement. Bangalore has introduced a comprehensive, ward-wise management information system that includes a self-assessment property tax component and provides information to the public on the city's budget. Bangalore has also successfully shifted to a fund based double entry accrual based accounting system and introduced a management information system. Coimbatore has computerized its database for property taxes and water charges, based upon which it has developed an accounting module, grievance reprisal module, etc. Kalyan-Dombivili has been able to integrate most of its modules, which has resulted in increased revenue collections.

4. National Mission Mode Project on e-Governance in Municipalities

The National e-Governance Action Plan has identified the formulation of various Mission Mode Projects in e-Governance, including one for municipalities under the responsibility of the Ministry of Urban Development. The purpose of these Terms of Reference is to support MoUD in the development of a structure for the design of a National Mission Mode Project for e-Governance of Municipalities.

The Assessment Phase of the Ministry of Urban Development's National Mission Mode Project on e-Governance hopes to draw upon lessons learnt regarding implementation and design issues from the various initiatives already on the ground. This phase also plans to systematically integrate and build upon the various components and lessons from the same. Further the Mission Mode Project hopes to draw lessons from the implementation support provided at the state level where such initiatives have already been launched. This learning will be integrated into the development of the Project's implementation plan with the idea of achieving potential savings through sharing of hardware infrastructure and software development costs.

The following chapters present the Assessment Phase of the National Mission Mode Project on e-Governance in Municipalities.

5. Coverage

The study covered a sample of four states and seven ULBs:

- Andhra Pradesh (State + Hyderabad + Vishakapatnam).
- Karnataka (State + Bangalore).
- Maharashtra (State + Kalyan + Mumbai).
- Tamil Nadu (State + Coimbatore + Trichy).

The state level focus was on policy related matters to assess the efforts taken at the state level to coordinate and facilitate the e-Governance initiatives, including provision of infrastructure, connectivity, enabling regulatory and procedural changes, providing capacity building support, etc.

The ULB level focus was on issues related to the actual design and implementation of functional modules and sequencing, the architecture, process reengineering, integration, citizen interface, etc. In the case of Mumbai, the focus was only on citizens' complaints management.

6. NCRCL Assessment Framework

NCRCL, for the purpose of the assessment and based on discussions with FIRE (D), developed a framework for assessment of both governance and technical aspects. This was based on the TOR requirements for the Assessment Phase. Since the main objective of the study was to understand the progress and status of e-Governance initiatives in the select states and cities within a very

limited timeframe, a study strategy was evolved in order to optimize the time and resources available.

The Assessment Phase framework is based on:

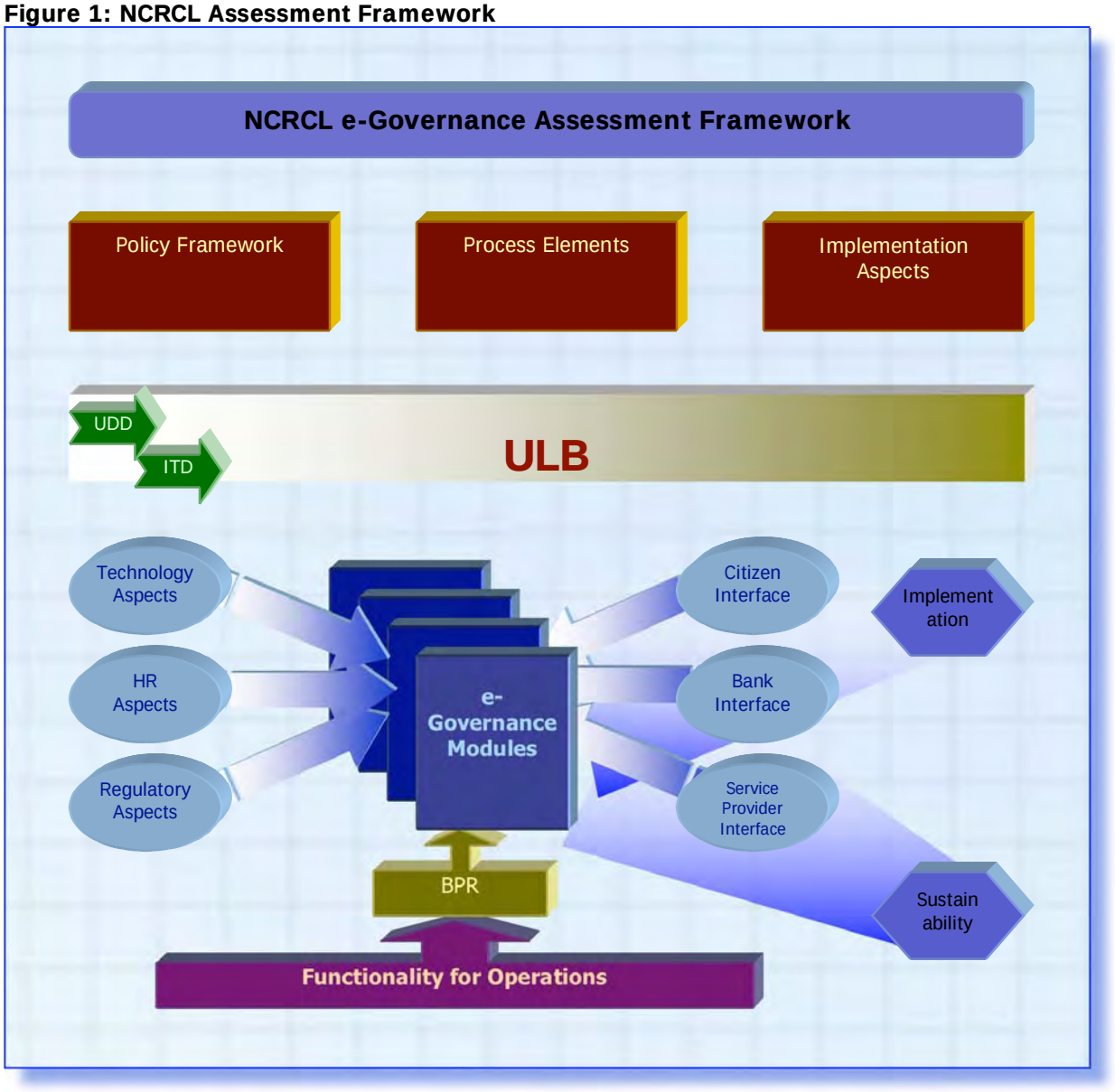
- Approach to e-Governance - policy considerations.
- Infrastructure and technology aspects.
- Human resource aspects.
- Implementation aspects.
- Strengths and weaknesses analysis.

The assessment framework and the study instruments drawn up have taken into consideration the e-Governance Assessment Framework 2.0 developed by NISG and testing priorities identified by STQC. The NCRCL assessment framework resulted in two study instruments - one for governance assessment and the other for technical assessment. Separate sheets were devised for specific information and general discussions, and request forms were also designed for document collection.

The assessment framework of NCRCL looks at three specific aspects of the e-Governance initiatives:

- Policy Framework.
- Process Elements.
- Implementation Aspects.

Figure 1: NCRCL Assessment Framework



6.1. Policy framework

Policy framework seeks to address three issues: whether there is a clearly laid out policy for e-governance at the state level, whether such a policy links well/synchronizes with those of an IT department/e-Governance department; do the ULBs per se have any guidelines for implementing e-Governance initiatives; or do the ULBs follow a different approach from that of the state.

Among the policy initiatives, three items (technology, human resource, regulations) would need specific focus from the viewpoint of successful e-Governance design and implementation. These relate to decisions on hardware, software, connectivity, etc., classified as 'technology' items that need to be common across the state. 'Human resource' aspects are very important in ULBs, particularly when technological and process changes are being considered. Changes in the legacy system often require proper

approval of the authorities through government orders or possibly changes in certain 'regulations' or legislation.

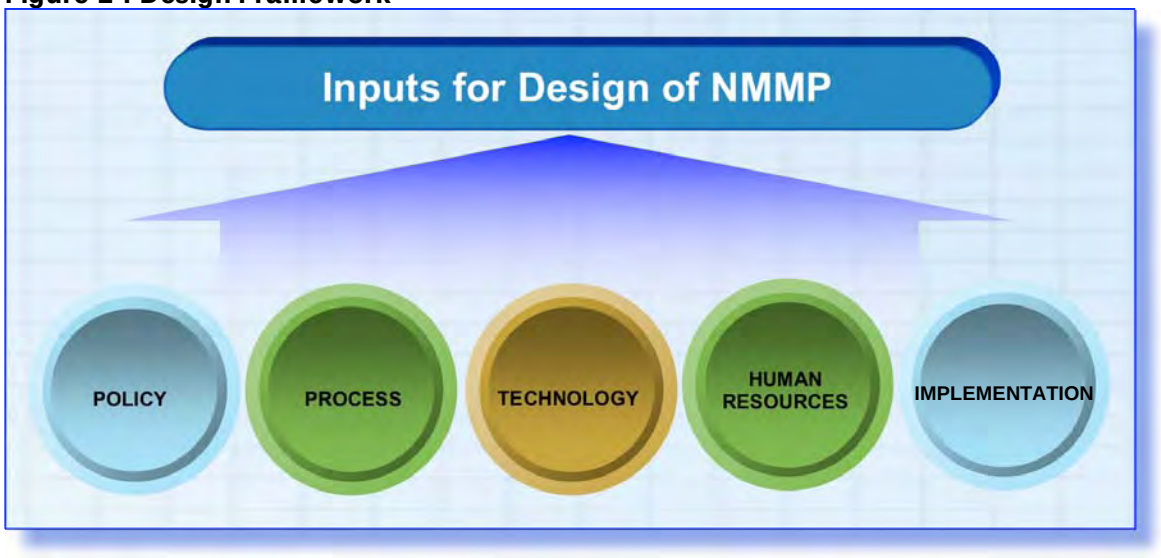
6.2. Process elements

Process elements include various functional modules in which e-Governance initiatives can be introduced. These elements form the basis for e-Governance. Various functional/departmental activities of the ULB are included in the processes; and these processes are, ideally, interlinked. Another major aspect is the business process reengineering (BPR) that is to be addressed in order to make the functionality efficient/effective under the new e-Governance environment. The process elements also have certain basic linkages with citizens, banking institutions and service providers, which need to be structured well in order to operate efficiently.

6.3. Implementation aspects

Implementation aspects relate to those elements that enable actual working of the various e-Governance initiatives. These include the implementation elements per se: plan, the team, the supervision, etc. Sustainability is the other aspect of implementation; this ensures proper continuity of the initiatives.

Figure 2 : Design Framework



7. Design Framework

This assessment report seeks to identify various findings that provide inputs for consideration during the Design Phase of NMMP. The Design Framework considers five elements: Policy – Process – Technology – Human Resources – Implementation, that provide various inputs for the design of NMMP. These elements support the development of the terms of reference (TOR) for that phase.

Policy aspects would provide the guidance and support for the implementation of NMMP. In the area of policy, several initiatives have already been taken up at ULB, state and central levels, including the NMMP by MoUD. Attention to policy considerations is essential for sustainability of the initiatives.

Process refers to various activities at the ULB, state and central levels that are required to help these institutions migrate from the existing system to the new one, and maintain the new system beyond the implementation period.

Technology refers to the backbone of e-Governance service delivery. The technology design, adoption and absorption need to be planned in a meticulous, cost effective and stakeholder-sensitive manner. The security, privacy and legal issues in data sharing, etc. are new to the realm of governance and need to be addressed very clearly.

Human Resources provide the basis for implementation and are considered as a key element in various successful cases. Apart from building an efficient and effective team to design and implement, ultimately the manpower at the ULBs should be capable of running the system on a continual basis.

Implementation provides project plans and management, and considers issues relating to change management. Providing clarity in the activities to be undertaken with proper institutional arrangements, review mechanisms, etc. has to be addressed for successful implementation.

8. Methodologies Used

Based on the assessment framework discussed, the following methods were used during the course of the study:

- Meetings with policy makers.
- Discussions with operations personnel.
- Analysis of documentation.
- Inspection of installation.
- Discussions with users/beneficiaries.

9. Limitations

During the assessment, there were certain limitations that arose due to:

- Constraints in time for covering all the detailed aspects.
- Non-availability of certain key personnel during the study.
- Non-availability of certain specific documentation as envisaged in the study.
- Non-availability of persons who championed the initial design and implementation.
- Lack of complete implementation of a module.
- Lack of adequate documentation of a module.
- Lack of availability of personnel who were involved during implementation.
- Some assessments not possible due to seasonality (regular property tax collection period over, and so on).

With the discussed backdrop and framework, **Chapter 2** presents a quick **Synthesis of Assessment** findings**.**

Annex 1.1

TERMS OF REFERENCE - Assessment Phase (Revised 5.12.2004)

National Mission Mode Project for e-Governance of Municipalities

i .Linkages between government (GoI/state) policies and the initiatives at the ULB level

- Are the initiatives in the ULB based on GoI or state government policy or directive? If yes, mention details of the same (identify from state assessment).
- If the initiative is based on a decision of the local council or elected representatives, provide details of the initiative, champions and governing conditions.
- If the initiative is part of a PPP or donor-related, provide details of the initiative with details of the support provided.

ii. Organization chart of ULB

- State objective of the e-Governance initiative. (Note: As an annexure, include a copy of the Terms of Reference.)
- Organization chart of ULBs – include details on distribution of roles and responsibilities; describe key municipal functions, their processes and linkages; carry out a preliminary data analysis to map functions to data (identify types, sources, and ownership of data) and map data flows.
- Identify a new organization structure(s) and its/their functioning as a result of the initiative (computer centre, data centre, etc.) and how they are staffed.
- Describe decision-making processes within the ULB.

iii. Key municipal functions, their processes, and reengineering as part of e-Governance activity

- Describe and map reengineering of functions and/or processes carried out as part of e-Governance activity; provide a workflow of the business processes (internal and backroom processes, external/public interface, outbound processes such as works procurement, etc.).
- Provide details regarding database used, its conversion, reconciliation and integration.
- Identify existing process outputs (provide sample and describe) including:
  - bills, certificates, sanctions, etc.
  - MIS tools - forms, reports, screens.
- Identify potential impact of laws and regulations on existing vs. redesigned business processes (i.e., governing municipal laws, municipal decision-making process, policy issues, sector regulations, information security and privacy issues, and system security, especially where on-line payment is proposed, any other).
- Compare former process measures vs. redesigned process measures.
- Indicate clearly the functional areas covered and those not covered along with the levels (for example, HO and zones covered, unit offices not covered).

iv. e-Governance infrastructure

- Describe technical architecture (hardware, software, operating system and network communications software), systems management plan and network infrastructure plan; provide graphical presentation of current application infrastructure:
  - Provide details regarding applications and program language.
  - Provide details on database system; include details on domains, environment, applications, etc; provide information on: server, processor, memory, swap, network, disks, operating system, application server, application, size of allocated databases files.
  - Provide details of current network architecture pertaining to application; include details on attribute, domain, network, routers, protocols, desktop IP addressing, and printer configurations; provide details including information on:
    - networking between main office and zone offices.
    - internet/intranet components - use of web enabled technologies.
    - system interfaces with other systems such as EDMS, GIS, and wireless technologies.
    - citizen interface (kiosks, service delivery mechanism).
    - describe level of computerization adopted and typical PC configuration.
    - quality of project documentation.
    - quality of user manuals.
    - Business Continuity Planning (BCP) and Disaster Recovery Plans (DRP) for The Information Systems function and the steps taken to achieve them.

v. System suitability/experience, ease of deployment, costs

- Review the infrastructure in place and assess:
  - suitability, reliability (including availability of SLA), stability and scalability of solution.
  - potential for current and new applications to be hosted/operated/integrated (open standard protocols/closed vendor protocols).

- vendor dependence to independence - type of access or control the city will have to the software source code or the license arrangements that will allow for future modifications in out-years; replication arrangements with vendor(s).
- information security management and systems security (if on-line payment is envisaged).
- systems auditing.

• Provide details regarding system deployment and training:
  - project management, monitoring and system development processes (include details on project team - size and skills).
  - speed in deployment/procurement - system installation time (including time for start).
  - implementation approach and plan, i.e., testing and debugging, cutover, and rolling out.
  - manpower (number and skill set) required to operate the system.
  - amenability of service delivery through PPP mode.
  - user training (plan and implementation).
  - support (vendor, help desk, etc.).
• Provide details on costs related to:
  - hardware, operating system and network.
  - software (including licensing and on-going maintenance costs).
  - computerization within urban local body.
  - system installation (including data entry/conversion, manpower costs).
• Provide details on functionality:
  - has the initiative addressed the functionality and requirements of various users?
  - how user friendly is the new process? use of local language interface.
  - what are the tangible process efficiencies (reduced time, faster receipts, etc.)?
• Stakeholder participation:
  - are all the stakeholders using the facilities?
  - how is the ease of access for various stakeholders (inside/outside)?
  - cost of accessing.
  - popularity (in terms of knowledge of the facility and frequency of the usage).
  - internal/external user satisfaction regarding perceived and actual benefits?

vi. Lessons learnt

- Pros and cons of the initiative and lessons learnt.
- System specific lessons with any suggested changes or enhancements (hardware and/or software).
- Strengths and weakness that could be applicable beyond this specific project such as: to the project management and system development processes, including the system development life cycle standards, development of requirements, requirements for change management tracking; the contracting methodology used; training issues; software; technology; project team; and standards and guidelines that might help in the future.
- Lessons for scaling/replicability; period of continuous functioning.
- Identify critical success factors: e.g., key agents/driver [continuity of project champion(s)], political support, donor support, implementation support/clarity, systematic and step-by-step approach, etc.
- Costs and funding source, collection of user charges, roll out plan, scope for integration of experiences across cities.
- Details regarding PPPs employed; estimates of private financing and payment mechanisms for the private party (ies).
- List any key problems and opportunities identified by user teams (periodic service reviews): internal/external, technical/non-technical, conceptualization/implementation, etc.
- Time factor and delays in implementation.
- Skill sets needed for implementation of various initiatives at various levels.
- Human resource issues in relation to the changes; role clarity and degree of employee buy-in

Deliverables

The Assessment Report will, in addition to addressing points 4.1a, b and c, i-vi of the TOR, will specifically provide the following deliverables:

1. Prioritized list of candidate core processes for reform and BPR.
2. Broad overview of functional architecture requirements.
3. Broad overview of any changes to laws and/or regulations required by implemented solutions (i.e., governing municipal laws, sector regulations, information security and privacy issues, etc.).
4. Broad overview of approaches to deployment of technology.
5. Preliminary change management plan.
6. Broad implications of project development costs for NMMP design.
7. TOR for design phase.
8. Input(s), if any, required by MoUD for preparation of scheme for NMMP.

2. Synthesis of Assessment

1. Introduction

This chapter provides a quick snapshot of the status of e-Governance initiatives in four states and seven ULBs. The status of the initiatives is provided in terms of the operational and planned functional modules, with a focus on the technical infrastructure used for the same.

2. Status and Technical Infrastructure of e-Governance Initiatives

The following tables give a summary of the various e-Governance initiatives covered as part of the assessment. Initiatives at both state and ULB levels are presented. **Table 1** provides state-wise and **Table 2** the ULB-wise technical infrastructure in a comparative form. It is an 'as-is' presentation and is not judgmental in nature.

Table 3: State Level – Technical Infrastructure of e-Governance Initiatives

Parameter	*Andhra Pradesh*	*Karnataka*	*Tamil Nadu*
1. No. of Modules Planned	16	7	30
2. No of Modules Implemented	2	-	18
3. Platform/Programming Language(s)/Technology	J2EE (JSP, Servlets & EJB)	J2EE (JSP, Servlets & EJB)	VB, ASP
4. Software Architecture	3-tier	3-tier	2-tier
5. Deployment Architecture	Centralized at district level	-	Servers at ULB – within ULB mixture of centralized and de-centralized
6. Database	IBM DB2	-	Oracle
7. Connectivity	APSWAN	-	SWAN
8. Hardware Platform (Servers)	RISC, Xeon	-	Xeon/Pentium
9.Hardware Platform (Clients)	Pentium	-	Pentium
10. Operating System (Servers)	Unix, Linux	-	Windows 2003 – Server
a11. Operating System (Clients)	Windows 2000 - Professional	-	Windows XP/98
12. Software Applications (Implemented)	o Property Tax o Birth & Death	-	o Birth & Death o Property Tax o Water Charges o FAS o Non-Tax o Professional Tax o Building Plan o Solid Waste Mgmt. o D&O and PFA o Inventory
13. Build or Buy	Contracted out	PPP	In-house development with assistance from TNUDP
14. Development Process	Rational Unified Process (RUP)	-	No recognized process

Parameter	*Andhra Pradesh*	*Karnataka*	*Tamil Nadu*
15. Backup Procedures	Backup to tape on a daily basis. Also, backup to state data centre daily.	-	Backup to CD daily.
16. PPP Arrangements	Danlaw – Nagarjuna Infotech, CMC, e-Seva	eGovernments Foundation	Incom Solutions, HCL
17. Citizen Interfaces	e-Seva & Citizen Facilitation Centres, Website	-	Citizen Facilitation Centres, Banks, Website
18. Documentation	Good focus on documentation	-	Limited focus on documentation
19. Use of Local Language	Not used	Limited to user interface	Provision has been made. Left to discretion of ULB for usage.

Note
- Maharashtra is not represented in this table as the study was restricted to OCMS in BMMC, and KDMC.
- The Karnataka state level initiative is still in its infancy due to which some of the infrastructure could not be ascertained.
- The split of software into modules (and hence their number) is reported as claimed by each initiative and no effort has been made to find the logical or functional accuracy of the split.

Initiatives at the city or ULB level, as given in **Table 2**, provide the extent of e-Governance implementation. The differences that are noticed in the approaches provide the basis for this assessment exercise.

Table 4: ULB Level – Technical Infrastructure of e-Governance Initiatives

Parameter	Hyderabad	Vizag	Bangalore	Coimbatore	Trichy	Kalyan	Mumbai
1.No. of Modules implemented	8	8	4	6	3	8	1 (Studied)
2. Platform / Programming Language(s) / Technology	Oracle D2K, ASP	VB, ASP	J2EE, ASP, VB	VB, ASP	VB, ASP	JSP, Oracle D2K, VB	JSP & Servlets
3. Software Architecture	2-tier	2-tier	3-tier, 2-tier	2-tier	2-tier	2-tier	2-tier
4. Deployment Architecture	Centralized	Centralized	Centralized	Centralized	De-centralized	Centralized	Centralized
5. Database	Oracle	SQL Server	Oracle	Oracle	Oracle	Oracle	MySQL
6. Connectivity	Leased Lines	Optical Fibre	Leased Lines	RF, ISDN	Leased Line	Optical Fibre, Leased Lines	-
7. Hardware Platform (Servers)	Xeon, Pentium	Xeon	Xeon, Pentium	Xeon	Xeon	Sparc, Pentium	-
8. Hardware Platform (Clients)	Pentium	Pentium	Pentium	Pentium	Pentium	Pentium	-
9. Operating System (Servers)	Unix, Linux	Windows, Linux	Windows	Windows 2000 – Server	Windows 2003 – Server	Solaris, Windows 2000 – Server	-
10. Operating System (Clients)	Windows 2000 - Professional	Windows	Windows	Windows	Windows	Windows	-
11. Software Applications	o Property Tax o Birth & Death o FAS o Complaints Mgmt o Works Mgmt. o Personnel Mgmt o Advertisement Tax o Trade License	o Water Charges o Property Tax o Birth & Death o Central Accounts System o Expenditure Mgmt o Payroll o Complaints Mgmt o Collections	o FBAS o Property Tax o Birth & Death o Complaints Mgmt.	o Property Tax o Water Charges o Birth & Death o Complaints Mgmt. o Collections o Works Mgmt.	o Property Tax o Birth & Death o Collections	o Property Tax o Water Charges o Birth & Death o Complaints Mgmt. o Trade License o Works Mgmt. o Town Planning o Legal Module	o Complaints Mgmt.

Parameter	Hyderabad	Vizag	Bangalore	Coimbatore	Trichy	Kalyan	Mumbai
12. Build or Buy	In-house developme nt	In-house development	In-house, contracted, provided by BATF	Contracted out	Provided by TNUDP	Contracted	Provided by PRAJA
13. Development Process	No recognized process	No recognized process	No recognized process	No recognized process	No recognized process	No recognized process	-
14. Backup Procedures	Backup daily to tapes.	Backup daily to tape. Every week to CD.	Backup daily to tape.	Backup daily to tape.	Backup daily. Every week to CD.	Backup daily to tape.	-
15. PPP Arrangements	e-Seva	e-Seva, banks	eGovernments Foundation	KGISL	Incom Solutions, HCL	-	PRAJA
16. Citizen Interfaces	e-Seva, circle offices, call centre, Website	e-Seva, city civic centres, banks, website	citizen service centres	city civic centres, banks, website	city civic centres, banks, website	citizen facilitation centres, website	Call centre, website
17. Documentation	Limited documentat ion	Limited documentation	Limited documentation	No documentation	Limited documentation	Very good documentation	-
18. Use of Local Language	Not used	Not used	Limited to user interface	Not used	Not used	Not used	Not used

Note

- In Mumbai (BMMC) only the complaints management system was studied and thus the reporting is restricted to it.
- The split of software into modules (and hence their number) is reported as claimed by each initiative and no effort has been made to find the logical or functional accuracy of the split.

3. Assessment at the State Level

Having seen the status and technical attributes of various initiatives, this section discussed the details of the assessment carried out in various states. The state level assessment shows various similarities and differences. In order to provide a bird's eye-view, key features of the initiatives are given in **Table 3.** The table considers key features like macro planning, process, scaling, legal, HR and technology.

3.1. Andhra Pradesh

- **Plan for the sector as a whole emerging**: In AP there are parallel e-Governance initiatives that are taking place one under the DMA and the other by the ULBs themselves. Apart from these municipal initiatives, initiatives like e-Seva (citizen facilitation counters) provide a common window to the citizens for services offered by various agencies including government departments. Also, certain corporations like Hyderabad and Vishakapatnam have taken the lead for promoting some of these initiatives. The DMA is currently handling the process of various e-Governance initiatives.
- **Full scale roll-out** of two modules (Property Tax module and Birth and Death module) across all ULBs. Other modules are under implementation.
- **Infrastructure well planned**: The hardware infrastructure, connectivity, etc. have been well planned. Necessary technical inputs have been taken from professional firms. The government also has a well laid out plan into which the municipal e-Governance initiatives are being dovetailed. From the ULBs to district data centres, and from district to central data centre, flow has been planned. The APSWAN has been established to provide the connectivity backbone for the system

- **Data Centre for ULBs established**: In AP, there are two levels of data centres for the ULBs. One at the district level and the other at the state level. These centres have been established. Apart from this, the GoAP has established APSWAN through which these data centres are being connected. Though there are connectivity and traffic related issues, the data centres have a good technical infrastructure.
- **Integration of government wide initiatives with urban sector**: As mentioned earlier, the e-Governance plan emerging for the sector as a whole seeks to integrate various activities. Currently the APSWAN band width is in the process of enhancement and this certainly is likely to provide opportunities for integration, as it would facilitate handling of larger volumes of data and multiple users. Moreover, through facilities like the e-Seva, transactions with various departments by citizens at a single point have been well addressed.
- **Creation of database**. At the state level, good focus on creation of database coupled with cleansing of existing manual data has improved the robustness of the system and the preparedness of the ULBs to implement Suvidha.
- **PPP/contracting out observed**: e-Governance initiatives have involved various private parties as input suppliers, contractors and consultants. Also AP has the advantage of having institutions like the NISG and CGG that provide various intellectual and value inputs.
- **Adoption of good processes**: Good processes for software development have been adopted (e.g., RUP), which are coupled with strong functional and security audits by the project consultant to ensure functional correctness as well as system integrity.
- **Legislative changes aspects not considered**: One requirement from the state level is to provide uniformity in various guidelines for e-Governance activities. There has been no significant state level initiative for looking at existing legislation, rules, and regulations with a view to enable support for e-Governance. There have been cases where clearances have been provided by way of GOs and approvals.
- **Several parallel initiatives**: Various agencies like the DMA, APUSP, CGG, apart from the initiatives by the corporations, have been involved in the process of e-Governance in municipalities. In this regard there is certain duplication of efforts. For instance, an accounting module has been designed under each of these initiatives.
- **Human resource aspects yet to be covered**: Human resource skill upgradation is a very important aspect for providing the technical expertise in the areas of IT, accounting, and specialized engineering skills (like environmental engineering). Though certain ad hoc arrangements have been made on a case to case or project basis, a state level HR approach has not been specifically considered in the case of AP for the purpose of engaging, managing and handling skilled manpower. This may become a critical factor in future.
- **Citizen interfaces**:
    - **e-Seva Counters**: The e-Seva counter is a one-stop shop for over 150 G2C and G2B services. e-Seva offers wide range of services under one roof to citizens. Such services are rendered irrespective of jurisdictional limits.

- **SUVIDHA**: This is an e-Governance project undertaken by the DMA, which aims at computerizing key municipal functions in 118 ULBs across the state. It covers 16 modules spread over two broad areas, i.e., Municipal Administration and Municipal Management Information Systems.

A quick survey of the citizen counters showed the success of these initiatives and the need to increase these facilities to cover more services.

- **Local language not employed**: The user interface as well as the data is only in English and no facility within the system contemplates the use of local language (i.e., Telugu).
- **Lack of integration** was noted among the various modules and in particular with the accounting module.
- **Very good documentation of the systems.** Due to the adoption of a very good process for development, the resultant documentation has been very good.
- **Business Continuity Planning and Disaster Recovery:** Though it is not a classical example of BCP and DR, SUVIDHA has adopted the use of daily backup plans at both the unit level and state level in order to ensure some protection against hardware and other disasters.

3.2. Karnataka

- **Separate department at the state level for e-Governance in infancy (Department of e-Governance):** This is a very young department and is different from the IT department. All the state level and department level initiatives on e-Governance will come under the ambit of this department as per a recent Government Order (7th January 2005).
- **State level plan now emerging** through Nirmala Nagara Programme for 57 municipalities. Implementation is under progress. Under the NN Programme, e-Governance initiatives have been well planned. The State, through ADB funding, has currently employed consultants to introduce a Fund Based Accounting System in select municipalities (57 out of 224 ULBs), to review legal aspects, to design replicable software, and to create capacity for replication and scaling.
- **Human resource plan well made with proper legislative changes:** The upgradation of technical manpower in municipalities has been done through a state level initiative. The GOK has brought in legislative changes for recruitment of technical staff by issuing a specific Notification (No. UDD 8 BMS 2004 Dated 16th Jan 2004) for recruitment of staff for ULBs. Already the recruitment for certain categories like Accountant (with BCom), Programmers, DBAs, Environment Engineers, etc. has been made. About 1,000 persons will be recruited. A separate cadre with different salary scale and promotional avenues has been created and necessary amendments made to the rules.
- **Novel approach to PPP through involvement of e-Governments Foundation (EGF)** for design, software and supervision support. EGF, an NGO, is supporting the Nirmala Nagara Programme by providing various design, software development and technical support free of cost. This pro bono service has provided a new dimension to PPP in the sector. Currently EGF has implemented a Property Tax Module for BMP and is involved in various developmental efforts in Nirmala Nagara project at the state level.
- **Usage of open source based development of application software:** Under the current plan the partnership with eGovernments Foundation is to

develop all software in the open source model so that source can be shared with any other ULB (of any other state) which is willing to adopt the same software.

- **Involvement of credible governmental agencies** like Survey of India. The e-Governance initiatives in this sector have also networked with credible agencies like the Survey of India, which is providing support for validation of base maps and related data by conducting surveys at field level.
- **Data Centres yet to be established:** In Karnataka data centres are yet to be established. Currently the entire schema for the same is in discussion.
- **Role of City Managers' Association:** The Karnataka City Managers Association (CMAK) plays a proactive role in conducting studies, training personnel and researching urban issues. CMAK has a good infrastructure and has recruited qualified personnel to conduct research in specific municipal areas like garbage disposal; also, CMAK conducts various sensitization and orientation programmes for municipal executives.
- **Local language used to a limited extent:** The adoption of Kannada is at present restricted to only the user interface. Transactional data is still in English.

3.3. Maharashtra

- **IT policy:** for enabling e-Governance at state level released in 1998, which provides guidelines and basis for documentation of feasibility and implementation.
- **Architecture:** aggressively advocating the policy of open source systems. In terms of standards for software development, UNICODE standards have been recommended.
- **SETHU:** counters (similar to e-Seva of AP) are being established at state level in various districts; this would also include municipal interface for citizens.
- **DMA's Role**: The DMA has laid out certain basic steps in phased e-Governance initiatives in the municipalities of the state, which are directly under DMA's control.
- **Implementation**: Change management and IT penetration with public are envisaged in implementation of e-Governance initiatives.

3.4. Tamil Nadu

- **Focus on governance:** In Tamil Nadu, the focus is very clearly on governance, using information and communication technology as only a tool for better governance.
- **Scope of eGovernance in TN**: covers g2c, g2g, c2g and g2n aspects.
- **Early start**: Commenced reform activities in the urban sector quite early; there have been several initiatives in the State in the municipal sector, the major two being computerization of all municipalities and migration to double entry accrual based accounting system.
- **Funding and full-scale roll-out**: by World Bank under TNUDP project, for computerization of all Urban Local Bodies, including 5 corporations, 102 municipalities and 611 town panchayats by providing adequate hardware,

software and related peripherals, application modules using client server and web enabled technology covering all major functions.

- **Process reengineering**: The accounting system of the ULBs in the entire state was revamped and double entry accrual system was implemented. This along with computerization and web-enabled interfaces with citizens has provided the basis for the process changes introduced.
- **Extensive training**: The GoTN appointed firms of chartered accountants across the state to implement the accounting modules, support/train the ULB staff in operating the new accounting system and hand hold them for some time for internalization. Also computer training programmes and training on fundamentals of computers and on various functions were provided to various ULB staff under the TNUDP Project.
- **Manual records converted into e-data:** The hitherto out-of-date manual records were updated by engaging a centralized data entry consultant to enter all the data of the Revenue, Public Health, Engineering and Administrative Departments for certain specified back periods. In total about 62,00,000 records were entered and validated.
- **Qualified computer professionals appointed:** GoTN, through the Employment Exchange, conducted examinations and interviews, and selected technically qualified persons by following the Government Recruitment procedures. These persons were appointed as Programmers, Assistant Programmers and Data Entry Operators at various Urban Local Bodies, Regional Directorates and CMA office to strengthen the computerization activities.
- **Option for use of local language,** wherever applicable, even for the transactional data apart from the user interface. Thus the software has been suitably structured to be adopted for either mode of usage (i.e., local language as well as English).
- **State Wide Area Network** has been created to connect all the ULBs; this helps in providing a backbone for information delivery to an administrative stakeholder.
- **Good control over systems** because of the involvement of qualified staff throughout the development process. This in-house knowledge base ensures longevity and better management of the system.
- **Effective implementation and support processes** have been set up. The staff at various ULBs is supported by a regional head who is in turn under the IT specialist of the TNUDP. Further, various communication channels have also been established (such as mailing lists) for support in the case of system issues or for enhancement requests.
- **BCP, DR issues have been considered to a limited extent,** but need to be taken further (more detailed specifications need to be drafted) and have to be internalized as core processes.
- **Integration with accounting:** The applications have been integrated to an extent with the accounting system (which is currently implemented in the municipalities and not in the corporations). However, some issues are yet to be sorted out.
- **Limited documentation** efforts have been carried out for the system. The system development procedures have not been documented. However, the user manuals for operation of the system are very thorough.

Table 5: State Level Initiatives – Some Key Features

Aspects	Andhra Pradesh	Karnataka	Tamil Nadu
1. Macro Planning	SUVIDHA: a DMA initiative for computerizing all ULBs in AP	State level plan Nirmala Nagara under progress, BATF & ADB funding	Early initiatives for computerization of all ULBs and migration to double entry accrual accounting system
	e-SEVA: a state level initiative for providing citizen interface	Separate department for e-Governance but initiatives in infant stage	Policy for using IT as a tool with clear focus on better governance
2. Infrastructure	Hardware infrastructure, connectivity etc., have been well planned Data centre for ULBs established – integrated with APSWAN	Data centres yet to be established	Hardware infrastructure, connectivity etc., have been well planned
3. Legislative	No significant initiatives for a re-look at existing legislation to support e-Governance initiatives	Accounting System (FBAS) regulations cleared by the government, legislative changes made for absorbing qualified personnel	Single Urban Local Bodies Act 1998 and Urban Local Bodies Rules 2000 provide uniformity across all the ULBs
4. Development Approach	Contracting development of software	Novel approach to PPP through involvement of NGO for development; use of open source based application development	Under World Bank funding for TNUDP, computerization of all ULBs has been done
	Computerization of all processes carried out without major BPR	The state level program addresses BPR issues as a part of implementation of accounting system	Computerization of all processes carried out without major BPR
		Involvement of credible government agencies like Survey of India in the e-Governance initiatives	
5. Human Resources	No state level HR approach – arrangements on case to case basis	HR plan well made, proper legislative changes in the areas of IT staff, accountants, engineers, etc.	Qualified computer professionals appointed through competitive selection procedure
			Extensive training facilities in the areas of computer operations (under TNUDP) and accounting (CA firms)
6. Citizen Interface	eSeva counters have been established	Yet to be decided	This aspect is left to the individual ULB for the usage of a combination of facilitation counters and banks
7. Scaling	Full scale roll-out in all ULBs	Initial implementation in 57 ULBs	Computerization of all ULBs has been done
Note: Maharashtra has not been represented in this table, as study is restricted to OCMS in Mumbai, and KDMC			

4. Assessment at the ULB Level

The ULBs studied, basically city corporations in all the four states, have been the front-runners for development of state level e-Governance activities. Many of these ULBs have been first and best in several individual initiatives. In terms of both successes and failures, the experiences have been similar. In terms of various e-Governance modules embarked upon, similarities have been found in the way the ULBs have approached them. The **Table 4** shows the status of various e-Governance modules implemented in the ULBs studied.

Table 6: Status of e-Governance Module Implementation

Modules	Hyderabad	Vizag	Bangalore	Coimbatore	Trichy	Kalyan	Mumbai
1. Property Tax	F	F	F	F	F	F	NS
2. Accounting	F	F	F	F	N	F	NS
3. Ward Works	P	N	F	P	N	P	NS
4. Births and Deaths	F	F	F	F	F	F	NS
5. Water Supply	NA	F	NA	F	N	F	NS
6. Citizens Grievances Monitoring	F	F	F	F	N	F	F
7. Building Plan Approval	N	N	N	N	N	P	NS
8. e-Procurement	N	N	N	N	N	N	NS
9. Personnel Management System	P	P	P	N	N	P	NS
10. Other key modules introduced	Trade License (P), Advt. Tax (P)	Expenditure Mgmt System (P), Tax Collection Module (F)	GIS (P)	Non Tax Module (F)	Non Tax Module (F)	Food & Trade License (P), Legal Module (F)	NS

F – Implemented and functional
P – Partially implemented/under implementation
N – Not implemented
NA – Not Applicable
NS – Not in the scope of Assessment Phase

The observations based on the assessment of various individual ULBs are discussed one by one. The **Table 5**, presented later, provides some key comparative elements of the initiatives in these ULBs. The comparisons have been made based on: own initiatives, leadership, funding, process (special features), citizen focus, integration, technology, organization, disaster recovery and unique features. These comparisons, at a glance, give a flavour of the initiatives carried out.

4.1. Municipal Corporation of Hyderabad, AP

- **Continuity in leadership**: A major positive factor for the city of Hyderabad has been the continuity of leadership at the Commissioner level. The present Commissioner has been in office for three years, which has provided an opportunity for enabling total transformation.
- **Self/local funding**: Most of the ULB level reforms have been carried out by the Corporation itself and these initiatives have been self-funded. The Corporation has availed no major external assistance for these initiatives.
- **Usage of contractors** for the development of software rather than procurement. Thus the entire control over the software rests with the Corporation.
- **Infrastructure planning and provisioning** happening only now. Connectivity issues need to be sorted out.
- **No evidence of technology roadmap/guidelines.** The systems seem to have been developed in an ad hoc manner and depend more on existing skill-

sets rather than an objective analysis of best practices and technology. However, efforts have now started to make use of the learning from previous iterations and to adopt a more standardized approach for future developments - such as slow migration to J2EE, etc.

- **Citizens' counters**: 4 Citizen Service counters have been established, each one of them in the circle offices of MCH, providing a range of services to the citizens. The in-house systems have also been adapted to service delivery via e-Seva apart from the corporations own centres.
- **Focus on computerization, less on process reengineering**: Various modules that have been implemented are based on the computerization of the existing processes. Hence, no significant process reengineering has been attempted. The basic approach has been to create databases and provide data for management decision.
- **Integration of systems not planned**: MCH has not planned integration of systems. For instance, the accounting system does not communicate with any of the other modules. Also, since the development of the systems has taken place over different periods of time with different champions, the integration has not taken place.
- **Accounting system yet to be internalized**: currently, consultants handle the core aspects of the accounting system. The internalization is taking time.
- **Disaster Recovery and Business Continuity issues yet to be addressed**: Both security and business continuity planning are still to be addressed at MCH.
- **MCH has developed an information rich website** which promotes transparency and ease of use by citizens.
- **Internal processes have also been computerized to an extent** apart from the citizen interface services (such as ward works management software).
- **User interface and data is only in English:** There is no adoption of Telugu anywhere in the system, nor has provision been made for future integration.
- **Interface to external institutions** such as hospitals for direct entry of birth information. Such a system promotes efficiency and reduces information lag. Appropriate control mechanisms for these linkages have been put in place to ensure data integrity.
- **Centralized hardware infrastructure** has been adopted with appropriate communication channels to the various touch points of the system.
- **Lack of efforts on documentation:** The documentation of the system was restricted to basic user manuals rather than capturing the overall system aspects.

4.2. Municipal Corporation of Visakhapatnam, AP

- **Top management sponsorship and commitment** towards these initiatives have helped in internalizing and driving the adoption of the new systems.
- **Good internal participation**: At the broad level there has been good acceptance from the employees of the Vishakapatnam Corporation leading towards e-Governance initiatives taking a progressive step in Vizag.

- **Separate department for IT:** was created in the Corporation with staff from various departments being posted here.
- **Soukaryam**: Soukaryam is a project initiated by the Vishakapatnam Municipal Corporation to deliver civic services online. The aim of the project is to bring about transparency, accountability and speed of delivery, and reduce unnecessary citizen visits to government offices.
- **Fusion of e-Seva and Soukaryam**: The Soukaryam project has been linked to the e-Seva project of the AP State in providing citizen services.
- **Web-enabled services**: provided through Internet for various municipal services to the citizens. The website provides a wealth of information to the citizen.
- **Focus on computerization**: The focus was mainly on computerization of existing procedures. Process reengineering was not carried out. Even for accounting, the existing single entry system was computerized and no attempt has been made to adopt a modern double entry accounting system. However, some process re-engineering has been carried out (such as the use of pre-signed forms for birth & death certificates at the citizen service centre).
- **Partnership with banks for collections:** This has broadened outreach and promoted ease of citizen access.
- **Contractors used for developing** the system, which helps the corporation maintain control over the system including aspects such as ownership, etc.
- **Lack of standards and proper technology roadmaps/guidelines:** Proper planning has not been done on developing such fundamentals and thus the adoption of technologies and processes has revolved around existing skill-sets and awareness and not necessarily on best practices.
- **Basic integration between property tax module and water charges module has been carried out:** Further, some modules have a limited integration with the accounting module, which is at present cash based.
- **Disaster Recovery and Business Continuity Planning has not been addressed.**
- **Facility for access of system by hospitals** whereby the data is directly fed in by the hospital staff coupled with scrutiny by the corporation officials.
- **Centralized infrastructure architecture has been adopted:** The application servers are housed in the data centre with communication channels to all service delivery points.
- **Infrastructure planning is more ad hoc,** rather than based on scientific methods of calculating demand and provisioning appropriately.
- **Good process for authorization of changes to data** has been established. Further all transactional data is also checked on a periodic basis to limit malpractices.
- **Lack of documentation:** The documentation of the systems has been restricted to basic user manuals, and not oriented to system related aspects.
- **The initiative has been locally funded** and no external finance was resorted to.

4.3. Bangalore Mahanagara Palike, Karnataka

- **BMP front-runner in ULB reforms:** BMP has been the major ULB that has attempted reforms since 2000, and has introduced e-Governance modules. Based on BMP experience, the GoK has planned the Nirmala Nagara Programme for implementing initiatives in the State.
- **Initiatives supported by external funding – BATF and ADB:** The first initiatives in the State for implementing FBAS in both Bangalore and Tumkur were initiated by external funding (BATF and ADB).
- **Focus on process reengineering:** The major difference between the AP or MCH initiatives and BMP has been on process reengineering. BMP has carried out major reengineering in the areas of accounting, works management, property tax collection, etc. Even under the Nirmala Nagara Programme, the focus has been to simplify processes.
- **Modules linked to accounting system:** In BMP there is a very clear strategy to integrate all the modules to accounting. All the modules have been planned with integration in view. This is very important from the control angle as integration to accounting system provides integrity to the entire operations.
- **Policy and legal issues addressed:** BMP has addressed various policy and legal issues like accounting policy and accounting regulations. The BMP Accounting Regulations, 2001, has been approved by the Council and GoK. This has made the implementation irreversible.
- **Support systems fully addressed:** In order to make the changes sustainable, several support arrangements have been made by BMP like establishing banking relationships for furnishing of periodic information for accounting. BMP also had an MOU with GoK for implementation of FBAS linked to release of grants by the GoK.
- **Citizens' counters, kiosks established:** The BMP has already established four citizen service counters. These, unlike AP, cater only to BMP-related services like property tax, birth and death certificate, etc. A quick survey made during the Assessment Phase shows that there is a very positive response for the same and the citizens want these counters to extend various other services.
- **Transparent public review**: BMP is participating in a public discussion platform where BMP's financial results are discussed on a quarterly basis with the public.
- **Publication of financial statements in national dailies**: BMP has been publishing its half yearly financial statements in national dailies like the Economic Times and Financial Express.
- **Good efforts to develop a technology roadmap/guideline** for future development/migration have been made which provide clarity in approach for e-governance deployments.
- **Security, BCP issues yet to be addressed**: Both security and business continuity planning are yet to be addressed at BMP.
- **Centralized infrastructure architecture has been adopted** and thus all servers are housed in a single data centre in the Corporation.

- **Connectivity issues are yet to be sorted out:** Efforts have to be undertaken to improve the current infrastructure.
- **Very good data maintenance process observed** which ensures cleanliness and security of data as well as help in detection of tampering.
- **Presence of computers only at the circle level and not at ward level:** Therefore, the e-governance initiatives are currently restricted to the circles.
- **Incomplete documentation efforts:** Certain modules have been well documented whilst others are incomplete.

4.4. Coimbatore City Municipal Corporation, TN

- **State level initiative was trigger, however continued well by the Corporation:** Coimbatore has taken forward the state initiatives and extended them with vendor participation. A local vendor, identified by the Corporation, has been providing services with regard to software development, technology related support and implementation. Certain enhancements to the generic model given at the state level have been made.
- **No separate department for IT**: was established though several initiatives were taken up. The implementation was done by the staff & officials of respective departments. Officials directly working under the Commissioner are coordinating the initiatives, with leadership from functional heads of accounts, revenue, etc.
- **Internal participation by employees:** The implementation of the initiatives was driven by excellent participation of the departmental staff. Some of the staff was on deputation from the state and others from CCMC.
- **Continuity in leadership**: There has been continuity of leadership at the Commissioner level during implementation phase.
- **Suitable technology**: has been used for network infrastructure. CCMC, with the help of the vendor, has used Radio Frequency for networking its zonal office to the Head Office, which is an innovative approach.
- **Computerization of existing processes:** In line with the state initiative the CCMC has computerized the existing processes. However, in areas like tax collections through banks, process changes have been observed.
- **No integration with accounts:** Various e-Governance initiatives work as stand-alone systems and have not been integrated with accounting. This results in duplication of efforts, giving rise to reconciliation issues.
- **Integration between property tax and water tax:** CCMC has attempted to integrate as much as possible the property tax and water tax databases. This integration and validation is an ongoing process with current coverage of about 30%.
- **Tie up with banks:** CCMC has tied up with banks for online collections. Also the banks have been given a gateway to the application module of CCMC, implementing proper security controls.
- **Citizen response very good:** The citizens are happy with the performance of the service centres, as it is very convenient for payment of taxes.
- **Centralized server architecture:** The entire system is hosted in a single server, which acts as the common databank for all applications. Thus all

transactions are committed to this single server. Computerization is only to the zone level. All the zones have been provided systems. However, the use of computers has not yet reached the ward level.

- **Website:** provides very detailed reports of the e-governance application, which is directly available to the citizens.
- **Vendor based approach:** The TNUDP provided software has been taken as a base and further modifications and enhancements have been made by appointing a vendor. However all the IP of the software rests with the vendor and the Corporation is only a licensee.
- **Disaster Recovery & BCP:** There are no proper plans for disaster recovery or business continuity.
- **Lack of documentation:** No efforts have been made on documentation of the system.

4.5. Trichy Corporation, TN

- **State level initiative** taken under TNUDP has developed a common computerisation and e-Governance platform. The entire infrastructure and software applications have been provided by the TNUDP programme. No specific ULB level planning is visible.
- **Human resources**: No dedicated IT department exists. One staff (Asst. Programmer) looks after the technology aspect. However, some of the infrastructure management has been outsourced
- **Computerization of existing processes:** The existing manual processes have been computerised without any planned processed reengineering at the ULB level.
- **Internal systems**: The current internal systems need further streamlining.
- **No integration with accounts** since accounts is still being maintained manually. There is an attempt to capture the manual data on MS Office (Excel), but no full-scale module is developed. The existing TNUDP accounting software does not provide integrated accounting of zones of the Corporation and hence has not been put to use. The maintenance of accounts manually has affected the integration.
- **Banking arrangements**: Trichy has very favorable arrangements with banks for quick transfer of funds. These arrangements provide real time transfer of funds for the Corporation. This is advantageous to the Corporation (unlike other ULBs like Vizag) as the fund flow is automatically taken care of.
- **Bank reconciliation**: This is done periodically.
- **Service network**: The City is adequately covered by banks/facilitation centres to carry the services to a larger segment.
- **Distributed server architecture**: The current infrastructure (i.e., servers) is split between various zones. That is, each zone's data is resident in its own server apart from the central server. However, the primary transactional system is the zonal server rather than the central server. Further, all transactions are mirrored into the central server at the point of occurrence and thus the central server is kept in sync with the zonal database.

- **Only English is used for both the interface as well as data** even though provision is available for the use of Tamil. This is more of a decision factor, rather than a limiting factor of technology.
- **Presence of very transparent and informative website** providing tremendous information to the citizen.
- **Business Continuity Planning and Disaster Recovery aspects** have not been planned.
- **Documentation:** Adequate documentation of reengineered business process of computerization does not exist. Hence complete information is not available on the e-Governance process.
- **Absence of road map:** There is no road map on long term plans to carry out the e-Governance initiative. No special cell earmarked for this purpose.
- **Citizen interface:** The initiative provides satisfactory facilities (banks/corporation premises) for the citizens to avail the services provided under e-Governance initiative. The citizen satisfaction level is high.
- **Website:** The Corporation has an updated website which can be accessed by every citizen.
- **Participative approach:** There is appreciable participation at all levels by the stakeholders. Staff commitment levels are high.

4.6. Kalyan Dombivili Municipal Corporation, Maharashtra

- **Early start**: The initiatives in KDMC were taken up in 2000 and, over a period of time, various processes have been improved upon.
- **Continued leadership**: There has been continuity of leadership at the Commissioner level during the implementation phase. The Commissioner pushed through successful implementation of the project and led it in a planned manner.
- **Own initiative**: The KDMC model is an in-house initiative that has become a model for a statewide initiative that is under contemplation.
- **Organization structure**: A new department for IT created. Importantly, two new posts for Systems Manager and Systems Analyst were created and professionals from private sector were recruited as Corporation employees. This significant creation of posts gives more emphasis to the e-Governance initiatives taken by the ULB.
- **HR aspects**: Though no major change is seen in the HR policy, various measures have been taken to shift staff from various other departments to the Computer Department, where they were put in-charge of specific activities.
- **Vendor driven development.** The entire developmental effort is undertaken with the support and input of vendors.
- **Integration between modules:** Modules are integrated with each other and ultimately integrated to the accounting system.
- **Agreements**: KDMC has entered into proper agreements with service providers ensuring system maintenance and stability.

- **Disaster Recovery & BCP**: Though not very clearly implemented, certain plans have been made for Disaster Recovery. KDMC plans to establish a Data Backup Centre in one of its wards in Dombivli area, as a measure towards Disaster Recovery.
- **Establishment of CFCs**: Citizen Facilitation Centres have been established, which cater to the civic needs of the citizens, and provide a range of services. All payments are received only through the Citizen Facilitation Centres. The CFCs have adopted citizen friendly techniques such as the usage of dual-headed displays so that the citizen is able to view the data that is being entered. The appreciation of such efforts is high.
- **Replication model:** KDMC has proposed its model of its Citizen Facilitation Centres to the State government for replication in other ULBs in Maharashtra. Also, KDMC has signed contracts with Margao Municipal Corporation in Goa and Nagpur Municipal Corporation in Maharashtra for replicating its model.
- **Very good documentation.** All the systems have been properly documented and a proper process is followed for the same.
- **Staff involvement:** There has been active participation at all levels by the Corporation staff. This was a typical top down initiative with bottom up implementation, which has proved to be a sustainable model due to ownership of the initiative at all levels by staff and all stakeholders.
- **Funding:** The KDMC initiative has been entirely funded by the Corporation's own resources and no recourse to external funding was attempted.
- **Business Process Reengineering:** BPR initiatives were done jointly with all the department heads and internalized by all the departments of the Corporation.

4.7. Brihanmumbai Municipal Corporation, Maharashtra (study restricted to OCMS)

- **User friendly:** The Online Complaints Monitoring System (OCMS) is well understood and is extensively used.
- **Grievance communication through web and call centre**: The grievances of citizens are received through Internet and through phone lines. A 24-hour call centre has been established to receive complaints and process them. The complaints reach the concerned departments immediately with a target time for compliance.
- **PPP**: The OCMS was developed and deployed through a public private participation with Praja, a voluntary citizens organization. Praja's involvement is not only through periodic review and discussion of complaints with the BMC officials, but also by participating in meetings of Local Area Citizens Committee (LACC) where grievance issues are discussed.
- **MIS**: The system generates grievances redressed and lists those pending beyond a specified due date; this keeps the pressure on the departments to ensure timely compliance.
- **Governance issues**: OCMS is a significant tool of good governance. The citizens get the real feel of grievances addressed. After the system was introduced, even the number of manual complaints has gone up.

- **Multiple systems operating**: Along with OCMS, another software called CARE (Complaints and Redressal) manages the back-end operations. The link between the two is currently manual, meaning that complaints raised under OCMS have to be fed into the CARE system manually for updating.

Table 5 discusses the salient features of e-Governance initiatives in the seven ULBs.

The assessment synthesis given in this chapter provides the basis for the **Principal Findings** as discussed in **Chapter 3.**

National Mission Mode Project

e-Governance in Municipalities

ASSESSMENT PHASE

State and ULB Studies

Final Report

April 2005

INDO-USAID FIRE(D) PROJECT
NCR CONSULTANTS LIMITED

Introduction

Background

The quantum leap in Information Technology (IT) has provided an exciting platform for making rapid strides in providing better quality municipal services to citizens. Hence the avowed concept of 'good governance' has been facilitated by IT much more than other administrative philosophies of the past centuries. Electronic governance has become the ultimate mantra for enabling good governance in its truest sense.

NCR Consultants Limited (NCRCL) was appointed by USAID FIRE (D) as consultants for the Assessment Phase of the National Mission Mode Project for e-Governance of Municipalities. The study was conducted between January and March 2005. The study plan of FIRE (D) consists of two phases: Assessment Phase, resulting in this assessment report, and a Design Phase, which will follow the present study.

Synthesis Report and State/ULB Studies

The Synthesis Report of the Assessment Phase provided the basis for the Terms of Reference for the Design Phase. This report on the State/ULB Studies documentation various base studies made in this regard. These State/ULB studies have provided the base for the synthesis report. This report documents various e-Governance aspects of the following four states and seven ULBs:

- States
  - Andhra Pradesh
  - Karnataka
  - Maharashtra
  - Tamil Nadu
- ULBs
  - Municipal Corporation Hyderabad
  - Municipal Corporation Visakhapatnam
  - Bangalore Mahanagara Palike
  - Brihan Mumbai Municipal Corporation (restricted to one module)
  - Kalyan Dombivili Municipal Corporation
  - Coimbatore City Municipal Corporation
  - Tiruichirapalli City Municipal Corporation

Presentation Details

This report has been prepared based on the terms of reference (TOR) provided by Indo US FIRE-D Project and the information collected and compiled by the study team during the visits. As much as possible the TOR format has been maintained. However, considering the extent of details required for such a study, limitations in the duration of the visits and the availability of information/persons required for the study in various places a reasonably detailed compilation has been provided.

Each of the cases has been presented in 5 chapters/sections:

- #1 Linkages of state level initiatives to ULB initiatives
- #2 Organisation Structure
- #3 Key Municipal Functions
- #4 e-Governance Infrastructure
- #5 Suitability, Reliability, Stability and Scalability of Existing Infrastructure
- #6 Lessons Learnt

Issues in relation to presentation

In the presentation of various facts collected during the visits and thereafter, there could be certain minor variations (not vitiating the overall findings) due to the following reasons:

- Non-uniformity of the data provided by various institutions;
- Non-validation of some of the data collected during interviews due to time limitation and non-availability of personnel for confirmation;
- Non-availability of concerned person (due to leave or transfer) during the visit;
- Reluctance to share information with regard to certain specific queries;
- Inadequate documentation support for various issues discussed;
- Understanding of the data requirements differently by different persons.

Similarly in the presentation of these individual cases, some of the following may be observed:

- Lack of similarity in presentation due to availability of facts and details in different formats, in differing granularity; though uniformity of the headings and sub-headings are maintained;
- Repetition of certain similar observations in different cases as the governing conditions is similar;
- In the case of lessons learnt the presentation is different in the case of states and ULBs based on the localised experiences and our observations;
- Strengths and weaknesses have been observed for implemented modules only.

In some of the ULBs information have provided have been excellent and with very minute details. These have been represented in this report to the extent possible. This could again contribute for differences in the presentation between cases in term of length and details. This does not mean that where less information has been presented there is less e-Governance initiatives. Also, the assessment has not been based only on the documentation provided. Based on the assessment made, proper weightage has been given to the initiatives as may be observed in the synthesis report. The objective of the study was to identify the key issues and ingredients for a successful e-Governance design. This definitely ahs been achieved.

Exceptions

Considering the mammoth task of study, discussion, collection of data, compilation, analysis and presentation there could be some gaps in the presentation of facts and in representation of some of the findings. Also, between the study period and the reporting period so many enhancements, developments and even changes could have taken place in some of the cases. So if any differences or deviations found in this report are not intentional. NCRCL would own such deficiencies, if any and would stand corrected.

NCR Consultants Limited
Chennai

April 2005

Table of Contents

Annexes

List of Figures

List of Tables

Abbreviations	
ADB	Asian Development Bank
AMC	Annual Maintenance Contract
AP	Andhra Pradesh
APSWAN	Andhra Pradesh State Wide Area Network
APUSP	Andhra Pradesh Urban Services for the Poor
ARO	Assistant Revenue Officer
ASP	Active Server Pages
AUTOCAD	Computer Aided Design
B.Com	Bachelor Of Commerce
BATF	Bangalore Agenda Task Force
BCC	Bangalore City Corporation
BCP	Business Continuity Planning
BMMC	BrihanMumbai Municipal Corporation
BMP	Bangalore Mahanagara Palike
BOOT	Build Own Operate Transfer
BOT	Build Own Transfer
BPR	Business Process Re-engineering
BSNL	Bharat Sanchar Nigam Limited
CA	Chartered Accountant
CAD	Computer Aided Design
CARE	Complaints And REdressal System
CAS	Centralised Accounts System
CC	City Corporation
CCI	Continuous Capacity Improvement
CCMC	Coimbatore City Municipal Corporation
CD	Compact Disc
CDMA	Commissioner & Director of Municipal Administration
CEO	Chief Executive Officer
CFC	Citizen Facilitation Centre
CGG	Centre for Good Governance
CMC	Computer Maintenance Corporation
CMC	City Municipal Councils
CSC	Citizen Service Centre
D&O	Dangerous & Offensive
D2K	Developer 2000
DBA	Data Base Administrator
DCB	Demand Collection Book
DDC	District Data Centre
DMA	Directorate of Municipal Administration
DS	Discussion Sheet
EAF	E-Governance Assessment Framework

Abbreviations	
EDMS	Electronic Document Management System
EDS	Electronically Deliverable Services
EGF	e-Governments Foundation
EMD	Earnest Money Deposits
EMS	Electronic Monitoring System
FAS	Financial Accounting System
FBAS	Fund Based Accounting System
FIRE	Financial Institutional Reforms Expansion
G2B	Government to Business
G2C	Government to Citizen
G2C - U	Government to Citizen - Urban
G2G	Government to Government
GIS	Geographical Information Systems
GO	Government Order
GOAP	Government Of Andhra Pradesh
GOI	Government Of India
GOK	Government Of Karnataka
GOTN	Government Of Tamil Nadu
H&S	Health and Sanitation
HO	Head Office
HR	Human Resource
IBRS	Integrated Bank Reconciliation System
IEEE	Institute of Electrical and Electronic Engineering
IIS	Internet Information Service
IPR	Intellectual Property Rights
ISDN	Integrated Services Digital Network
ISO	International Standards Organisation
ISRO	Indian Space Research Organization
IT	Information Technology
IVRS	Interactive Voice Response System
J2EE	Java 2 - Enterprise Edition
JE	Junior Engineer
JSP	Java Server Pages
Kbps	Kilo bytes per second
KDMC	Kalyan Dombivli Municipal Corporation
KGISL	KG Information Systems Limited
KV	Kilo Volts
LACC	Local Area Citizen Committee
LAN	Local Area Network
MA & UD	Municipal Administration & Urban Development
MAN	Metropolitan Area Network
MAS	Municipal Administration System

Abbreviations	
MB	Mega Bytes
Mbps	Mega Bytes per second
MCH	Municipal Corporation of Hyderabad
MCV	Municipal Corporation of Visakhapatnam
MHz	Mega hertz
MIS	Management Information System
MMIS	Municipal Management Information System
MMP	Mission Mode Project
MOU	Memorandum of Understanding
MoUD	Ministry of Urban Development
MSO	Maintenance Service Organisation
NAM	National Accounting Manual
NCRCL	NCR Consultants Limited
NCST	National Centre for Software Technology
NEGAP	National e-Governance Action Plan
NGO	Non - Governmental Organization
NICNET	National Informatics Centre Net
NISG	National Institute of Smart Governance
NMMP	National Mission Mode Project
NMS	Network Monitoring System
NN	Nirmala Nagara
OCMS	Online Complaint Management System
ODBC	Open Database Connectivity
PC	Personal Computer
PF	Provident Fund
PFA	Prevention of Food Adulteration
PMS	Personnel Management System
PPP	Public Private Participation
PROOF	Public Record of Operations and Finance
PWC	PricewaterhouseCoopers
PWD	Public Works Department
RDMA	Regional - Department of Municipal Administration
RFP	Request for Proposal
RISC	Reduced Instruction Set Computer
SAS	Self Assessment Scheme
SDC	State Data Centre
SDLC	Software Development Life Cycle
SFC	State Finance Commission
SLA	Service Level Agreement
SLA	Service Level Agreement
SQL	Structured Query Language
SR	Standard Rates

Abbreviations	
SRS	Software Requirements Specifications
STQC	Standardisation, Testing and Quality Certification
SWAN	State Wide Area Network
TASA	Technical Assistance Supporting Agency
TCMC	Tiruchirapalli City Municipal Corporation
TCP/IP	Transmission Control Protocol/Internet Protocol
TMC	Town Municipal Councils
TNEB	Tamil Nadu Electricity Board
TNUDP	Tamil Nadu Urban Development Program
TOR	Terms Of Reference
TP	Town Panchayats
UDD	Urban Development Department
ULB	Urban Local Body
UPA	Urban Public Affairs
UPS	Uninterrupted Power Supply
USAID	United States Agency for International Development
VB	Visual Basic
VPN	Virtual Private Network
w.r.to	With reference to
WAN	Wide Area Network
WINCODE	Work Identification Number Code

State Studies

Andhra Pradesh State

1. Linkages of State Level Initiatives to ULB Level Initiatives

Andhra Pradesh is one of the few states in India that have taken up e-Governance Initiatives in a very serious manner. Three ULBs, viz. Municipal Corporations of Hyderabad, Vizag and Vijayawada, were the front-runners, based on which e-Governance initiatives were triggered off at the state level. In, Andhra Pradesh, the initiatives taken by these ULBs (which are discussed in chapter 3 of this section) have been self-driven and not part of any statewide plan. The state level initiative 'SUVIDHA' is proposed to be implemented in 118 Urban Local Bodies in the state excluding these three ULBs, as these ULBs have their own application modules already implemented. Even in the case of infrastructure provision, these ULBs already have their own set-up established, ahead of the state level initiatives.

1.1 Objective

The GoAP's vision of e–Governance is 'to leverage information technology to attain a position of leadership and excellence in the information age and to transform itself into a knowledge society'. In line with this strategy, the CDMA in AP has undertaken an ambitious project, 'SUVIDHA', which is an Electronic Municipal Administration System. The State Government has also implemented the 'e-Seva' project as a one-stop-shop for providing a range of services to citizens from different Government agencies.

1.2 Key Features

The progress of the e-Governance initiatives in the State has the following key features:

a. Macro planning

- **Plan for the sector as a whole emerging:** In AP there are two initiatives that are taking place, one under the CDMA and the other by the ULBs themselves as mentioned earlier. The CDMA is currently handling the process of various e-Governance initiatives at the state level and already in about 5 ULBs the implementation is stated to be under progress.
- **Integration of Government initiatives with Urban Sector:** The state is currently integrating various initiatives, which have until now been existing as islands in some of the ULBs. For instance, connectivity for linking various ULBs with the district head quarters and the CDMA at Hyderabad is addressed through the enhancement of the bandwidth of the APSWAN (State Wide Area Network). This would provide opportunities for integration of data from various ULBs. Moreover, through facilities like the e-Seva (a common counter for providing interface with citizens), the government is able to provide single service point for various needs of citizens.

b. Infrastructure

- **Infrastructure well planned:** The hardware infrastructure, connectivity, etc. have been well planned with technical inputs from professional firms. The government also has a well laid out state level plans (concerning various departments), into which the municipal e-Governance initiatives are being dovetailed. To enable the flow of data from the ULBs to district data centres and from district data centres to central data centre, the infrastructure and connectivity have been planned.
- **Data Centre for ULBs established:** In AP, there are two levels of data centres for the ULBs: one at the district level and the other at the state level. Apart from this, the GoAP has established APSWAN, into which these technical backbones are getting integrated. Though there is some connectivity and traffic related issues, the data centres have excellent technical infrastructure.

c. Legislative

- **Legislative changes aspects not considered:** There has been no significant state level initiative for amending the existing legislations, rules and regulations for enabling implementation of the e-Governance initiatives. There have been cases where clearances have been provided by way of GOs and approvals to help implementation of the initiatives on a case to case basis.

d. Development approach

- **PPP/Contracting out observed:** The initiatives have involved various private parties as input suppliers, contractors and consultants. Also AP has the advantage of having institutions like the NISG and CGG who provide various intellectual and value inputs.
- **Several parallel initiatives (CDMA, APUSP, CGG, etc.):** Various agencies like the CDMA and APUSP (Urban Support Project funded by the World Bank) are involved in similar initiatives. In this regard there is certain duplication of efforts. For instance, accounting module has been designed under each of these initiatives implementation in the ULBs.

e. Human resource

- **Human resource aspects yet to be covered:** HR aspects have not been specifically considered in the case of AP for the purpose of engaging, managing and handling skilled manpower required for the initiatives at the ULB/state level. This may become a critical factor in time to come.

f. Citizen Interface

- **e-Seva Counters:** e-Seva counters are a one-stop-shop for over 150 G2C and G2B services. e-Seva offers a wide range of services under one roof to the citizens. Such services are rendered irrespective of jurisdictional limits of ULBs.
- **'SUVIDHA':** This is an e-Governance project undertaken by the DMA, which aims at computerizing key municipal functions in 118 ULBs across the state. It covers 16 modules spread over two broad areas namely Municipal Administration and Municipal Management Information Systems. In about 5 ULBs, the initiative is under implementation.

g. Scaling

- **Full scale rollout in all ULBs:** Full scale rollout has been planned in all ULBs in the State. Out of the 16 modules, 2 have already been implemented across the state.

While the above gives the highlight of the state-wide initiatives, the details with regard to these are discussed elsewhere in this section of the report.

2. Organization Structure

2.1 Municipal Administration and Urban Development Department

Figure 1: Organisation Chart of MA&UDD

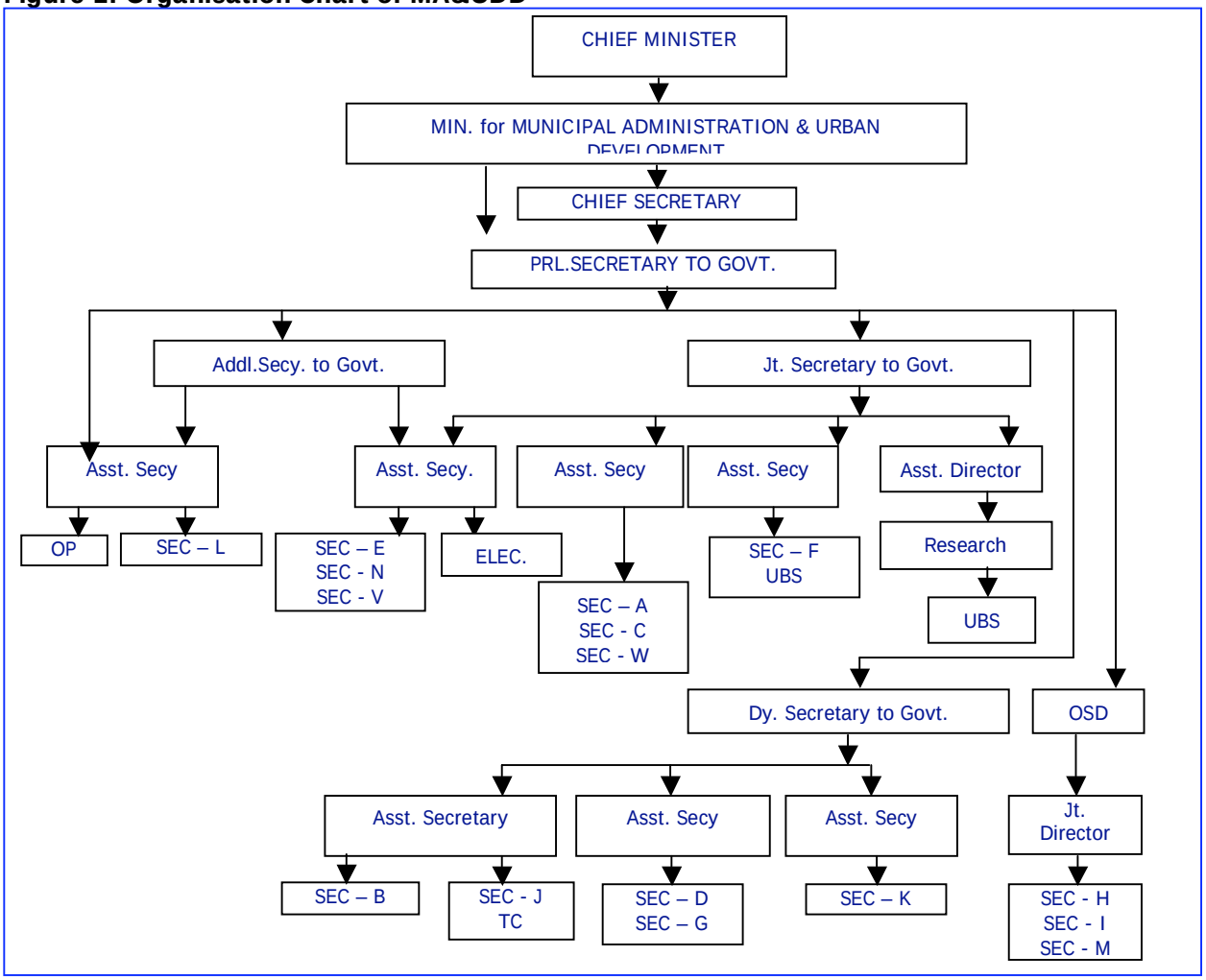
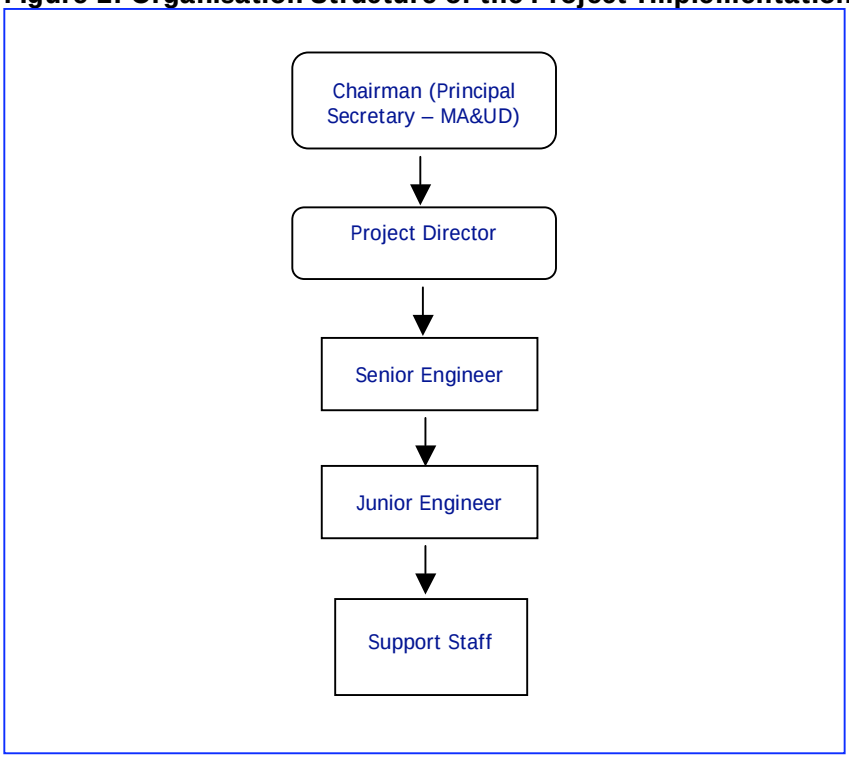


Figure 1 shows the organisation structure of the MA&UDD. The Ministry for Municipal Administration & Urban Development functions under the supervision of the Chief Minister of the state. The Principal Secretary to the Government heads the department. The next levels are held by the Additional Secretary and the Joint Secretary to the Government. They in turn are assisted by several Assistant Secretaries at various levels and also Section Heads. There is in addition a Deputy Secretary to govt. who reports directly to the Principal Secretary. The OSD also reports to the Principal Secretary. He is assisted by the Joint Director who is responsible for same of the Section Heads. The Commissioner/Director of Municipal Administration (DMA) works under the supervision of the Principal Secretary to the department. The DMA is a separate entity in the department taking care of the administration of municipal activities. Various e-Governance initiatives are executed as project by the department with a Project Implementation Committee.

Figure 2: Organisation Structure of the Project Implementation Committee



A Project Implementation Committee headed by a Chairman, who is the Principal Secretary of MA&UDD, has been formed for the implementation of the state level initiatives, as shown in **Figure 2**. The Project Director is supported by Senior and Junior Engineers. All these executives are support by a set of operational staff. The entire work, right from data migration till development of the application modules, implementation and training of the end users, has been outsourced from private vendors. However, the Project Implementation Committee holds the overall responsibility for the entire initiative.

The Directorate of Municipal Administration (DMA) is the controlling authority for all the ULBs in Andhra Pradesh (118 in number) excluding the corporations of Hyderabad, Vizag and Vijayawada. The entire project implementation is controlled at the DMA's office. All agreements and contracts with the various agencies involved (discussed later) are executed by the DMA's office. The DMA is also primarily answerable to the Project Implementation Committee for the implementation of the project.

3. Key Municipal Functions

3.1 Description of Modules

The 'SUVIDHA' project comprises of Municipal Administration System (MAS) and Municipal Management Information System (MMIS). The MAS is aimed at computerizing the basic activities of the ULB, and to standardize its administration functions. The MMIS provides information/reports pertaining to various modules at the ULB level.

The modules envisaged in 'SUVIDHA' are:

a. **Property Tax:** The functional part in this module involves calculating property tax taking into account details like usage of the building, building type, plinth area, unit rate, building age, etc. and maintaining the year-wise arrears details of each individual assessee. Accordingly a figure is arrived at, and the Demand Notice is issued. Payments are recorded and receipts are issued for the amounts paid towards Property Tax. Payments are accepted either in full or part. Provision has been made to accept advance payments for which Advance Tax Receipts can be issued.

b. **Vacant Land Tax:** The functionality of the module is similar to that of the property tax module in terms of collection of revenue and issue of receipts in relation to the vacant land of the assessees. The module maintains year-wise arrear details of individual assessees.

c. **Building Permissions:** This module primarily deals with tasks of issue of building permissions (for construction of new building, modification of existing ones, etc.), standardization of collection of building fees and other charges, providing atomatic technical scrutiny, monitoring of file processing, providing status of the building applications, enabling approval of layout proposals, support demolition process of unauthorised constructions, etc. Updating data for planning, implementation and maintenance of development activities such as road widening, junction improvements, development of parks, play grounds, sub-ways, parking lots, bus bays etc. are handled by this module. Generation of receipts for building application, fee payment receipt, etc. has been provided.

d. **Projects and Works:** This module is used to track projects/works by providing information in relation to preparation of estimates, providing administrative and technical sanctions, tender, agreement, work order status, billing and payments including advances and deposits, etc. It also allows the registration of contractors, movement of materials, etc.

e. **Solid Waste Management:** This Sanitation-Solid Waste Management module deals effectively with the allocation of manpower for sweeping and garbage removal, allocation of vehicles for garbage transport, movement of the vehicles, record of garbage dumping at the dumping ground, maintenance of the vehicles and public toilets within Municipality limits.

f. **Assets and Inventory:** This module deals with the maintenance of immovable assets, and stock of various items within the municipal warehouse. Based on requirements of the municipality the requests are made for various items required, and based on the stock levels purchases are initiated. The system also maintains the list of products and suppliers. Issue, issue returns, purchases, purchase returns and reorder level for each of the item in inventory are maintained. The system provides reports on section wise issues, supplier wise purchases etc., for any given period of time.

g. **File Movement:** This module primarily traces the movement of files and deals with creating inward files, recording the file movement details like sending files to outward tappal, closing of file, etc. The module provides facilities for viewing file history, file movement details. Apart from this, reports on arising files, old files, current files, etc. are provided by the software.

h. **Court Cases:** The court cases module provides facility for monitoring of the court cases pertaining to the ULB. The module tracks cases at various stages such as admission, interim order, evidence, hearing, argument, judgment and appeal.

i. **Births and Death:** This Birth and Death module primarily deals with recording of birth and death details taking place within the municipal limits. Recording/registration of the primary data in relation to birth/death, information on the fee collected including the late fee, issue of the certificates are handled by this module.

j. **Advertisement Tax:** This module deals with the issue of new agent licenses, new advertisement licenses, renewal of these licenses, maintenance of hoarding details, hoarding tender details, recording of unauthorized advertisements, removal of unauthorized advertisements, cancellation of licenses, etc. Generation of license certificate, renewal

license certificate, and addressing enquiries on the status of license are handled by this module, apart from the collection of fees.

k. **Water Tap Connection and Tax:** This module captures details of water connections of all types, verification and feasibility details for sanctioning water tap connections, issue of Consumer Numbers, details of payments for new connections, generating of demand notices, maintenance of arrears details, details of disconnection and regularization of illegal connections, etc. The module generates reports, provides some "views", "search" options for monitoring the status of various connections issued/pending.

l. **Dangerous & Offensive Trade Licenses:** This module primarily deals with issue of new licenses, installation permission/NOC, renewal of D&O trade license, change in the title/name of the trade license, upgrading of the license, closure/cancellation of trades, and fee collection. The module generates license certificate, upgraded license certificate, renewal license certificate, and enquiries on the status of license. System also generates DCB municipality wise/revenue ward wise/sanitary inspector wise. Similarly D&O Trade Register, list of defaulters and demand notices are generated.

m. **Financial Accounting:** This software uses double entry system of accounting for the preparation of books of accounts. The accounting software has been designed in such a way, when an entry is made at the entry level say revenue collection, reports and registers for various levels upwards are made available. This avoids the task of maintenance of various intermediary registers.

n. **Schemes:** The Schemes module facilitates the sanitary inspectors, section clerks and filed level employees to record the details of implementation of various state and central government sponsored schemes. This is done by recording the details of various surveys conducted by the municipality, keeping track of the grants and funds released against each scheme and their utilization. The module generates view of statistical reports on the implementation of schemes and performance of individual groups.

o. **Grievance Redressal:** The Complaint/Suggestion/Application (Grievance) is taken at the Citizen Complaint Cell (CCC) or by post or through Phone or through Fax/E-mail/Web. The grievance data is stored in the database directly or through entries made by the CCC, and an acknowledgement issued to the citizen (complainant). The grievance information is forwarded to the concerned department/section, depending on its nature for further action. The concerned section staff attends the complaints with in the given time period. The reply is sent back from the corresponding department/section to the CCC and then to the complainant. A web user can check the status of grievance through web. This system provides periodical reports on status wise complaint list, department wise pending complaints, etc.

p. **MMIS:** This module serves as the reporting module using the data collected in the various modules described above. The reports address various levels of Management Decision Making within the ULB.

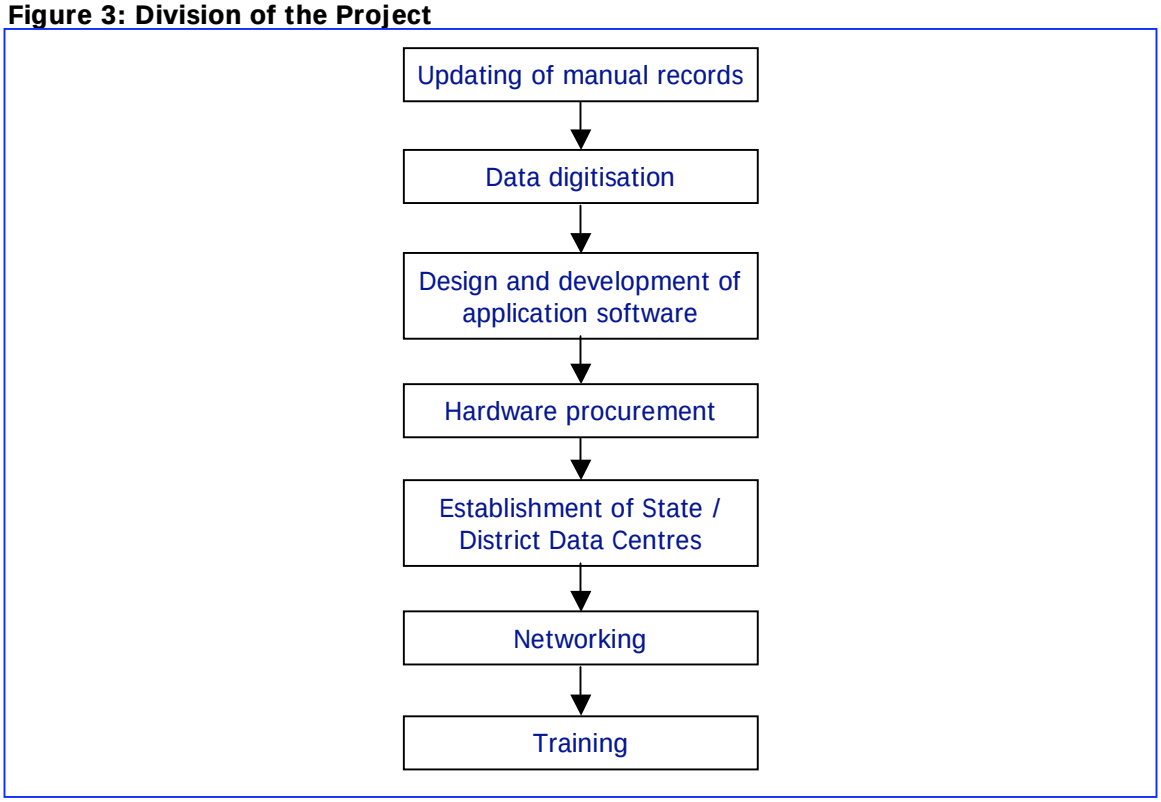
Software for all the above modules has been developed and audited. Two modules namely, Property Tax and Births and Deaths have been implemented across the 118 ULBs. The main features of this initiative are given below:

3.2 Processes and Procedures Followed

a. A Project Implementation Committee as discussed earlier was constituted for implementation of the project.

b. The project was divided into the following components as shown in **Figure 3**.

Figure 3: Division of the Project



c. The following agencies are involved in the project as shown in **Table 1**.

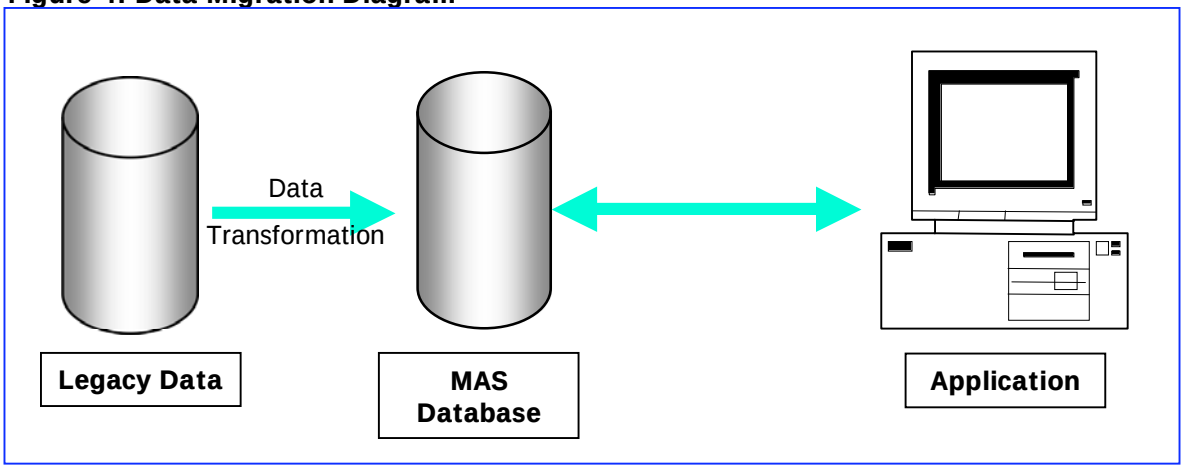
Table 1: Agencies Involved in the Implementation of the e-Governance Initiative

Particulars	Agency	Scope of work
Software	Danlaw Technologies India Limited and Nagarjuna Infotech Limited	a) Study of existing systems and procedures b) Designs of the application software c) Design of the Security Architecture d) Development of the application software based on the system specifications e) Implementation f) Operational Support and Maintenance g) Comprehensive Training h) Documentation i) Data migration strategy j) Infrastructure Requirements study
Project Consultancy	PricewaterhouseCoopers	Details not available
Hardware	Andhra Pradesh Technology Services, Hyderabad	Details not available
Network/Systems Integration and Facilities	CMC Limited	a) Supply of hardware/software as per the technical specifications outlined b) extend support to DMA for coordinating

Particulars	Agency	Scope of work
Management		with BSNL for leased lines c) Data Networking at SDC d) design and implement IP addressing schema e) Installation and management of Enterprise Management System (EMS) at SDC f) Data Networking of DDCs and ULBs g) Installation and management support for the information security components h) install and manage all the related peripherals i) provide for the 'Structured' cabling as per the industry standards j) System Integration k) installation of the Enterprise Management System and integrating the WAN and all the components at the SDC and required hardware/software at DDCs & ULBs and other locations of the department with the EMS l) Maintenance of MAS & MMIS Network/Systems solution, which includes management of Network Equipment, Servers, EMS and End User Systems, UPS etc throughout the state for a period of three years m) Deputation of personnel to provide 24X7 maintenance activities
Data digitization	Jyothi Computer Services	a) Receiving and housing material from DMA b) Keying in of information from Data Sheets c) Error correction d) Delivering the output on CD – R media

The overall data digitization and migration strategy was first developed. The digitization of data was taken up in accordance with this strategy before the implementation of the modules. Initially records relating to property tax, vacant land tax, advertisement tax, D&O trades, water charges and births and deaths were digitized keeping in view the requirement of e-Seva centres, data volume and immediate needs of the public. The initial data entry and validation have been completed for all the ULBs. **Figure 4** gives a broad overview of the 'data migration strategy' used.

Figure 4: Data Migration Diagram



3.3 Process Outputs

Property tax receipts are being issued. Birth and Death certificates are also issued. Specific forms have been provided to apply for Birth and Death certificates. MIS information like daily collection reports and other analytical reports are also being generated.

3.4 Impact of Laws and Regulations

No legislative changes have been made to suit the implementation of the new modules. The security policy, disaster recovery and business continuity procedures are being planned now.

3.5 Functional Areas Covered

The Property Tax and Birth and Death module presently cover only the Revenue Department. These modules have not been integrated with the Accounts module.

3.6 Strengths and Weaknesses of the System

Strengths

i. The concept of designing a MMIS along with MAS is a very significant step since it ensures that the benefits of deploying modules of the MAS immediately accrue at the CDMA's office in the form of improved and integrated MIS.

ii. The approach followed for developing software for all the modules and implementing each of them, helps in integration of modules. It also helps in assessing the long term and short term funds requirements for them.

iii. The AP model, wherein the overall project control is retained with the Department while individual vendors are brought in to work in their specific areas, also brings out the best in partnership.

iv. The approach of first updating manual records, digitizing them and then implementing the modules also ensures the sustainability of the initiative.

Weaknesses

i. Developing all the modules together and then implementing them may cause certain duplication in development work since many of the modules may undergo changes based on practical problems which come to light only when they are implemented. Such changes may necessitate changes in the other modules also.

ii. Even though various modules have been planned in advance, the fact that all the modules must revolve around the Financial Accounting System has not been given due importance.

iii. In addition to the implementation costs, budgeting also has to be made for operating the system on a day-to-day basis to prevent the initiative from failing (like loss of connectivity due to non-payment of BSNL bills).

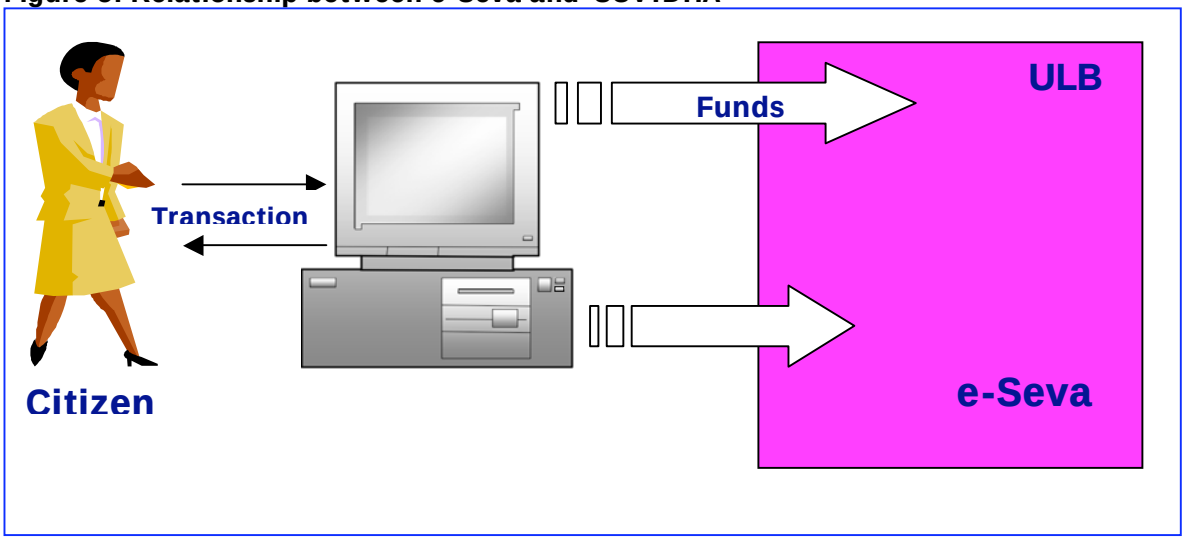
iv. Even though work is being done on framing the security and backup policies, the same are long overdue and should have been in place much earlier.

Even though the e-Seva initiative is not an e-Governance effort per se, it has been included in the report since it has proved to be a clear winner in terms of a convenient electronic medium for delivery of a variety of services (apart from municipal services) to the citizens and is an essential touch point (point of contact) for all the e-Governance initiatives in the State ('Suvidha', MCH, MCV, etc.).

e-Seva is a major G2C initiative in e–Governance in Andhra Pradesh built on the Public Private Partnership (PPP) – Build, Own, Operate and Transfer (BOOT) model. The prime objective of e-Seva is to provide a single counter service delivery from payment of utility bills to issue of certificates and licenses, information and booking of tickets, etc. The number of services available extends up to 150. The pilot project which was started in 1999 has extended to a strong network of 65 centres in Hyderabad and around 185 centres across the state. While 'SUVIDHA' concentrates on implementation of the 16 modules in all the ULBs, e-Seva is a citizen friendly initiative for payment of various dues spanning across State Government, Central Government and private agencies. e-Seva is independent of 'SUVIDHA' and serves as an additional input/output point for the respective modules of 'SUVIDHA'.

The citizen can approach an e-Seva centre and pay his dues, obtain certificates and make enquiries. Wherever the individual modules of 'SUVIDHA' have been implemented, online information is available at the e-Seva counters. The interrelation between e-Seva and 'SUVIDHA' is explained in **Figure 5**.

Figure 5: Relationship between e-Seva and 'SUVIDHA'

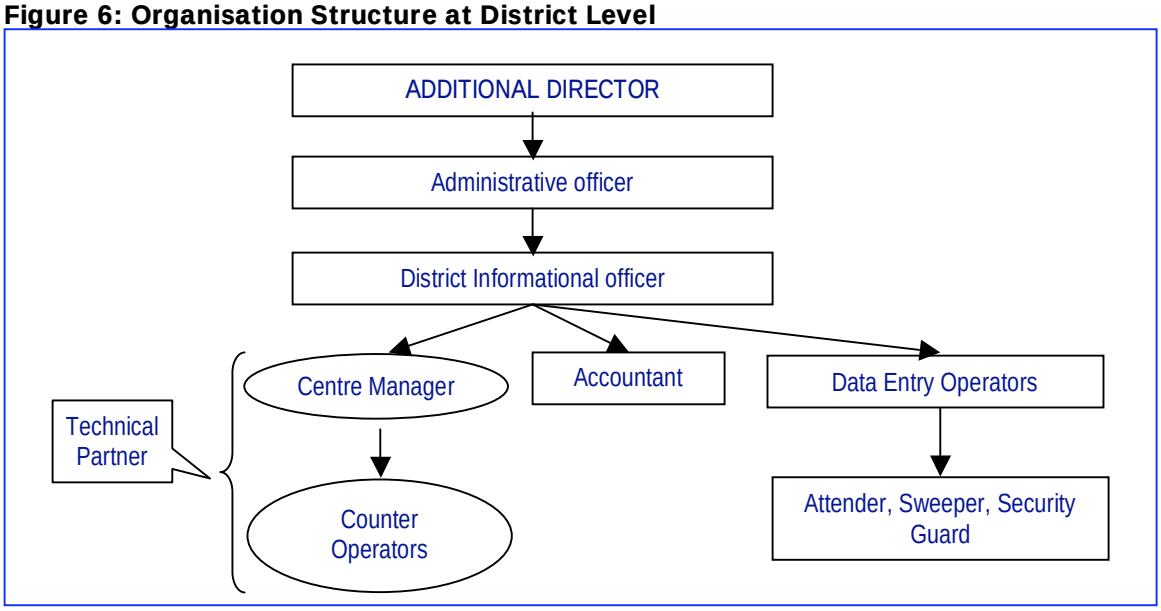


Processes and procedures followed

a. A separate post of Director, Electronically Deliverable Services (EDS) was created in GoAP for this purpose. A Director, e–Seva Services was also nominated to take care of these services.
b. In each district, the Joint Collector was designated as Additional Director, e–Seva.

Figure 6 shows the organization structure set up at the district level.

Figure 6: Organisation Structure at District Level



Process Outputs

Depending on the type of service rendered, receipts, certificates, etc., are generated for the citizens. Daily reports are also generated for the centre and for individual agencies involved. Certain services require filling up of forms etc. which are also collected by the centre.

Impact of Laws and Regulations

The e–Seva centre acts as a facilitator for the collection of various payments and dispensation of services. No major legislative changes were made apart from the creation of certain additional posts to administer the project. Online payments are currently not offered in the e-Seva setup.

Functional Areas Covered

The e–Seva centres cover a wide range of services spread across central, state and local bodies. With regard to municipalities, the services covered are property tax payments, birth and death certificates, sale of trade license applications, renewal of trade licenses, issue of parking tickets, etc. Geographically, every centre accepts payments pertaining to any area.

Strengths and Weaknesses of the System

Strengths

i. The unique PPP model adopted transferred the risks attached to the private partner while retaining overall control with the Government.
ii. High level of user satisfaction as indicated in a survey conducted of 15 users.
iii. The self–financing model creates enough incentive for the private partner to carry on in the project.
iv. This has resulted in substantial savings in costs and time to the citizens and the various agencies involved.

Weaknesses

i. Connectivity problems due to non–payment of BSNL bills by the Government.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiative in Andhra Pradesh ('SUVIDHA') is given in **Table 2**.

Table 2: Snapshot view of the e-Governance initiative in Andhra Pradesh

Parameter	Details of AP Initiatives
1. No. of Modules Planned	16
2. No of Modules Implemented	2
3. Platform/Programming Language(s)/Technology	J2EE (JSP, Servlets & EJB)
4. Software Architecture	3-tier
5. Deployment Architecture	Centralized at district level
6. Database	IBM DB2
7. Connectivity	APSWAN
8. Hardware Platform (Servers)	RISC, Xeon
9.Hardware Platform (Clients)	Pentium
10. Operating System (Servers)	Unix, Linux
11. Operating System (Clients)	Windows 2000 – Professional
12. Software Applications (Implemented)	Property Tax Birth & Death
13. Build or Buy	Contracted out
14. Development Process	Rational Unified Process (RUP)
15. Backup Procedures	Backup to tape on a daily basis. Also, backup to state data centre daily.
16. PPP Arrangements	Danlaw – Nagarjuna Infotech, CMC, e-Seva
17. Citizen Interfaces	e-Seva & Citizen Facilitation Centres, Website
18. Documentation	Good focus on documentation.
19. Use of Local Language	Not used.

4.1 Description of Technical Architecture

a. Hardware

The ''SUVIDHA'' project has provisioned very good infrastructure consisting of high end database, application and backup servers. Typically the servers are 64-bit symmetric multi-

processor boards with a clock speed of 750 MHz. District Data Centres (DDCs) have Intel Xeon based systems with hot swappable hard disks, and the end-user systems use a minimum of Pentium IV processors. The detailed configuration of the servers and client desktops is provided in **Annex B1**.

b. Software

All modules of the ''SUVIDHA'' project are developed with the use of the J2EE framework. IBM Websphere Multi Server Advanced Edition is used as the application server. Tivoli Enterprise Edition is used as the backup software. IBM DB2 UDB is the common database used for all the modules.

c. Operating System

UNIX is used as the Operating System for database servers, application servers and for some backup servers. Other backup servers use Windows NT. Linux is used in the servers in the District Data Centre. Desktop PCs typically use Windows 2000 - Professional Operating System.

d. Network communication software

No evidence of usage of network communication software was found.

e. Systems management plan and network management plan

M/S. CMC Limited have been contracted for a period of three years for System Integration and Maintenance which includes installation and management of network equipment, servers, end-user systems, UPS, etc., throughout the state.

f. Details of applications and programming languages

The modules of 'SUVIDHA' are built on the J2EE framework. JBOSS is used as the application server. Details of each module are provided in **Annex B2.**

g. Details on database system

'SUVIDHA' uses IBM DB2 UDB as the database software. 'SUVIDHA' has located the transactional database servers in several District Data Centres (DDCs), each of which are shared by a set of ULBs. This essentially means that all the ULBs are connected to their respective District Data Centres (DDC) where their core transactional system is hosted. The DDCs are in turn connected to the respective District Network Centres which are used to replicate the data from all the DDCs at a central database located in the State Data Centre. Detailed information on database system configuration is provided in **Annex B3**.

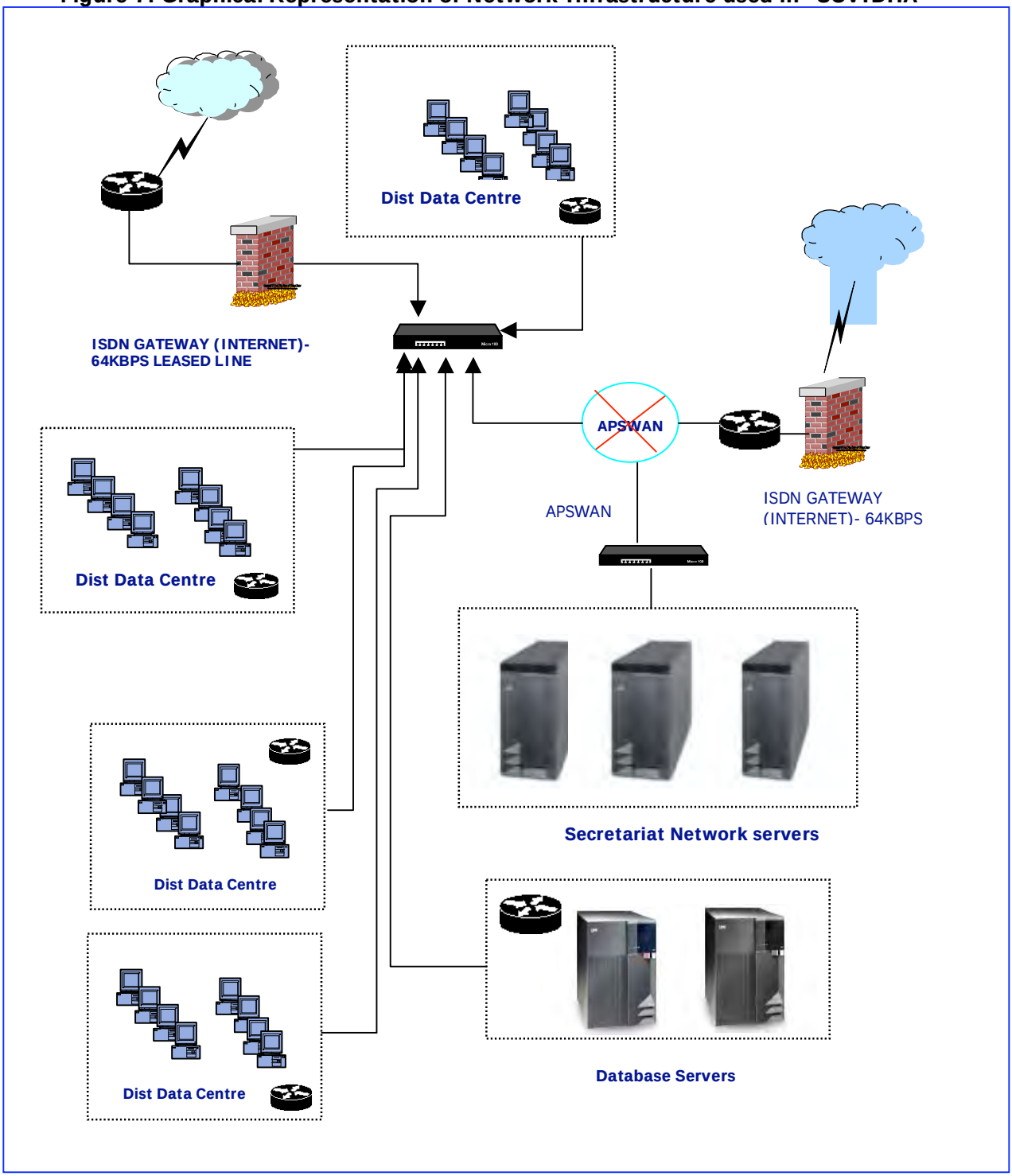
h. Details on current network architecture

All the Urban Local Bodies are connected to the respective District Data Centre (DDC) of the department using a 64 kbps leased line with ISDN or dial-up as backup options. DDCs are connected to the respective District Network Centres using a 64 Kbps leased line with ISDN as backup (via APSWAN).

APSWAN provides the connectivity from District Network Centres to the Secretariat Network Centre in Hyderabad. The ULB head offices and circle offices are connected with a 64 kbps leased line, and a 128 kbps ISDN line is used as a backup line. Detailed network hardware configuration is provided in **Annex B4**.

Figure 7 gives a graphical representation of the network architecture that has been used for 'SUVIDHA'.

Figure 7: Graphical Representation of Network Infrastructure used in ''SUVIDHA'



i. Internet/intranet components

All the modules have been developed on a browser-based deployment architecture. Currently they have not been internet-enabled and are for use via the intranet only. Certain websites have also been built, but they are used purely for informational purposes and do not support transactional operations.

j. System interfaces with other systems

The current system does not have interfaces with other software such as EDMS, GIS, etc.

k. Citizen interface

The citizen's interaction with the 'SUVIDHA' initiative is primarily either through the facilitation centres at the ULB offices or through the e-Seva centres. A website has also been set up for each ULB which provides informational services for the citizen on various aspects.

l. Level of computerization

All the core operational aspects of the municipalities are being shifted to the electronic system in a phased manner. For the modules that have been computerized, there is no dual manual system. The typical desktop PC configuration is given in Annex B1.

m. Quality of project documentation & user manuals

The 'SUVIDHA' project was observed to have very good project documentation and user manuals. The user manuals are precise and cover the required breadth of operational requirements for the user of the modules. However, certain errors were noticed in the documentation which could be set right by means of a cleansing exercise.

n. Business continuity plan and disaster recovery plan

Data is backed up daily in tapes and stored in the DDC. Further to this, the data is also transmitted to the SDC where there is another backup server. Thus there is sufficient redundancy and planning in backup procedures and policies to safeguard the data against loss. Apart from these ad-hoc procedures there was no documentation of Business Continuity Plans and Disaster Recovery Plans.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The infrastructure currently in place appears to be suitable for the current scenario. However, due to the nascent nature of the project an exact capacity benchmark could not be established to gauge the appropriateness of current provisioning.

The applications are built on a common J2EE framework which is scalable by its inherent architecture. However, actual testing has not been done to verify the argument.

Clear SLAs (for most of the hardware and software infrastructure) have been signed which guarantee a certain degree of stability and reliability to the system. For instance, the contract with the software vendors has clearly specified procedures for handling issues and enhancements that affect day-to-day operations. Furthermore, certain aspects of the system such as hardware and connectivity have mandatory levels of uptime, with provision for only a small downtime for maintenance and other work on the system. For example, a minimum uptime of 99.9% has been mandated for the servers at the District Data Centre.

a. Potential of the current application and new application to be integrated/operated/hosted

Since the source code for all software is available with the DMA, any other application that is developed can potentially be integrated and hosted on the same infrastructure. Further, there are no proprietary protocols/methods being used which would hinder integration. However, the presence of a recognized interface layer or methodology was not discerned during the assessment due to which definite judgements cannot be made on the ease of integration with other modules at the software level.

b. Vendor dependence to independence

The software for 'SUVIDHA' has been developed by Danlaw Technologies in consortium with Nagarjuna Infotech. Ownership of source code rests with the DMA and there is a MoU for replication at other sites with the vendor (on a revenue share of 20:80 for the DMA). This gives the DMA sufficient leverage in times of contention, and clear independence from the vendor because of well documented ownership of code.

c. Information security management and systems security

Role-based security is provided in the software for authentication and authorization. Online payments are not being envisaged at this point of time.

d. Systems auditing

The audit of the system on aspects of security and controls and also functionality was handled by PricewaterhouseCoopers who were the principal consultants of the project. However, documentation on the methodology or on the findings could not be obtained.

5.2 System Deployment and Training

a. Project management, monitoring and system development process

The DMA has created a Project Implementation Committee with overall responsibilities of project delivery and monitoring. Furthermore, PricewaterhouseCoopers who are the principal consultants have also been involved in each stage of the development process right from creating the RFP to monitoring of implementation.

The 'SUVIDHA' project team has adopted the Rational Unified Process (RUP), a wide-spread and heavy-duty framework for SDLC management.

b. Speed in deployment/procurement - system installation time

There is no proper documentation available on deployment/procurement and system installation time.

c. Implementation approach and plan

The Property Tax Module and the Birth and Death Module were implemented across all ULBs in the first phase. All other modules are to be implemented across select ULBs as a pilot project, after which they will be implemented across the state. The typical implementation plan adopted is as follows:

i. Data digitisation.
ii. Installation and configuration of software on the server.
iii. Training to staff and roll-out.

The general approach adopted for data digitization is as follows:

i. Data entry by operators.
ii. Printout is validated by corporation staff of respective departments against original

data.

iii. The corrections are then entered again into the system.
iv. On this corrected data a random audit is performed to ensure the integrity.

d. Manpower required to operate the system

The 'SUVIDHA' project has identified certain roles and responsibilities that have to be considered during deployment. Each of the district data centres (which typically serve a set of ULBs) have been assigned one Manager/Co-ordinator who directs all the efforts needed to roll-out the system, right from data entry to hardware installation and commissioning and deployment of software. This person is also responsible for on-going maintenance after complete roll-out. Apart from this a regular set of administrators (for systems, network, etc.) have been deployed to manage the system on a continuous basis.

e. Amenability of service delivery through PPP mode

The 'SUVIDHA' project has been able to share its back-end infrastructure with the e-Seva setup and integration has been achieved between them for collections at e-Seva and updating of the 'SUVIDHA' database. Thus, duplication of processes has been eliminated and the software has been proven to be capable of service delivery through PPP mode.

f. User training

The user training has been done in a planned manner with the involvement of the vendors. Plans are also being formulated to provide training using existing training entities such as universities.

g. Support

Support has been identified as one of the aspects of service to be offered by the vendor and clear expectations/deliverables have been identified. Processes have been laid out for areas such as change requests, software patching, etc. Furthermore, support is also handled by the trained professionals who have been deployed at the site.

5.3 Details on Cost

For the 'SUVIDHA' project, an approximate estimate of costs as gathered during the study is given below:

- Computers and peripherals – Rs. 17.0 Crores.
- Application Software – Rs. 5.0 Crores.
- Data digitisation costs – Rs. 1.5 Crores.

5.4 Functionality

The modules developed currently serve the specific purpose of computerization of existing processes and cover the necessary functionality. The user interface is only in English and the need has not been felt to provide local language support in any of the modules. The recognized process efficiencies offered by the system are in terms of faster receipts, better access to data and generally a better level of overall service.

5.5 Stakeholder Participation

a. Stakeholder usage and ease of access

Stakeholder usage is very high because of the absence of a manual system. The internal users do not have any issues with access to the system. Furthermore, the citizens have very good access to relevant and detailed information via the Corporation website which is user-friendly and easy to use.

b. Cost of accessing

The study could not cover aspects of cost at this level of detail.

c. Popularity

The acceptance and usage by citizens is very good due to the very high level of convenience offered in comparison to the older system. The citizen response has been very positive and the efforts have been lauded. Furthermore, the Corporation employees have also recognized the benefits offered by the system and have been pro-active in its usage.

6. Lessons Learnt

- **Key lessons learnt.**
  - State level initiatives taken up after initial experiences of the ULBs.
  - Design for scaling at state level based on ULB experience.
  - Financial Accounting module has been the first and key initiative.
  - Integration of various modules to Financial Accounting has not been made.
  - User/citizen interface is an important and primary aspect of implementation.
  - Robust hardware planning and experienced service providers support to the process of setting up e-Governance initiatives are contributing factors for success.

- **Strengths and weakness that could be applicable beyond this specific project.**
  - Project management with specific deadlines, deliverables and output evaluation takes time.
  - System development documentation, even if established, needs to be reviewed and maintained seriously.
  - Functional requirement specifications documentation and data standards need to be established.
  - Change management plans are to be developed and monitored involving all the stakeholders.
  - Clarity in contracting (through proper RFP and contracting methodologies) is required.

- **Lessons for scaling/replicability.**
  - Clarity on objectives of the total e-Governance exercise required.
  - Clear planning on functionality, software, hardware, operational aspects, role and responsibilities of all the stakeholders to be made.
  - Roadmap with responsibilities of all stakeholders supported by proper arrangements/agreements is required.

- **Critical success factors.**
  - Political will.
  - Freedom for champions to act.
  - Clarity in requirements.
  - Systematic approach.
  - Making it a state level project with sops for various stakeholders.

- **Costs and funding source, collection of user charges, roll-out plan, scope for integration of experiences across cities.**
  - Totally funded by the State.

- **Details regarding PPPs employed.**
  - State level planning made through consultants (PWC) including RFP development.
  - Various arrangements with vendors for service delivery have been made.

- **List any key problems and opportunities identified by user.**
  - Opportunity
    - State wide e-Governance initiatives and generally IT savvy government atmosphere.
    - Institutional mechanisms for sensitizing key players on e-Governance aspects.
  - Key Issues
    - Integration of various modules.
    - Linkages to financial accounting.

- **Time factor and delays in implementation.**
  - Delays in implementation arise due to lack of single entity taking the responsibility for implementation.
  - Various persons involved in implementation not completely aware of all aspects of municipal e-Governance requirements.

- **Skill sets needed for implementation of various initiatives.**
  - Governance: total understanding of various issues to be tackled at government level, and apart from project management, review, and trouble-shooting.
  - Functional: requirements at operational level, the need for process reengineering, linkages to decision making, linkages for financial accounting and control, reconciliations.
  - Technical: requirements with regard to data, hardware/software aspects, data centre, security, business continuity, SLA with service providers, upgrading.
  - Logistics: requirements relating to resource requirements, arrangements with service providers, review mechanisms.

- **Human resource issues in relation to the changes; role clarity and degree of employee buy-in.**
  - Matching of roles and responsibilities with qualification, background and experience of staff through revision of existing regulations and practices.
  - Training and sensitization of various personnel for their specific staff.

1. Linkages of State Level Initiatives to ULB Level Initiatives

The e–Governance strategy for Karnataka is to 'enhance and promote the use of information and communication technologies' in the functioning of the Government in order to make required information available to all citizens and to provide all services in an efficient way and identify services on an on-line basis.

The procedure as laid out in the above e-Governance strategy document, for implementation of e-Governance initiatives is:

1. Process Reengineering.
2. Preparation of SRS document.
3. Discussion and finalization of the SRS document by the vendor and the department.
4. Implementation of the project in pilot location.
5. Scaling up of the project to other areas.

At the state level with regard to Municipalities, work is being done by the DMA mainly under specific programmes like Nirmala Nagara, apart from certain stand-alone initiatives by the ULBs themselves. The UDD has an agreement with eGovernments Foundation, an NGO for design and development of software for the Nirmala Nagara project. The implementation of the project is handled by the DMA along with the ULBs. The following are the main initiatives undertaken at the state level:

1. Property Tax along with Geographic Information System (GIS).
2. Public Grievance and Redressal Module.
3. Birth & Death Module.
4. Fund Based Accounting System.

In addition to the above modules, the DMA is also planning to implement the following modules:

1. Ward Works.
2. Trade License.
3. Water Tax.

In addition to creating an e–Governance culture amongst the employees in the municipalities and at the DMA's office, certain new posts have been created to bring in the expert knowledge required to implement such projects. Municipal Employees Cadre and Recruitment Rules were specifically passed to provide for the induction of Accounts and IT staff in various entities. Accordingly, the staff were recruited and deployed at the ULBs, District Commissioner's Office and DMA's Office.

1.1 Objectives

Karnataka, since 2000, has been very progressive and keen in introducing various reforms. The approach to reforms in the Municipal sector is quite professional. The State is taking several key steps to make the changes irreversible. Various process reengineering aspects, legislative changes with regard to human resources and novel PPP are some of the totally different approaches the State has taken. Features of the State level initiatives are discussed below.

1.2 Key Features

a) **Separate department at the state level for e-Governance in infancy (Department of e-Governance):** This is a very young department and is different from the IT department. All the state level and department level initiatives on e-Governance will come under the ambit of this department as per a recent Government Order (7th January 2005).

b) **State level plan now emerging** through Nirmala Nagara Programme for 57 municipalities. Implementation is under progress. Under the NN Programme, e-Governance initiatives have been well planned. The State, through ADB funding, has currently employed consultants to introduce a Fund Based Accounting System in select municipalities (57 out of 224 ULBs), to review legal aspects, to design replicable software, and to create capacity for replication and scaling.

c) **Human resource plan well made with proper legislative changes:** The upgrading of technical manpower in municipalities has been done through a state level initiative. The GOK has brought in legislative changes for recruitment of technical staff by issuing a specific Notification (No. UDD 8 BMS 2004 Dated 16th Jan 2004) for recruitment of staff for ULBs. Already the recruitment for certain categories like Accountant (with BCom), Programmers, DBAs, Environment Engineers, etc. has been made. About 1,000 persons in total are expected to be recruited. These posts are with different salary scale and promotional avenues.

d) **Novel approach to PPP through involvement of e-Governments Foundation (EGF)** for design, software and supervision support. EGF, an NGO, is supporting the Nirmala Nagara Programme by providing various design, software development and technical support free of cost. This pro bono service has provided a new dimension to PPP in the sector. Currently EGF has implemented a Property Tax Module for BMP and is involved in various developmental efforts in Nirmala Nagara project at the state level.

e) **Usage of open source based development of application software:** Under the current plan the partnership with eGovernments Foundation is to develop all software in the open source model so that source code can be shared with any other ULB (of any other state) which is willing to adopt the same software.

f) **Involvement of credible governmental agencies** like Survey of India. The e-Governance initiatives in this sector have also networked with credible agencies like the Survey of India, which is providing support for validation of base maps and related data by conducting surveys at field level.

g) **Data Centres yet to be established:** In Karnataka data centres are yet to be established. Currently the entire schema for the same is under discussion.

h) **Role of City Managers' Association:** The Karnataka City Managers Association (CMAK) plays a proactive role in conducting studies, training personnel and researching urban issues. CMAK has a good infrastructure and has recruited qualified personnel to conduct research in specific municipal management aspects like garbage disposal; also, CMAK conducts various sensitization and orientation programmes for municipal executives.

i) **Local language used to a limited extent:** The adoption of Kannada is at present restricted to only the user interface. Transactional data is still in English.

As of January 2005 the implementation of e-Governance initiatives is partially functional in Bangalore and Tumkur, preparations to make state level implementation (first phase) is in an advanced stage.

2. Organization Structure

2.1 Directorate of Municipal Administration

Figure 8: Existing Organisation Structure of UDD / DMA

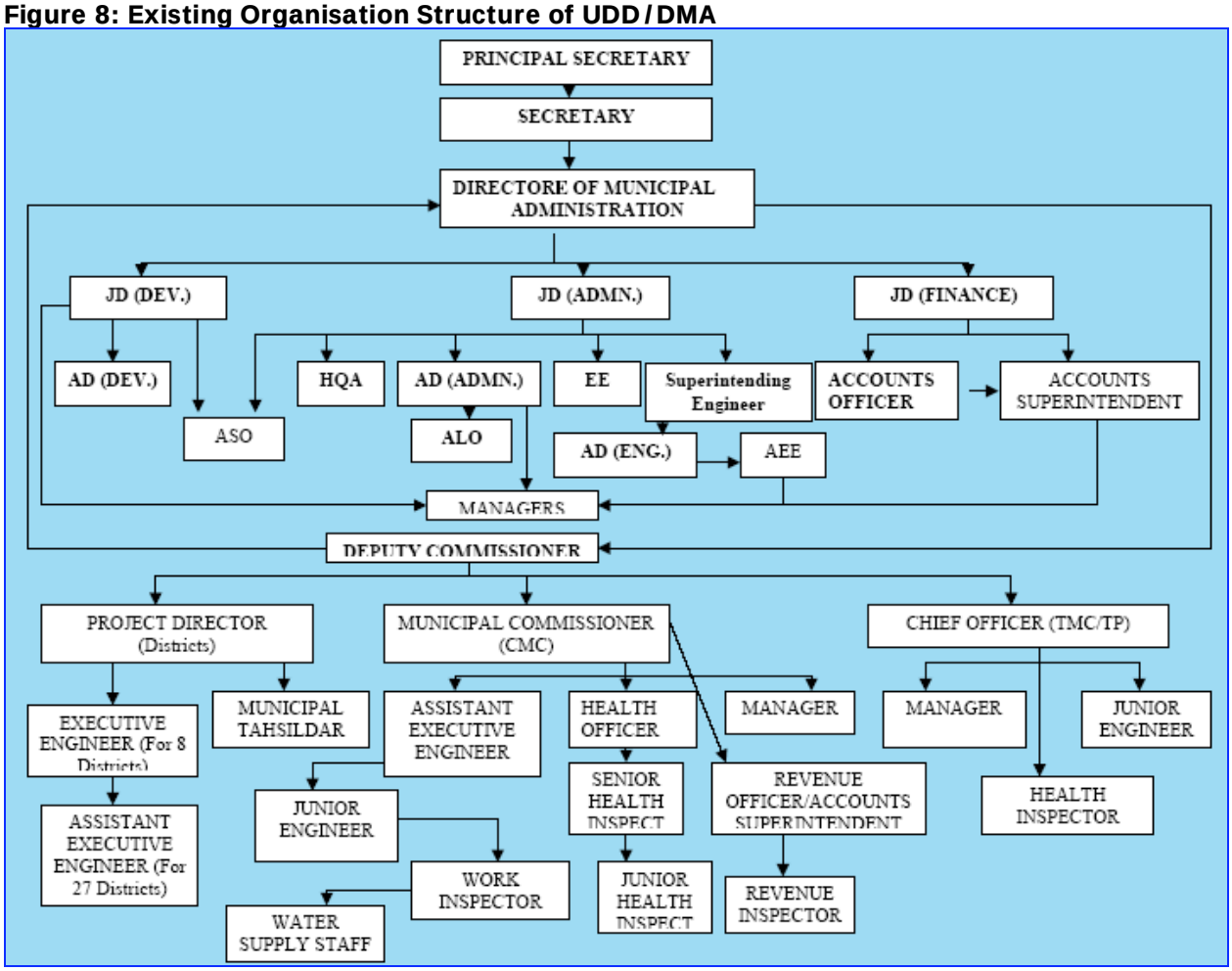


Figure 8 shows the existing organisation structure of DMA in Karnataka. The Directorate of Municipal Administration comes directly under the Principal Secretary and the Secretary in the UDD organisation structure. The Joint Directors under the Director, control various functions like finance and administration. Under them are Additional Directors with the Managers reporting to them. The Deputy Commissioner (DC) directly reports to the Directorate of Municipal Administration. The DC is assisted in his task by the Project Director of Districts and the Chief Officer. The Municipal Commissioner takes charge of the ULB. Engineers, various officers and staff of ULB complete the organisation structure.

3. Key Municipal Functions

3.1 Description of Modules

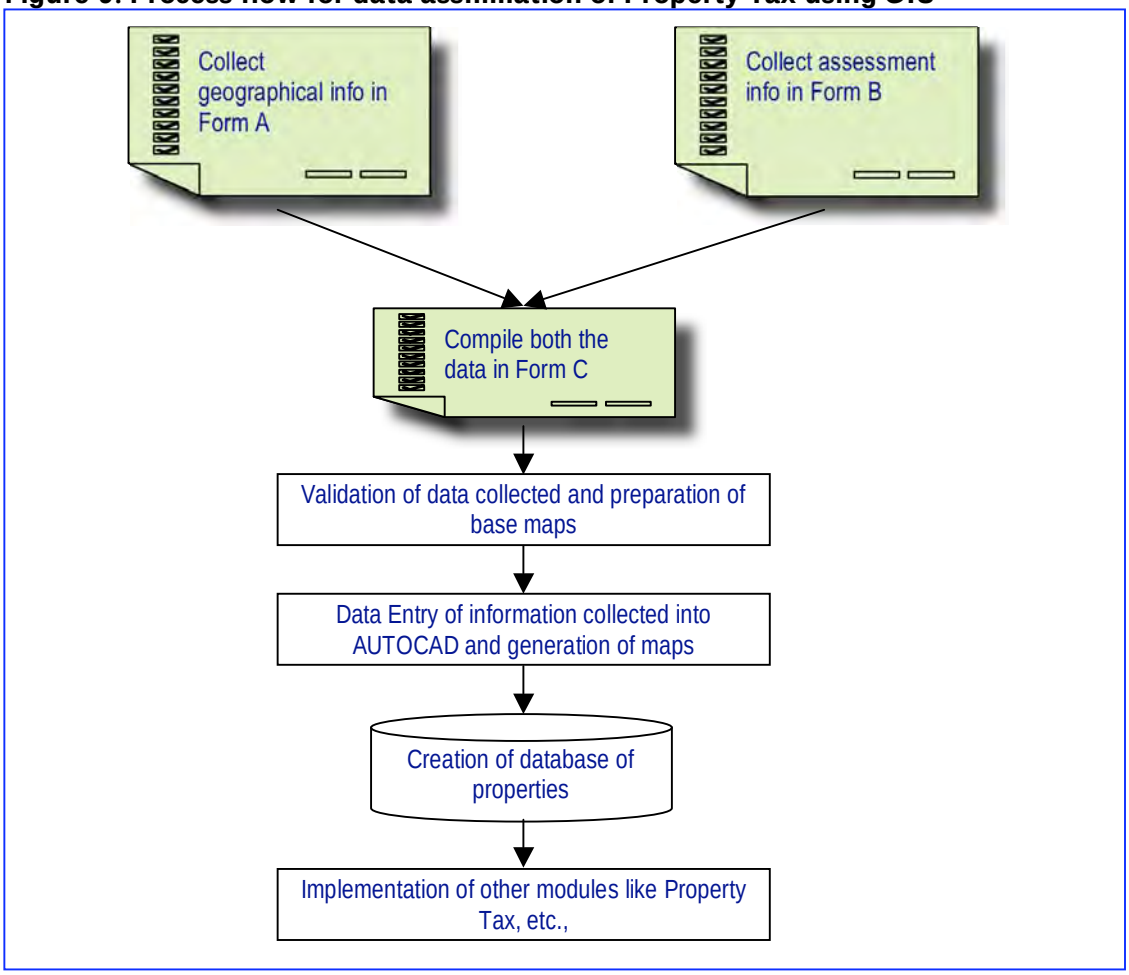
a. Property tax along with GIS

This system aims to create a complete database of all properties in each ULB. It is designed to serve as the database for all other Municipal Management Modules (such as GIS, Trade Licenses, etc.). Connected to the Property Tax module is the GIS module, which is also planned to be implemented. The GIS and Property Tax module are to be implemented in 57 ULBs across the state. In addition to the GIS and Property Tax module the DMA also plans to implement the Birth and Death Module, and the Public Grievance Module in the 57 ULBs. However, the other modules are still in the conception stage. While data collection has been initiated across 57 ULBs, the entire project has been implemented in select wards of Byatrayanapura CMC on a pilot basis. The main features of this initiative are given below:

Processes and procedures followed

i. The methodology followed for implementation is an incremental approach wherein the objective is to first collect the data, validate it and then build modules around it to manage the day to day operations of the ULB. The approach is diagrammatically represented in **Figure 9**.

Figure 9: Process flow for data assimilation of Property Tax using GIS



ii. The existing Municipal staff and the IT staff recruited have been delegated or assigned to work on this project. The Commissioners were personally made responsible for the success of this project.
iii. A system for monitoring the progress of data collection by each user group has been adopted. The Municipal Commissioners were made responsible for the progress of the respective groups.

Impact of laws and regulations

As mentioned earlier, major changes have been made in the recruitment rules to cater to the new job requirements for implementing and maintaining the e-Governance initiatives. This has provided support and comfort for implementation. There is no Information Security Policy in place as of now.

Former process measures vs. redesigned process

Formerly, property records were maintained manually and these never provided complete information due to lack of updating. The assessment procedure was also highly person dependent. Once the GIS enabled Property Tax is implemented, the annual demand generation, collection updating, overdue statements, etc. are expected to be handled by the module itself. The payment of taxes through citizens service counters and linkages of GIS to updated property data base is expected to cut down various intermediary processes and improve quality of data available for managing.

Functional areas covered

While the GIS could support all departments of the ULB (depending on the extent of data mapping), the Property Tax module affects only the Revenue Department. The focus is on building a database of properties, roads and streets. However due to constraints of cost and complexity, the details of sub surface features like water lines, telephone lines, etc. are not covered in the GIS mapping. Thus the GIS provides only partial information to the Engineering Department.

Strengths and Weaknesses of the System

Strengths

i. The focus on first collecting and refining the data and then attemptin full fledged implementation is a robust procedure.
ii. The standardization of forms for data collection and validation by reputed agency ensure the integrity of the data collected.
iii. The amendment of recruitment procedures and initiatives undertaken by the DMA to build capacity within the system before embarking on state level initiatives has been well conceived.
iv. The training given to a large number of engineers and IT staff is an important step undertaken.
v. Clear mandate from the DMA about its commitment to the implementation of the project has sent clear signals to the Municipal Commissioners about the importance of the project.
vi. Involvement of an expert agency like Survey of India to serve as technical support agency is an important feature of the initiatives.

Weaknesses

i. The documentation of the entire project has been poor.

ii. The shift of focus from Satellite Imagery based GIS to the AUTOCAD maps though resulting in cost reduction has compromised on the granularity of the information. The information available now is only directed at identifying properties, streets and numbering. This may prove insufficient in the long run since the GIS is expected to serve various departments. It will be required to contain information on the electric lines and water lines network, planning of road maintenance, other works expenditure, etc. A detailed GIS for the city as a whole containing granular information may be desirable in the long run. This aspect has been ignored by adopting this property–centric approach.

iii. The PPP approach followed in Karnataka makes the DMA/UDD heavily dependent on the private partner. This also raises the issues of ownership of Intellectual Property in relation to various artefacts developed in the process. The agreement with EGF in Karnataka places the responsibility of implementation, maintenance and upgradation on the UDD. Only the software is provided by the private partner.

b. Public Grievance & Redressal Module

This Module is aimed at recording citizen's complaints and managing them. The main features of this system are:

i. Citizens can record their complaints over the internet, telephone or personally.
ii. Each complaint is tracked by a unique complaint number.
iii. Complaint is forwarded to the respective officials.
iv. Status of the complaint is displayed to the citizen.
v. Reports for analysis are generated.

A detailed analysis of the system has not been possible since the same is yet to be implemented.

c. Birth & Death Module

This module is used to record births and deaths and print registration certificates. It also provides for online and offline registration. It captures certain additional information like cause of death.

A detailed analysis of the system has not been possible since the same is yet to be implemented.

d. Fund Based Accounting System

Fund based accounting system (FBAS) is a comprehensive accounting system that forms a core area for implementation of e-Governance initiatives under the Nirmala Nagara Programme. The DMA has appointed consultants for implementation of FBAS in the 57 select municipalities. The FBAS implementation is based on the successful implementation of the same in Bangalore Mahanagara Palike and TumKur City Municipal Council. This exercise is basically a scaling up exercise of the Bangalore and Tumkur experimentation.

A detailed analysis of the system has not been possible since the same is yet to be implemented at the state level.

4. e-Governance Infrastructure

4.1 Description of the Technical Architecture

The 'Nirmala Nagara' programme is yet to establish the technical infrastructure because all efforts are currently focused towards building the base data (for eg. property tax records). The current thinking is to establish a data centre at the state level to service the ULBs. However concrete steps have not been taken in this regard nor with regard to other technological aspects. Hence, the assessment of the technical architecture cannot be made as part of the study.

A snapshot view of certain aspects of the e-Governance initiatives in Karnataka is given in **Table 3.**

Table 3: Snapshot view of the e-Governance initiatives in Karnataka

Parameter	Details of Karnataka Initiatives
1. No. of Modules Planned	7
2. No of Modules Implemented	-
3. Platform/Programming Language(s)/Technology	J2EE (JSP, Servlets & EJB)
4. Software Architecture	3-tier
5. Deployment Architecture	-
6. Database	-
7. Connectivity	-
8. Hardware Platform (Servers)	-
9.Hardware Platform (Clients)	-
10. Operating System (Servers)	-
11. Operating System (Clients)	-
12. Software Applications (Implemented)	-
13. Build or Buy	PPP
14. Development Process	-
15. Backup Procedures	-
16. PPP Arrangements	eGovernments Foundation
17. Citizen Interfaces	-
18. Documentation	-
19. Use of Local Language	Limited to user interface

5. System Suitability and Deployment

Due to non-establishment of technical infrastructure, this aspect of assessment could not be carried out.

6. Lessons Learnt

- **System specific lessons with any suggested changes or enhancements (hardware and/or software).**
  - ULBs have taken up the initiatives ahead of the state level plan.
  - Design for scaling up based on ULB experiences (Bangalore/Tumkur).
  - Accounting (FBAS) module is the first and key initiative.

- Integration to accounting considered in the design and implementation.
- User/citizen interface part of implementation.

❖ **Strengths and weakness that could be applicable beyond this specific project.**
- Project management with specific deadlines, deliverables and output evaluation consumes a lot of time and dedicated efforts.
- System development documentation standards, cycles need to be established.
- Functional requirement specifications documentation needs to be maintained in a systematic fashion.
- Change management plan needs to be developed and monitored involving all the stakeholders.
- Clarity on human resource planning required, and positioning of personnel at various levels including revised recruitment policies are important for enabling implementation.

❖ **Lessons for scaling/replicability.**
- Clarity on objectives of the total e-Governance exercise required.
- Clear planning on functionality, software, hardware, operational aspects, role and responsibilities of all the stakeholders is important before the commencement of the initiatives.
- Roadmap with responsibilities of all stakeholders identified with proper arrangements/agreements has to be in place quite early as part of the overall plan.

❖ **Critical success factors.**
- Political will.
- Freedom for champions to act.
- Clarity in requirements.
- Systematic approach.
- Making it a state level project with sops for various stakeholders.

❖ **Costs and funding source, collection of user charges, roll out plan, scope for integration of experiences across cities.**
- Funded by ADB in implementation, design support by EGF.

❖ **Details regarding PPPs employed; estimates of private financing and payment mechanisms for the private party (ies).**
- PPP with EGF for technical advice, cost free software development.
- Replication through ADB funding, presently.
- Arrangements for replication through transparent tendering process and selection procedures.

❖ **List any key problems and opportunities identified by user teams.**
- Opportunity
  - Networking of world class talents tied up through EGF.
  - Novel PPP arrangement.
- Key Issues
  - Long term sustainability model.
  - Aspects relating to integration of various modules.

❖ **Time factor and delays in implementation.**
- Delays in implementation arise due to lack of single entity taking the responsibility for implementation.
- Various persons involved in implementation not completely aware of all aspects of municipal e-Governance requirements.

- **Skill sets needed for implementation of various initiatives at various levels.**
  - Governance: total understanding of various aspects required at government level, and for the following levels, apart from project management, review.
  - Functional: requirements at operational level, the need for process reengineering, linkages to decision making, linkages for financial accounting and control, reconciliations.
  - Technical: requirements with regard to data, hardware/software aspects, data centre, security, business continuity, SLA with service providers, upgrading.
  - Logistics: requirements relating to resource requirements, arrangements with service providers, review mechanisms.

- **Human resource issues in relation to the changes; role clarity and degree of employee buy-in.**
  - Matching of roles and responsibilities with qualification, background and experience of staff through revision of existing regulations and practices.
  - Training and sensitization of various personnel on key aspects relating to objectives, methodology, roles and responsibilities of the stakeholders.

Maharashtra State

1. Linkages of State Level Initiatives to ULB Level Initiatives

Maharashtra is one of the largest states in India with 247 Urban local bodies including 20 Corporations. It includes Brihan Mumbai Municipal Corporation, which is one of the largest Corporations in India. The State has been attempting various reforms in the Urban sector as a whole. The Government recognizes the autonomy and independence of the ULBs and have given them broad guidelines called 'good governance' initiatives. However, the decision on e-Governance aspects (technical, etc.) in the case of the municipal bodies is being left to the ULBs, considering the independence of the third tier of the government which the ULBs represent.

In this regard, in 2001 the State released a report on "good governance" at the State level, which clearly brought in various aspects of good governance needs in the ULBs. Also the State, in as early as 1998, had released an IT policy for enabling e-Governance at the State level. Vide GR. COM 1001/CR 174/01/39, dated 29.10.2001, guidelines for IT service providers were clearly made. The GR not only provides guidelines but also provides a basis for documentation of feasibility and implementation. At the State level, even by 1998 all the districts were connected to the Mumbai Secretariat through VSAT. A recovery/back-up site has been placed in Pune. Optical Fibre Cable network up to 500 meters of the District Control Centres have been laid. The data centres for ULBs have been planned with 2 Mbps connectivity.

In terms of architecture for e-Governance, the State is stated to have been aggressively advocating the policy of open source systems from as early as 1998. Besides, front-end java, back-end open source systems, ODBC database, and for mission-critical applications licensed software have been recommended by the State. However, in reality, many of the successful implementations by the ULBs in the state have used licensed systems. In terms of standards for software development, UNICODE standards have been recommended.

The e-Governance initiatives in the municipalities have been driven initially by various individual corporations like BMC, Navi Mumbai, Kalyan Dombivili, Pune, etc. Some very useful and interesting models have emerged from these experiments. The integrated Citizen Facilitation Centres (SETHU counters - similar to e-Seva of AP) are being established in various districts of Maharashtra; this would also include municipal interface for citizens.

SETHU

(SETHU) is an approach to provide integrated interface for addressing citizen requirements. At present there are multiple points of interaction between the citizen and individual departments spread over so many different Government offices. The Integrated Citizen Facilitation Centres (SETHU) is to work on these very basic needs of the citizens and reorienting the administrative processes accordingly.

The aim is to:

- Lay the foundation for e-governance.
- Create visible impact of the intention of the Government in this direction.
- Facilitate the interaction of the citizens with the Government to make it more transparent, pleasant and satisfying.
- To create foundation for citizen centric e-governance, at district headquarters and subsequently at taluka headquarters.

It provides for:

- Single window clearance of 83 important certificates (includes renewal of leases, permits and licenses).
- Quick redressal of public grievances.
- Common registry of letters, petitions for all sections of the office.
- On line pendency monitoring of all above.
- To provide services after office hours and on holidays also, in order to save time, money and energy of the public.

Certain initiatives had been taken by the State as well and there is a considerable enthusiasm for e-Governance at the top level of the Government. Scaling up of the ULB level initiatives is under active consideration.

1.1 Objectives

- To provide a world-class information technology infrastructure for the people of the state.
- To set up an institutional framework for taking a lead in the IT sector, to make the people of the state highly computer literate and to produce top class IT professionals through strong HRD initiatives.
- To consolidate and greatly strengthen the IT industry in the state through fiscal and non-fiscal incentives.
- To computerise the citizen-government interface in order to make government more transparent and to bring it closer to the people.

1.2 Key Features

a. IT Penetration is low: In the State, there is an extremely low IT penetration with the public and this applies to the metros as well. This is a key issue when starting the state-wide initiatives.

b. State follows ULB driven initiatives: The e-Governance initiatives in the municipalities have been driven initially by various individual corporations.

c. State level initiatives emerging: In terms of architecture for e-Governance, the State is stated to have been aggressively advocating the policy of open source systems from as early as 1998. The top bureaucrats are evincing considerable interest in the issue, and many policies are in the anvil.

d. Favourable background for e-Governance: In 2001 the State released a report on "good governance" at the State level, which clearly brought in various aspects of good governance needs in the ULBs. Also the State, in as early as 1998, had released an IT policy for enabling e-Governance at the State level.

e. Change Management has to be planned: Though the state is planning to enhance the computerization, it has not considered the human aspects of the migration to the computerized environment. The DMA office has provded all the ULBs with computers as a first step towards initiation of e-Governance. Computerization involves fundamental changes in the way work is done, many a times requiring reengineering of processes. Such human resource requirements are yet to be addressed.

2. Organization Structure

2.1 Directorate of Municipal Administration

The DMA Office is in charge of the overall policy initiatives of the municipalities in Maharashtra, the Corporations are directly dealt with by the Urban Development Department. DMA does not get involved the day-to-day activities of the ULBs. DMA has plans of enhancing the service deliverability of the ULBs in the State.

Figure 10: Organisation Chart of the DMA

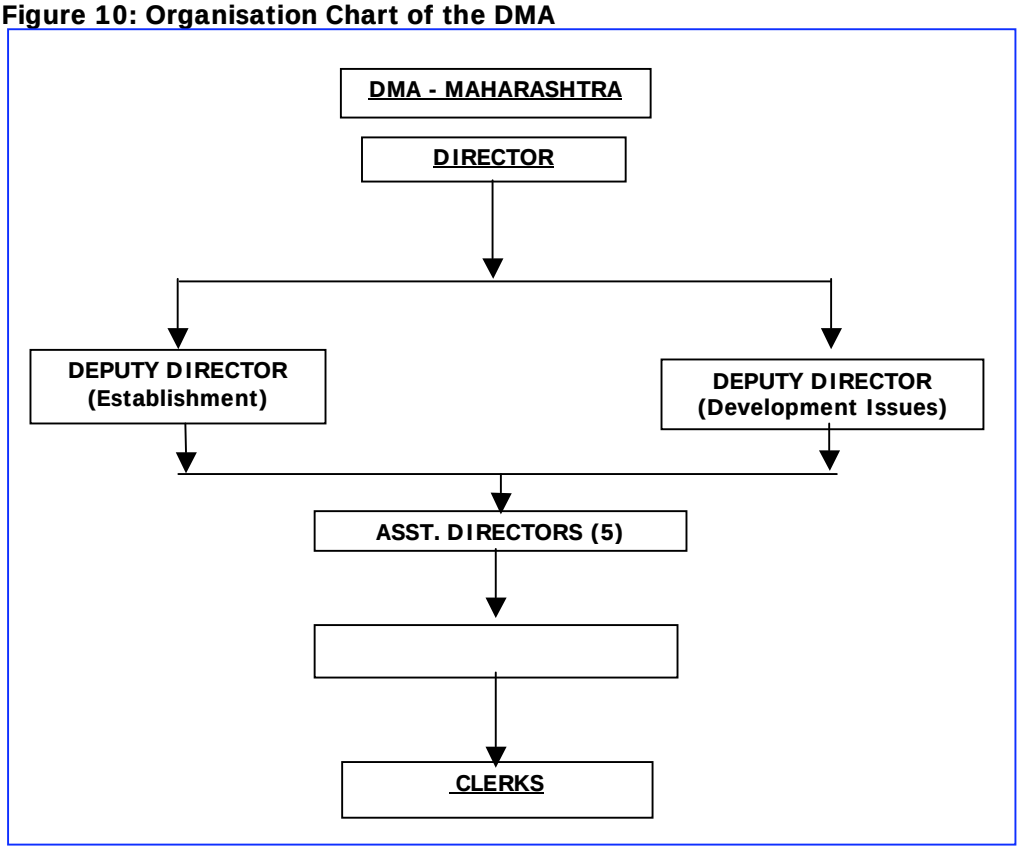


Figure 10 shows the Organisation Structure of DMA in Maharashtra. Though the DMA generally supervises the affairs of the municipalities, implementation of certain specific initiatives at the state level has been given to him and this includes the implementation of National Accounting Manual (NAM).

The DMA has laid out certain basic steps for phased e-Governance implementation in the municipalities of the State, which are directly under his control:

a. Provision of basic computer infrastructure: this is to sensitize the users with computers and make them comfortable to take on various e-Governance initiatives.
b. Creation of comprehensive database of various modules: this is a key activity, as validation of data has been identified as a core component of successful computerization.
c. Process re-engineering in each location based on local needs.
d. Connectivity at the state level being established. ULB to district level and district to State level connectivity are yet to be established.
e. All the security, back-up and business continuity plans to be established.

f. Introduction of double entry accounting systems as per NAM. This will be a parallel activity that will be carried out in order to provide the base so that all transactions are covered. Required links between accounting and other modules will be given as and when needed.
g. GIS to be integrated to various modules.
h. Systematic training of the employees for complete handling of the modules on their own.

As a first step all the municipalities have been given 5 computers each. As the hardware is in place, each of the above steps will be executed in stages and monitored for successful implementation.

3. Key Municipal Functions

The 74th Constitutional Amendment Act, which aims at making the Urban Local Bodies (ULBs) as vibrant Local Self Government institutions, lists out the functions to be transferred to Urban Local Bodies. The 12th schedule to the Act has identified 18 functions within the domain of Urban Local Bodies.

Maharashtra state has been active in providing varied services to the urban population, but has not formulated specific e-Gov measures for the ULBs, apart from basic computerisation efforts. Of late, certain plans have been made by the DMA to computerize a few functions of the ULBs. It is also planned to introduce double entry accounting system on the lines of NAM, in all the ULBs. But these plans are still in the initial stages and the detailed plans are under preparation.

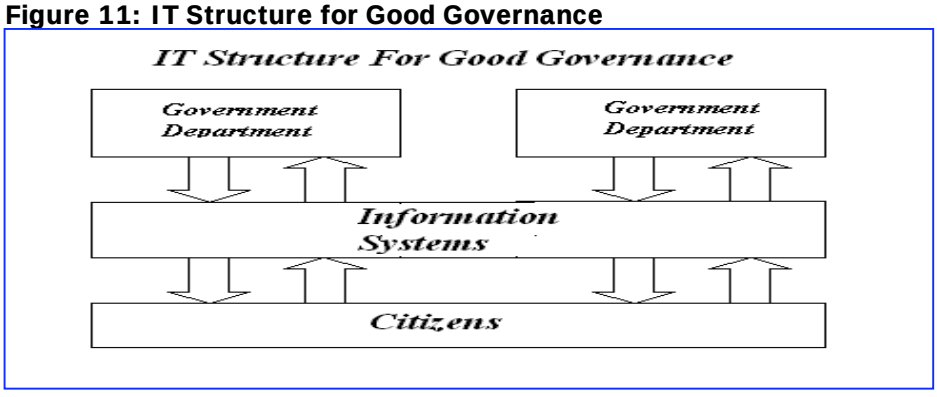
4. e-Governance Infrastructure

Currently no infrastructure for e-Governance of ULBs has been made available by the State. The DMA has laid out certain basic steps for e-Governance in the municipalities of the State, as mentioned earlier, which include plans for providing hardware and software infrastructure, networking etc., to the ULBs. Currently all the municipalities have been given a set of hardware–five PCs with basic accessories. The process of familiarizing staff with computers is on in the ULBs. However, no structured training has been provided.

The discussions with DMA however brought out overview of considerations for e-Governance in the municipalities. While these are yet to take concrete shape, the key features are likely to be:

a. Good e-Governance is based on the structure given in **Figure 11**.

Figure 11: IT Structure for Good Governance



b. Architecture:

- Architecture: Multi Tier, Web enabled
- Hardware: Intel/AMD based
- Operating System: Linux
- Application Server: Web sphere / Weblogic.
- Database: RDBMS (central) / MySQL (Local)
- Networking: TCP/IP LAN and WAN
- Fonts: Unicode
- Front End: Neutral to operating system (Java, XML, C++)

c. Language related features: Local language should be enabled. Maximum use of fonts/technology available in public domain (Unicode) should be used. All masters to be essentially bilingual. The user interface needs to be bilingual. Facility for online toggle between English and the local language needs to be provided. Facilities for search and access in local language should be provided. Standard script keyboard with bilingual fonts need to be made mandatory.

d. Security and back-up: Data flows over a Network to be protected by encryption. Adequate security features to prevent misuse or unauthorized access. Use of Biometrics where required. Suitable systems for mirroring databases (backups) in State Level Server need to be established.

e. Intellectual Property: Intellectual property rights of software to vest in Government. Vendor to provide source code, documentation for future upgrading, enhancement and maintenance.

f. Key Common Masters: The following masters need to be key and common among all the

i. Citizens, Organizations
ii. Property, land
iii. Employees
iv. Contractors/supplier

5. System Suitability and Deployment

As of now, no major initiative is implemented at the state level, and hence this aspect could not be assessed.

6. Lessons Learnt

- Creation of basic infrastructure in all the ULBs is essential before any e-Governance initiative.
- Data base creation for various modules with proper validation is very important and needs to be done over a period of time.
- Basic functioning of various modules is necessary for triggering any process reengineering, and needs to be handled on a case to case basis.
- Security of data, back up and business continuity need to be planned ahead.
- Open source systems need to be used with the backing of competent IT staff.
- Updating of employees to various functionalities and operation of software, need to take place consistently.
- While overall requirements and methods need to be specified, the actual requirement and implementation need to be handled by the ULBs themselves.
- Wherever required service providers could be used, based on clear-cut arrangements.

Tamil Nadu State

1. Linkages of State Level Initiatives to ULB Level Initiatives

The unique feature of the Tamil Nadu (TN) e-Governance initiatives is the "centralised planning" of the whole exercise. The initiatives have been extended to all the municipal bodies and the computerization has reached a fairly advanced stage. The World Bank had funded the TNUDP project which has successfully linked the state initiatives with those of the ULBs. Some ULBs have enhanced the state initiative and have added their own features. The Tamil Nadu initiative has been a successful model of a well-coordinated state-pioneered initiative, and has a high penetration level extending to the entire state.

1.1 Objectives

Tamil Nadu has been one of the states that commenced reform activities in the urban sector quite early (in the late 1990s). There have been several initiatives in the state in the municipal sector, the major two being computerization of all the municipalities and migration to double entry accrual based accounting system.

Considering the importance of e-Governance, under the TNUDP Project Phase II funded by the World Bank, TN took up the computerization of all Urban Local Bodies covering 5 Corporations, 102 Municipalities and 611 Town Panchayats by providing adequate hardware, software and related peripherals, and application modules using client-server and web-enabled technology covering all major functions of municipalities. The TNUDP-II also aimed at creating static and dynamic website for 5 Corporations and 102 Municipalities, establish Local Area Network/Metropolitan Area Network/Wide Area Network, facilitate the local bodies to instantly use citizen-friendly services at facilitation counter/collection centres and Banks.

TNUDP Project

This is a World Bank funded project for urban development in the state. Under TNUDP-II, the World Bank provided US $ 18.95 million for the two components listed below.

Institutional Development Component

- Capacity building of Urban Local Bodies.
- Capacity building of Commissioner of Municipal Administration.
- Technical Assistance to TNUDF and selected ULB to raise resources from the domestic capital market.
- Technical Assistance to municipalities for project preparation and implementation and recruitment of outside expert.
- Staffing and incremental operation costs of Project Monitoring Unit.
- Institutional development activities to be added during the project implementation period.

Urban Investment Component

- Line of credit for the basic infrastructure investments include mainly water supply, sewerage and sanitation, solid waste management, roads, storm water drains, and street lighting.
- Integrated Sanitation Programme.

1.2 Key Features:

a. **State–wide initiatives have been successfully executed:** The ULBs in the state have been covered under a single coordinated initiative and the project already functioning. This has been funded by a World Bank loan and has embraced all the urban local bodies in the state.

b. **Necessary infrastructure in place and e-databank created:** Initially a minimum number of computers were provided to all 102 Municipalities and 7 RDMA offices, to create computer awareness to the employees of the local bodies through TNUDP. Further, to introduce e-Governance services, under TNUDP-II with the concurrence of World Bank, additional computers were procured and commissioned at 5 Corporations, 102 Municipalities, 7 RDMAs offices, 16 ADTP offices, 611 Town Panchayats, TNUDP-II, CMA, DTP and MA&WS department by engaging ELCOT as procurement agency at a total cost of Rs.16.5 crores.

As part of procurement, 10 days basic computer training programme for 745 staff members covering all 5 Municipal Corporations, 102 Municipalities and 7 RDMAs offices was conducted. Similarly, a 7 days basic computer training programme was conducted for 1282 staff members covering all 16 ADTP offices and 611 Town panchayats offices. Apart from the above, through Training Component of TNUDP-II, 1473 staff members have been trained on computer fundamentals and on various specific functions, for a period equivalent to 23,500 man-days.

c. **User-friendly systems developed and implemented:** In the steps towards computerization, initially TNUDP-II developed application software modules in single user version. To adopt e-Governance concept and services all the application software modules covering 18 major functionalities such as Birth and Death Registration, Property Tax, Water Charges, Non-Tax, Profession Tax, Building Plan approval, Solid Waste Management, D & O and PFA Licenses, Movable assets, Immovable assets, Inventory, FAS, Vehicle, Personnel Management System, Mother & Child Welfare, Census, Electoral rolls, and Hospital Records were developed using client-server and web-enabled technology and installed in all 102 Municipalities and 5 Corporations. Currently, implementation is in an advanced stage.

After implementing the initially developed 18 application modules, TNUDP-II have identified the need for 12 more modules to bring e-Governance into local bodies such as Miscellaneous collection, Banks/Collection software, Grievances, Urban Indicator, Litigation, Monitoring of Tender, Personnel register, Street Light maintenance, Underground Drainage, Vacant Land Tax, Below Poverty Line and Administrator Module and the same have been developed by the TNUDP-II in-house software development team.

d. **Provides services to citizens at easy access:** As on date, on-line collection of Revenue at 4 Corporations out of 5 and 91 Municipalities out of 102 has been commissioned. The remaining 1 Corporation and 11 Municipalities are in the process of implementation of the same.

e. **Accrual Accounting systems are in vogue:** Introduction of accrual accounting began with the revamping of entire accounting procedures. Two retired officials from the Local Fund Audit were engaged to completely redraft the accounting procedures in the Municipalities, based on double entry accrual accounting system. The manual prepared was vetted by the Institute of Chartered Accountants of India and the accounting manual was implemented through proper training of various officials in all the 102 Municipalities. The

GoTN appointed Chartered Accountant firms across the State to implement the accounting modules, support/train the ULB staff in operating the new accounting system and hand-hold them for some time for internalization. The chartered accountants also took the responsibility of preparing and certifying the opening balance sheet of the ULBs. The audit under the new system has also been regular. The accounts for the year 2003-04 have been completed in all the Municipalities under the new accounting system.

f. **All manual records converted into e-data:** After the initial hiccups in transition from manual to computerization, the manual records hitherto not maintained up-to-date were updated and reconciled with manual records by engaging a centralized data entry consultant, to enter the manual data of all the Revenue, Public health, Engineering and Administrative records for certain specified back periods. In total about 62,00,000 records were entered and validated. (2052 billion key depressions).

g. **Qualified computer professionals identified and appointed:** Through Employment Exchange, Government of Tamil Nadu, and by conducting examinations and interviews, technically qualified persons were selected by following the Government recruitment procedures and appointed to work as Programmers, Assistant Programmers and Data Entry Operators at various Urban Local Bodies, Regional Directorates and CMA office to strengthen the computerization activities. The required GOs were issued by GoTN.

h. **Local bodies connected with administrators to the Government:** Local Area Network has been established in all 102 Municipalities and 5 Corporations. Proposal for WAN has been programmed, prepared and sent to World Bank for approval.

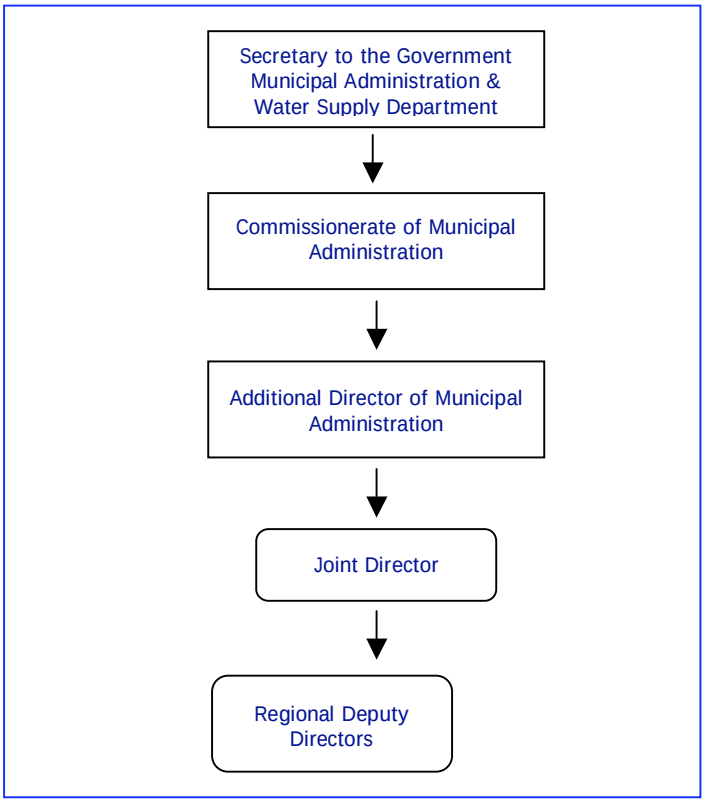
i. **On-line monitoring of the process and the performance of local bodies facilitated:** Since the complete components of data are made available, the Management can easily monitor the performance of each local body and provide necessary support and guidelines to enable the local heads to improve services and take quick decisions.

2. Organization Structure

2.1 Commissionerate of Municipal Administration

The Commissionerate of Municipal Administration directly controls all the ULBs of Tamil Nadu. Any initiatives/aspects relating to governance and administration of the ULBs is handled by the Commissionerate of Municipal Administration. The CMA has an Additional Director, Joint Director and a few Regional Deputy Directors. The CMA falls directly under the Secretary to the Government of Municipal Administration and Water Supply Department. **Figure 12** shows the Organisation Structure showing the setup of Municipal Administration in Tamil Nadu.

Figure 12: Organisation Structure showing the setup of Municipal Administration in Tamil Nadu



The function of training, implementing and monitoring of the e-Governance initiatives have been largely with the TNUDP II project. Experts were able to train the staff and provide necessary support as well as carry out the functions of trouble shooting and de-bottlenecking wherever required. This was an enabling factor in the successful penetration of e-governance in both large and small locations.

3. Key Municipal Functions

3.1 Description of Modules

Under the TNUDP-II project, the preparation of the software and implementation of the same in all the local bodies covered by the project for various modules have been successfully done. Currently software for the following 18 modules have been completed and installed in all the 102 Municipalities.

The following modules have been installed:

a. Birth & Death Registration
b. Property Tax
c. Water Charges

d. Non-Tax
e. Professional Tax
f. Building Plan Approval
g. Solid Waste Management
h. D & O and PFA
i. Movable Assets
j. Immovable Assets
k. Inventory
l. FAS
m. Vehicle
n. Personnel Management System
o. Mother & Child Welfare
p. Census
q. Electoral rolls
r. Hospital Records

In some Corporations and Municipalities certain additional modules have been introduced. Some of these modules are:

a. Miscellaneous Collection
b. Banks/Collection Software
c. Grievances
d. Urban Indicator
e. Litigation
f. Monitoring of Tender
g. Personnel Register
h. Street Light Maintenance
i. Underground Drainage
j. Vacant Land Tax
k. Below Poverty Line
l. Admin Module

3.2 Processes and Procedures Followed

The entire project management has been done by an IT specialist under the TNUDP-II programme. Further, interestingly the entire software has been developed by the ULB recruited programmers and assistant programmers who had very good domain knowledge because of their earlier experience in handling municipal systems. The monitoring of all aspects of roll-out is being done by this team at the local level and progress is reported to the IT Specialist.

The following agencies are involved in the project:

a. **Software** – In-house development with guidance from TNUDP–IT Specialist but ECIL prepared a Project report on computerisation before the TNUDP II took over.
b. **Project Consultancy/Management –** TNUDP-IT Specialist.
c. **Hardware – Network/Systems Integration –** HCL Technologies Limited.

3.3 Process Outputs

- Properly planned computerization has resulted in:
  - Collection of revenue at facilitation counter located in ULB premises, collection centres and identified Banks.
  - Issue of Birth Certificate.
  - Issue of Death Certificate.
  - Issue of Planning Permit.
  - Issue of Trade Licenses.

- Registration of on-line grievances and complaints.
- Facility for downloading requisite applications.
- Registration of on-line complaints/suggestions through email.

3.4 Impact of Laws and Regulations

In Tamil Nadu some major reforms have taken place with regard to the legislations. In the spirit of the 74th Constitutional Amendment Act, the GoTN has introduced a single Urban Local Bodies Act 1998 and Urban Local Bodies Rules, 2000. This provides for uniformity in the functioning of all urban local bodies which has facilitated state-wide e-Governance initiatives.

3.5 Functional Areas Covered

The 18 main functions in all the ULBs and up to 12 additional functions in certain select ULBs, as discussed earlier, have been covered. In this regard, the following points are noteworthy.

- Revenue items (Property Tax, Water charges, Non-tax, Professional Tax, Vacant Land Tax) computerized and made on-line.
- Collection of revenue at facilitation counters.
- Collection of revenue through banks. Bankers operate even on holidays and after office hours.
- Issue of computerized Receipts, Notices and Demands by local bodies.
- Trial Balance produced within a week of closure of monthly accounts in most of the local bodies. It has reduced the pressure workload on auditors when it comes to finalization of accounts and audit man days have been reduced from 70 to 50.
- Use of computer systems by staff increased to 60%.
- Inter office communication largely by e-mail.

3.6 Strengths and Weaknesses of the System

Strengths

i. The basic design of various modules has considered integration with financial accounting system, which was has not been the case in the other states.
ii. The accrual accounting system introduced as a part of the initiatives ensures greater credibility of the finance figures.
iii. Funding was tied up in advance (with a World Bank loan) and hence procurement of hardware/infrastructure was not a problem.
iv. The approach followed of developing common software for all the locations reduced the time taken for trials and trouble-shooting activities.
v. The innovative recruitment policies followed by the state government enabled the appointment of competent IT professionals.
vi. Provision of a large number of service centres made the system accessible by a large section of the population.
vii. Appropriate training facilities for the field level staff not only enhanced their productivity, but also motivated the staff to perform better. Now the comfort levels are reasonably high and long-term sustainability is ensured.

Weaknesses

i. There is inadequate documentation as a whole which results in a greater reliance on the human element.
ii. Even though work is being done on framing the security and backup policies, the same are long overdue and should have been in place much earlier.

iii. The centralised software initiative has not addressed certain local needs of municipal bodies. The accounting software has been made only for single zone and does not address the needs of multi-zone corporations. This has resulted in various additional efforts for consolidation.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiative in Tamil Nadu is given in **Table 4**.

Table 4: Snapshot view of the e-Governance initiative in Tamil Nadu

Parameter	Details of Tamil Nadu Initiatives
1. No. of Modules Planned	30
2. No of Modules Implemented	18
3. Platform/Programming Language(s)/Technology	VB, ASP
4. Software Architecture	2-tier
5. Deployment Architecture	Servers at ULB – within ULB mixture of centralized and de-centralized
6. Database	Oracle
7. Connectivity	SWAN
8. Hardware Platform (Servers)	Xeon/Pentium
9.Hardware Platform (Clients)	Pentium
10. Operating System (Servers)	Windows 2003 – Server
A11. Operating System (Clients)	Windows XP/98
12. Software Applications (Implemented)	Birth & Death Property Tax Water Charges FAS Non-Tax Professional Tax Building Plan Solid Waste Mgmt. D&O and PFA Inventory
13. Build or Buy	In-house development with assistance from TNUDP
14. Development Process	No recognized process
15. Backup Procedures	Backup to CD daily.
16. PPP Arrangements	Incom Solutions, HCL
17. Citizen Interfaces	Citizen Facilitation Centres, Banks, Website
18. Documentation	Limited focus on documentation
19. Use of Local Language	Provision has been made. Left to discretion of ULB for usage.

4.1 Description of Technical Architecture

a. Hardware

The project has planned for appropriate hardware and all the ULBs have been provided with servers of good configuration. The typical server deployment methodology is as follows – for smaller ULBs there is only a central server where all transactions take place. However for larger Corporations, the main transactional servers are deployed at the zonal level rather than at the central level. Adequate desktops have also been provided to all the Municipalities. The different ULBs have been given appropriate hardware as per their requirements.

Computers have been provided in all Municipalities and office of the Regional Directors in 1998. Systems have been supplied as detailed below.

- Special Grade Municipalities - 5 Nos to each Municipalities.
- Selection Grade Municipalities - 4 Nos to each Municipalities.
- Grade I Municipalities - 3 Nos to each Municipalities.
- Grade II & III Municipalities - 2 Nos to each Municipalities.

b. Software

All the modules have been developed in a client-server model using Visual Basic (VB) 6.0. The web-based (typically reporting and informational) applications have been developed using Active Server Pages (ASP). Oracle 9*i* is used as the database software for all modules and Internet Information Server (IIS) is used as the application server for web-based applications.

c. Operating System

The servers use Windows 2003–Server Edition as the operating system apart from some which use Windows NT. Windows 98SE/Windows XP are typically used on the client systems.

d. Network communication software

No evidence of usage of network communication software was found.

e. Systems management plan and network management plan

The entire job of systems integration and maintenance has been contracted to HCL Technologies Limited. The contract includes management of network equipment, servers and end-user systems.

f. Details of applications and programming languages

All the modules use Visual Basic (VB) as the programming language with the usage of ASP for dynamic pages. All the applications use the two-tier model and there is limited integration between the accounting module and the other modules. Details are given in **Annex B5.**

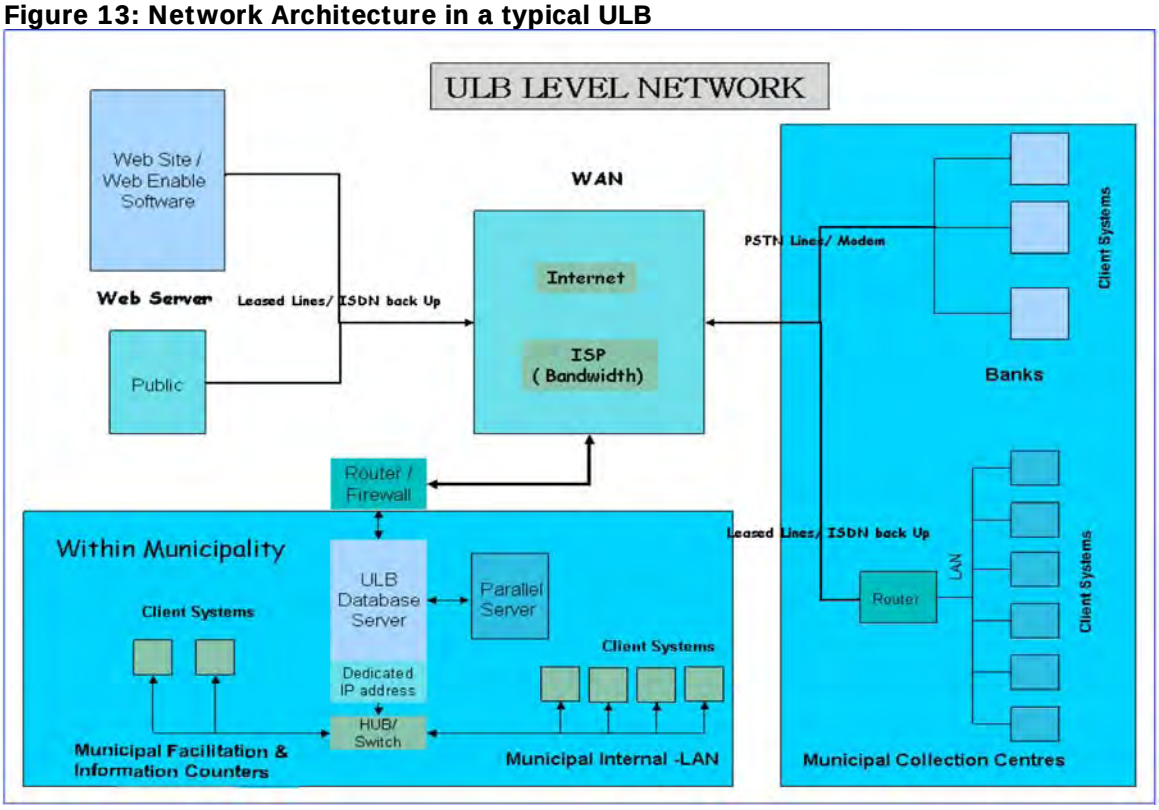
g. Details on database system

Oracle9*i* is used as the database for all applications. As mentioned earlier, the typical deployment is to split the data across zones and to have a replicating/reporting database in the head office or to have a single database for the entire municipality.

h. Current network architecture

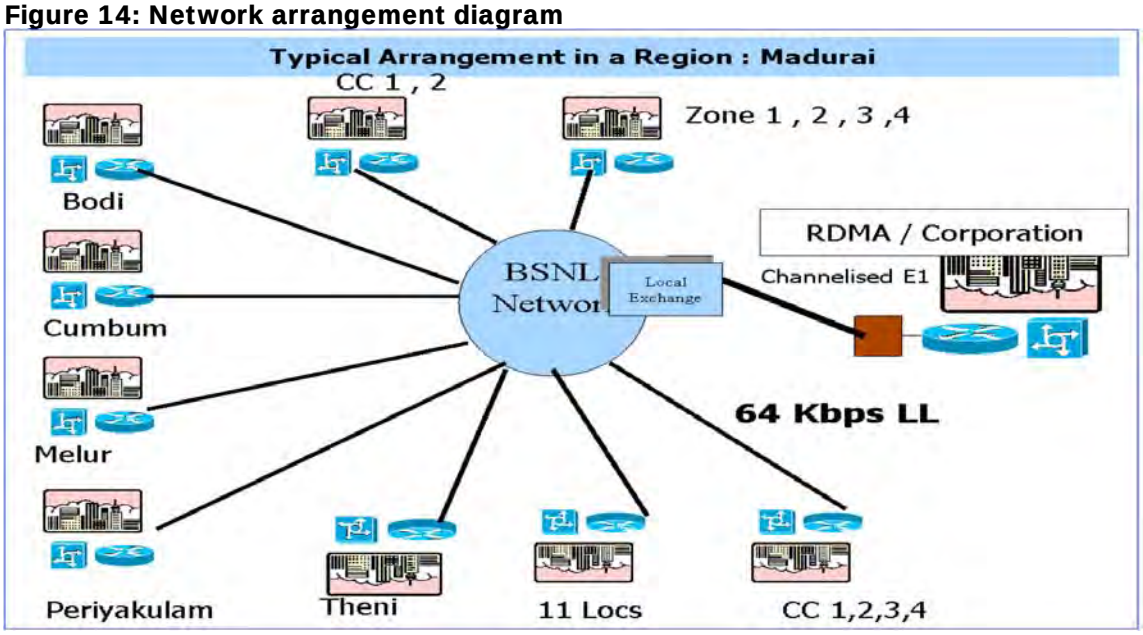
The network architecture in a typical ULB is shown in **Figure 13**. All the zone offices and banks are connected to the main server via leased lines. A separate internet line is also provided to enable the serving of dynamic pages directly from the web server at each municipality.

Figure 13: Network Architecture in a typical ULB



The ULB level networks are integrated at the regional level in order to provide for consolidation at the State level to the CMA office and other users. This connectivity is represented in **Figure 14.**

Figure 14: Network arrangement diagram



i. Internet/Intranet components

All the modules have been developed on a client-server mode and are served over the intranet. Further, most of the modules have a web-based informational and reporting system with varying levels of access to data for citizens and Corporation staff.

j. System interfaces with other systems

The current setup does not have/provide for interface(s) with other software such as EDMS, GIS, etc.

k. Citizen interface

Generally the primary citizen interfaces in all the ULBs are the various collection centres (either corporation operated or bank operated). All the ULBs have been provided with websites which provide detailed information to the citizen on various aspects.

l. Level of computerization

All the core operational aspects of the ULBs are being migrated to the electronic system in a phased manner. For the modules that have been computerized there is no dual manual system. All the zone offices have been provided with computers.

m. Quality of project documentation & user manuals

The TNUDP project was observed to have relatively good documentation with regards to system administration aspects (such as maintenance aspects of database, etc.). However, the core project documentation with regard to system design, architecture, etc. was missing. The user manuals were of good quality with clear explanations for operational aspects.

n. Business continuity plan and disaster recovery plan

Data is backed up to both the systems own hard disk and to CDs. Apart from this practice there was no documentation or evidence for steps towards Business Continuity Planning and Disaster Recovery.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The hardware currently deployed has proved to be suitable for the current loads except for a few cases (such as Tiruchirapalli). The communication infrastructure in place has proved to be sufficient in most of the ULBs but has room for some improvement in some of the larger sites. There are no SLAs to guarantee reliability but some in-house processes have been put in place to maintain the stability of the system (such as regular maintenance procedures) apart from regular checks by the vendors. Further, all the applications have been built on a client-server model which is not inherently recognized for being very scalable.

a. Potential of the current application and new application to be integrated/operated/hosted

There is partial integration between the modules (linkages between accounting and the other modules). New modules developed can be hosted and operated in the same infrastructure since all the modules currently are in the client-server model and there are no limitations evident at this point. However, the presence of a recognized interface layer or methodology was not discerned during the assessment.

b. Vendor dependence to independence

The entire software and infrastructure has been provided for by the TNUDP initiative and the

ownership of the code rests with TNUDP. The code has been to a large extent developed by select ULB staff which has helped the staff to be well versed with the developmental, deployment and operational aspects.

c. Information security management and systems security

Role-based security is built into the transactional systems for authentication and authorization purposes. Online payments are not envisaged at this point of time.

d. Systems auditing

There was no record of system audits having been carried out or of any plans for the same.

5.2 System Deployment and Training

a. Project management, monitoring and system development process

The entire project management was handled by an IT specialist under the TNUDP-II programme. Furthermore, the entire system development has been done by the ULB recruited staff with good domain knowledge. The monitoring of all aspects of roll-out is done by this team at the local level and progress is reported to the IT-Specialist.

The typical approach to development is as follows:

- Requirements gathering based on discussions with department staff.
- Team based development using the appropriate technologies based on delivery with architectural and design aspects handled by the IT Specialist.
- Initial round of testing by the developers based on requirements taken up for development.

As seen, development process follows the generic system development process, and there is no recognized Software Development Life Cycle method followed.

b. Speed in deployment/procurement - system installation time

Due to the clear direction and project monitoring done by the TNUDP working committee, all modules were implemented in very good time across all the ULBs in Tamil Nadu.

c. Implementation approach and plan

Data collection and data digitization are a major effort and are a pre-requisite for successful implementation of any module. Data digitization of the existing and collected manual records was contracted to private organizations. The typical implementation approach is as follows:

- Start of data-entry as soon as database design is fixed which will run parallel to other system development activities.
- Thorough testing of application for aspects of functionality, performance and security. The testing is done by both the developers as well as some of the Corporation staff in order to give an over all finish to the application.
- Installation on host systems (servers and clients).
- Training provided to the operational users before and during the start of continuous functioning of the system.
- Close monitoring of application by development team till the module stabilized and bugs if any have been identified and fixed.

d. Manpower required to operate the system

The assistant programmers who have been appointed at each ULB take care of day-to-day operational aspects of the system. They are supported by existing employees of ULBs and contract employees to handle data entry.

e. Amenability of service delivery through PPP mode

The software has no inherent limitations in service delivery via PPP mode. HCL Technologies Limited has been contracted for supply of hardware related support. Various service providers have been contracted by ULBs on a case to case basis for providing various support services. Some custom interfaces have been built in a few ULBs as independent efforts with the help of specialist vendors.

f. User training

The user training is taken care of by the local IT staff at each ULB. There is no documentation available on the methodology.

g. Support

Since all development has been done by TNUDP, there is no concept of vendor support. However, certain internal support and co-ordination mechanisms have been put in place to aid in negotiating operational problems that may arise.

5.3 Details on Cost

For the state as a whole, the costs incurred through TNUDP are:

- Computers and peripherals Rs.16.50 Crores
- Website Rs. 0.18 Crores
- WAN & collection centre set up Rs. 2.25 Crores
- System requirement specification Rs. 0.26 Crores

The above only gives an indicative picture of the actual costs since the investments were made across various items, at various times and more specific information could not be obtained.

5.4 Functionality

Computerization of the existing processes has been done and thus it covers the core required functionality with some tweaking in processes. The TNUDP project is one of the few initiatives that have provided for local language interface apart from English. In fact, this has been widely adopted in many ULBs. The systems have proved to be very beneficial in terms of improving transparency and also in increasing convenience to the citizens. Some of the reported benefits include:

- A 10-15% increase in collections under the new system as compared to the older system.
- Birth and Death certificates issued in 15 minutes.
- Closure of cash book instantaneously and tallying.
- Trial balance produced within a week of closure of monthly accounts in the ULBs.

5.5 Stakeholder Participation

a. Stakeholder usage and ease of access

Stakeholder usage is very high because of the absence of an alternative manual system. The internal users do not have any issues with access to the system. Furthermore, the citizens have very good access to relevant and detailed information through the website which is user-friendly and easy to use.

b. Cost of accessing

During the study this level of detail could not be obtained.

c. Popularity

The acceptance and usage of the e-Governance interfaces by citizens is very good due to the very high level of convenience offered in comparison to the older system. The citizen response has been very positive and the efforts have been lauded. Furthermore, the ULB employees have also recognized the benefits offered by the system and have been pro-active in their usage.

6. Lessons Learnt

❖ **Key steps in the project implementation, to make e-Governance initiatives successful.**

- Conversion of all manual records into Electronic Databank.
- Appointment of qualified Computer Professionals – System Analyst, Programmers, Assistant Programmers and Data Entry Operators.
- Strengthening of infrastructure by providing computer hardware, software, UPS, and peripherals including Local Area Network.
- Formation of in-house development team.
- Development and implementation of user-friendly application modules.
- Provision made for easy access of citizen services.
- Establishment of Wide Area Network.
- Provision for on-line monitoring of the Process and the Performance of the Local Bodies.

❖ **Key issues identified by GoTN in relation to e-Governance in ULBs.**

- **Funding:** The projects that are part of e-Governance initiatives could be funded through Govt sector (or) Private sector (or) Public participation to finance, manage and operate.
- **Centralised implementation/Interoperability:** Centralised implementation provides opportunity for total control of the implementation process. This also provides opportunity for interoperability of various common modules. Inter-operation and collaboration of various state govts, various departments within a state govt, and so on (eg, Design issue for integrated services) is necessary how the various applications will be brought together and built into one needs to be planned.
- **Delivery of services:** The penetration of computers and Internet is low. Some framework needs to be worked out for delivery of the services, that would be accessible to the poorest of the poor.
- **Use of Local Language:** The access of information must be permitted in the language most comfortable to the public user.
- **Knowledge management:** Knowledge sharing, creation of database, replicating best practices within and outside. In this regard frequent meeting, review and sharing of information between various institutions during implementation is important.

❖ **Major Bottlenecks encountered and strategies used.**

- Updated data not readily available in Manual records (eg, Arrear Demand Register). This was tackled by using the following steps:
  - Manual records updated (eg. Municipal ADR records without omission of double entries and tallying with DCB, updating it and tallying with DCB) by conducting monthly review with each local body.
  - Updated records entered into computer database.
  - Wherever bulk records encountered, data entered by outsourcing.
  - Verification of Computer records, authorization done to have accurate database.

- Dearth of skilled personnel (ULB staff) to work on computer. Lack of dedicated IT Professionals. Lack of awareness of computer culture and its advantages. This was tackled by the following initiatives:
  - Training imparted to the ULB personnel – 3,500 nos. / 23,450 man-days
  - The end-users involved in day to day operations uses the modules developed.
  - Qualified IT professionals appointed.
  - Training imparted to 600 nos. Engineering personnel.
- Insufficient e-Governance Infrastructure facilities. Absolute lack of monitoring for want of information. These were tackled through the following:
  - **Infrastructure**
    - Procured, installed and commissioned computer peripherals
      - 1625 systems.
      - 0.5KV & 5KV UPS - 696 Nos.
  - **Website**
    - Website for all the Municipalities (102) and Corporations(5) designed and hosted at NIC server including Citizen charter.
  - **Connectivity**
    - LAN – Established within the ULB Office
    - MAN– Established connecting zonal offices, Bank branches and collection centres in the Corporations.
    - WAN – Connecting all ULBs to respective Regional offices.

ULB Studies

Municipal Corporation of Hyderabad

1. Linkages of State Level Initiatives to ULB Level Initiatives

Municipal Corporation of Hyderabad has been one of the pioneers of e-Governance in the country and is an oft-repeated success story in any e-Governance forum, having started the initiatives in the late 1990s. Almost all the initiatives of MCH were conceptualized and implemented much before 'SUVIDHA', state level initiative of Government of Andhra Pradesh. The two initiatives (state level/MCH) do not share any commonality such as software, technology architecture, etc. However, MCH citizen interface software is in line with the e-Seva initiative, the citizen friendly payment system, though the path to this integration is different from the 'SUVIDHA' sites.

2. Organization Structure

2.1 Objective of the e-Governance initiative

MCH's objectives of e-Governance initiatives are to empower the citizens to have better access to the Corporation's services, and to have a robust internal control system for facilitating better governance.

2.2 Organisation Structure

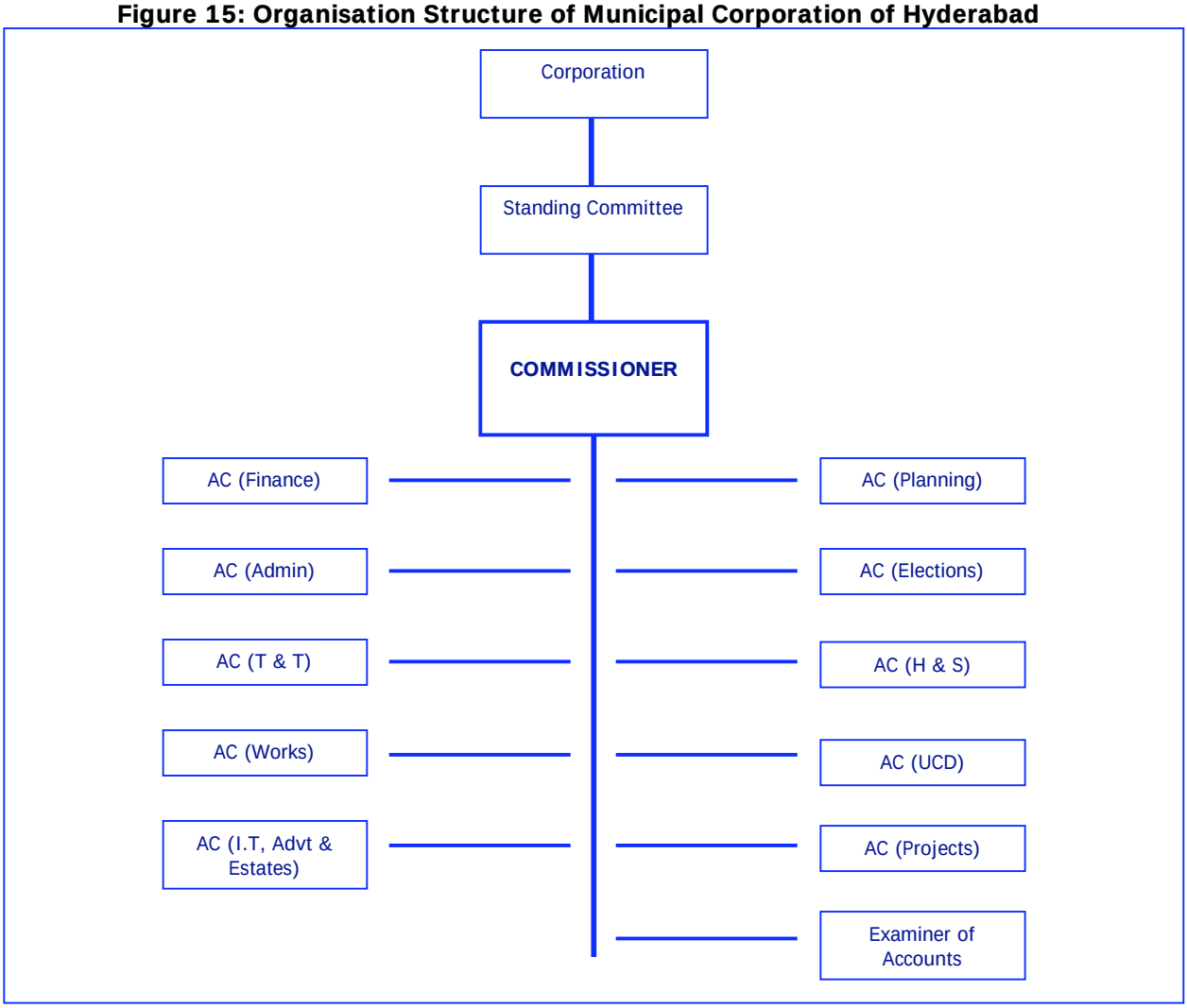
Hyderabad, the capital of Andhra Pradesh, founded in the year 1591, is the fifth largest city in India. The Hyderabad Board and Chadagarh Board were constituted in 1869 to manage the Municipal administration of the States of Secunderabad and Hyderabad which were amalgamated in the year 1933 into a Corporation and given statutory status under the Hyderabad Municipal Act. In 1950, two separate Corporations were created under the Hyderabad Corporation Act, 1950, one for the city of Hyderabad and another for the city of Secunderabad. These two Corporations were again merged into a single Corporation by the Hyderabad Municipal Corporation Act, 1955.

The ULB consists of a deliberative wing and an executive wing. While the deliberative wing of the ULB consists of elected members, the Commissioner heads the executive wing. The role of the deliberative wing is mainly confined to governance of the ULB and laying down of policies and guidelines, according approvals, etc., for the various developmental programs. It is the executive wing, which is mainly responsible for the administration, regulatory and developmental activities being carried out by the civic body. The functions of the executive wing are discharged by the Assistant Commissioners of each of the functional areas like planning, elections, H & S, etc. The Organisation structure at MCH is basically divided as the Standing Committee and the Commissioner. The Commissioner heads the Corporation with the approval of various decisions, rules taken by the Standing Committee. Further the Organisation structure below the Commissioner is divided according to the major departments of the Corporation.

The Civic administration of the Twin Cities is divided into four zones namely East Zone, West Zone, South Zone and Secunderabad Zone, which are each headed by Additional Commissioners.

Figure 15 gives an indicative organization structure of the executive body.

Figure 15: Organisation Structure of Municipal Corporation of Hyderabad



Primarily, the changes due to e-Governance initiatives in the Organisation structure of MCH are few. One of them is the introduction of a post called the 'Additional Commissioner of I.T' who takes care of the Information Technology front of MCH and is also responsible for the e-Governance related activities in the Corporation and the other is the addition of a Data Centre which handles all the data related aspects, development and maintenance of the softwares used, website hosting and maintenance, etc. The staff deployed at the data centre are on a contract basis and include various system engineers, a Database Administrator, a Systems Administrator and a Project Manager. An Executive Engineer and an Assistant Engineer (employees of the Corporation) have been placed at the Data Centre for overall supervision.

2.3 Distribution of Roles and Responsibilities at MCH

The Commissioner's roles and responsibilities can be broadly classified into two:

- Obligatory and
- Discretionary

The Obligatory roles relate to erection of substantial boundary marks defining the limits of the city, maintenance of public streets, roads, public health and other matters relating to sanitation and improvement of the city, etc. are provided for the Corporation at its discretion relating to the general welfare of various classes of the population, transport facilities, furtherance of educational objectives, improvement of socio-economic status of the inhabitants of the city, etc.

Apart from the regular Obligatory and Discretionary roles, the Commissioner is also responsible for good service delivery to the citizens, as a part of good governance.

There are about 6 circles which are headed by Additional Commissioners, who take care of the day-to-day administration of the circle operations. The Additional Commissioners report to the Commissioner.

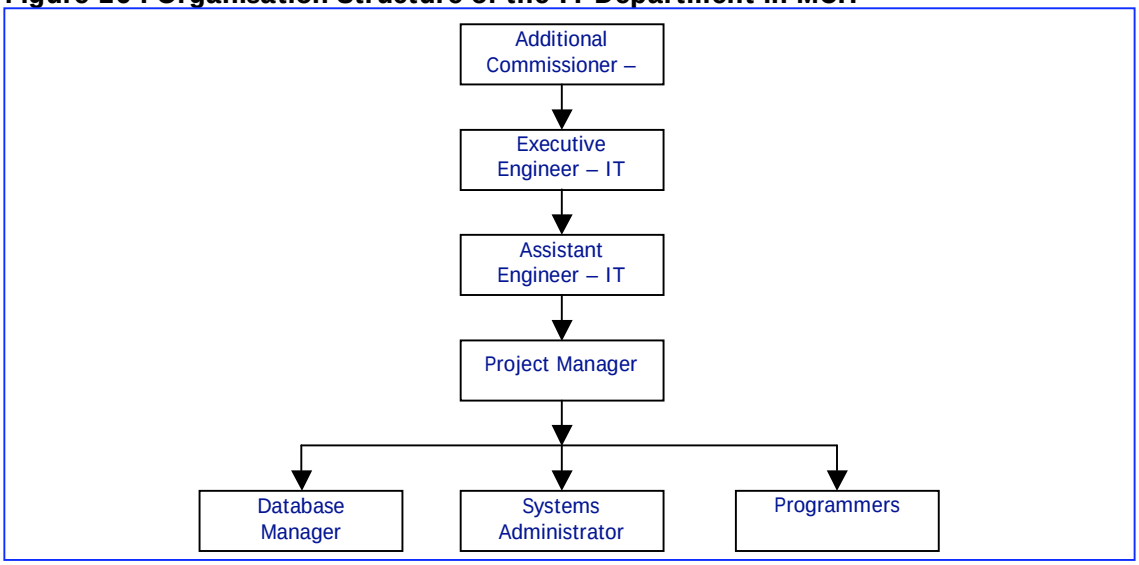
Each of the departments in MCH is headed by an Additional Commissioner, who is in-charge of and responsible for the specific functions of that particular department of MCH as shown in the organization structure above.

To handle the computerization projects and the e-Governance activities, a new post of Additional Commissioner (IT) was created at the Corporation. He is also in-charge of the IT Cell at MCH. The Additional Commissioner (IT) directly reports to the Commissioner.

2.4 New Organisation Structure

An IT department was formed in MCH with the Additional Commissioner of IT heading the department followed by an Executive Engineer (IT). The programmers, database manager, systems administrator, and project manager are all contracted and are supervised by the Assistant Engineer (IT). A new organisation structure has emerged for this department which is shown in **Figure 16.**

Figure 16 : Organisation Structure of the IT Department in MCH



As a result of the IT department in MCH a new Data centre was set up to capture the data from various (applications) modules which were connected to it. The data is captured from various modules in this centre where it is validated, processed and stored. The centre acts as a permanent storage centre of data, in such a way that the data can be accessed at any time and may be used in any decision making process within the MCH.

2.5 Decision Making Process within the ULB

In order to take effective decisions, it is necessary that there is a smooth flow of data to the decision making levels that may be interpreted suitably.

The decisions that are taken at the department level are classified depending upon the nature, frequency, and degree to which they affect the general policies of the MCH as laid down by the Council and the personnel involved in the decision making process are to a great extent determined by the above factors.

The decisions taken at MCH are of policy and functional nature. The decisions taken by the officials of the Corporation are explained below:

Commissioner

The Commissioner is the highest level of authority of MCH and is vested with policy level decisions. Thus the assignment of various works to the respective Additional Commissioners and fixing of deadlines for them are done by the Commissioner.

Additional Commissioners

The duties of the Additional Commissioners are functional in nature and hence the decisions taken by them are also of this nature. Each of the Additional Commissioners has the authority to delegate the functions in such a way that the works are completed on time and as per the requirements of the Commissioner. The nature of decisions taken at this level is solely dependent on the functional portfolio of each of these Additional Commissioners. The functional areas within MCH are shown in the organisation structure - Planning, Ward works, Health, IT, etc. to name a few. The Additional Commissioner has the power to take decisions that are necessary to execute the functions in these areas.

Additional Commissioner –IT

As a result of the e-Governance initiative, the Additional Commissioner-IT has new roles and responsibilities that have resulted in additional decisions to be taken by him. He takes decisions regarding various IT related works of MCH. The Assistant Commissioner takes decisions so that the projects under this section are completed on time. Due to the e-Governance initiative, the Additional Commissioner-IT is in charge of ensuring that the services sought to be achieved through this reach the citizens. Operational decisions in this regard are made by the Additional Commissioner. Hardware and software procurements and their maintenance are also under his purview.

The decision making powers per se have not been affected as a result of introduction of the new initiatives. However, the e-governance initiatives have ensured that decisions being taken are more informed (due to increased reliability of the basic information) and timely (due to faster processing with the aid of computers).

3. Key Municipal Functions of MCH

3.1 Functions of MCH

The functions of the Hyderabad Corporation may broadly be classified under the following heads:

a) Health and Sanitation.
b) Engineering.
c) Revenue and Accounts.
d) Horticulture.
e) General Administration.
f) Audit.
g) Urban Public Affairs (UPA).
h) Estate.

3.2 Processes and their Linkages

a. Property tax

This is one of the main sources of revenue for the MCH. It covers all the aspects of assessing a property for tax. Residential and commercial properties situated within the limits of ULB, are to be assessed for tax. Based on such assessments, all the assessees are expected to pay property tax. Information regarding all the new constructions, existing constructions and other extensions/modifications, if any, are provided by the Town Planning Department for tax assessment.

The assessment is based on certain parameters like area, plinth, type of construction and rental value. Based on the parameters, the annual tax applicable is calculated. The steps involved in tax assessment are:

- Maintaining assessment details.
- Updating assessment details whenever needed.
- Calculating property tax and obtaining the necessary approvals.
- Issuing notices.
- Hearing and disposal of owners' objections.
- Reassessing tax, if required.
- Generating final demand notices.
- Maintaining the details of survey for reassessing tax.
- Maintaining the details of various court cases.

b. Births and deaths

The registration of births and deaths is also one of the major functions of MCH. The births and deaths, which take place in the hospital are recorded and reported to MCH. For non-hospital events, the concerned citizens can make necessary applications. Delay in registration of the event requires clearances from various authorities. Once the event is registered, ULB issues the necessary certificate. In the case of a non-hospital event, the certificate is issued after necessary scrutiny and inspection. At any given point of time correction to birth/death details can only be done by the Registrar of Births & Deaths. Necessary records are maintained.

c. Financial accounting system

Financial Accounting system in MCH is based on double entry accounting system, which records all the financial transactions taking place. The accounting system is designed to seamlessly record all the financial transactions of various departments. The major functions are:

- To record all receipts from different modes of payment.

- To record all payments.
- To generate all records required under the law.
- To generate statements required by various authorities for budgeting and decision making.
- To maintain accounts required under the law.

d. Citizen grievance

MCH provides various public utility services, and also receives a large number of complaints/suggestions/grievances pertaining to various services rendered. Grievance Redressal module is basically meant for redressing the grievances of the citizens timely and effectively. The functions are as follows:

- To register the complaints/suggestions received.
- To issue an acknowledgement.
- To forward it to the concerned authorities for action to be taken.
- To capture status of the complaint till it is resolved.
- To intimate the concerned authorities if the complaint is not rectified.
- To generate necessary reports for proper monitoring.

e. Personnel management system

MCH has developed a Payroll module with minimal features based on local requirements. The administrative activities of the module mainly deal with the maintenance of employee service details, loans and advances, payroll, terminal benefits, leave taken, career events, and pension activities. The database of all employees is available. Most of the personal details of the employees are available in the database. Based on Acquittance register, changes in monthly earnings and deductions are fed into the module, resulting in generation of payslips for the current month. This module has also been deployed at the circles, where local databases are maintained for payroll. The database of the circles is synchronized with the head office on a monthly basis. Pay slips, pay bills and deduction statements are generated out of the system. Monthly pay bills are sent to the Audit section for payments. Many features built-in are not utilized due to non-availability of data and inadequate implementation efforts at MCH.

f. Advertisement

Advertisements are put up in many places in the city and the advertisers have to pay tax for them. The Advertisement Tax is collected from the Advertiser/Agency for the display of advertisements. Advertisements are of different types such as hoardings, wall paintings, balloons, slides, neon signs, bill boards, etc. MCH has developed a module for advertisement hoardings and under this billboards and big hoardings are the only two areas which are computerized. The data is fetched from the Property Tax module. Each record (advertisement) is given an identification number by which it is tracked. A database of about 1900+ hoardings is available. When the file comes to HO for payments, the database is updated. The Advertisement section by itself is not decentralized but the module is centralized and is operational only at the head office. In the month of February, agency wise demand notice are generated from the module and along with a covering letter was sent to the respective parties. Regularly surveyors go to the field and the database accordingly updated and where any difference was observed, the same are rectified in the database, and arrears calculated. Certain reports and forms are made available over the internet.

The main aspects covered in this module are:

- To issue advertisement permits to the advertisers after collecting necessary registration fee.
- To collect renewal charges in case of renewal of the advertising permits.
- To issue licenses for erecting, fixing, retaining, hanging or displaying advertisements.
- To collect advertisement taxes.

- To collect permission fee in case the land used for advertisements belongs to the corporation.
- To collect advertisement tax in case of renewals.
- To collect removal charges from the concerned parties where unauthorized advertisements are removed.

Leasing out identified places for hoardings at municipal places as well as private sites within the municipality are also done if the period of advertisement is longer.

g. Solid waste management

The municipalities and local bodies employ various methods for the removal of garbage and debris under the supervision of the Health Wing. The solid waste is collected and transported to the dumping grounds. As solid waste management involves cleaning, transporting and dumping, it deals with the following:

- Allocating manpower for sweeping and garbage removal, monitoring and recording the work executed.
- Allocating vehicles for garbage removal, monitoring and recording of the movement of vehicles.
- Planning the resource for effective utilization of manpower and vehicles.
- Monitoring and recording the garbage collection and dumping at the dumping grounds.

h. Ward works

MCH undertakes a large number of works both developmental and maintenance. The ward works module helps in keeping track of all the works in the corporation. The tracking is done on both the physical as well as the financial progress. A work is tracked from the stage of approval of the estimate till the closure of the work. The work status and status of payments have also been put upon the web for the viewing of the citizens.

3.3 Modules at Municipal Corporation of Hyderabad

This section highlights the modules being implemented at MCH. It brings out the processes and procedures followed in the old system and after the e-Governance initiatives, process outputs, impact of laws and regulations, functional areas covered, the changes to the system and the strengths and weaknesses of the system.

a. Property tax module

The Property Tax Module in MCH has been developed and is maintained in-house. While on the one hand, it makes the job of maintaining property assessment records easier, on the other, it makes the life of the citizen easier. Records are maintained for over 6 lakh properties. The Property Tax module also has provision for online payments and receipt generation. It is also integrated with the e–Seva application and daily collections are updated online. The main features of this initiative are given below:

Former process measures vs. redesigned process

The previous process of property tax collection was done in manually by maintaining various records and registers. Proper updating of records would not take place and there was scope for misappropriation of funds by the bill collectors. Calculation of arrears could be manipulated and fraudulent practices were difficult to be controlled. Bill generation previously was based only on the current demand leading to various frauds and malpractices. For example, due to the human element involved in the collection of current and previous dues of property taxes, a large amount of revenue would not be collected leading it to become non-recoverable after a period of time. Under the previous process the assessees had to pay their taxes at the respective wards but in the redesigned

process, the collection banks were nominated, Citizen Service Counters and e-Seva counters made available so that citizens could make payments at their convenience. Apart from the technology aspects, minimal changes were made in the processes and methodology as a part of the introduction of the e-Governance initiative.

Processes and procedures followed

i. Minimal changes were made in the processes and methodology as a part of the introduction of the initiative. Setting up of the Citizen Service Centres and having arrangement with the bankers for daily banking of collections were some of the significant measures undertaken.
ii. Major portion of the data entry work has been outsourced to outside agencies.
iii. An in-house data centre has been established at the Head Office and a core internal team has also been put in place to manage the running of the various software modules.

Process outputs

The Property Tax module generates receipts for the amounts collected. Details pertaining to properties are available for viewing by the citizens. Certain basic reports are generated to support day-to-day operations. Certain forms have also been designed for the use of citizens. The property details have been put up on the internet.

Impact of laws and regulations

No thought has so far been given to any legislative/regulatory changes that may be required. This is due to the fact that the procedures (apart from those involving IT) as such have not been altered much and continue to remain the same. Information security and disaster recovery policies are yet to be framed. MCH is considering introducing online payments for collection of dues from the citizens. However, no legal changes have been introduced to facilitate the same as of now.

Functional areas covered

The Property Tax module mainly covers the activities of the Revenue Department. Links with other departments like Finance, Engineering etc., if any, are manually controlled. The Property Tax Module is in operation in all the Circles of MCH. In addition to the Circles, Property Tax can also be paid at the e–Seva centres across the City. Arrangements have been made for transfer of data and monies pertaining to collections.

Strengths and weaknesses of the system

Strengths

i. Property Tax details are available on the web for the citizens for viewing.
ii. A major portion of the preliminary data collection, updating and refining process is complete. The data available now has a high degree of accuracy and integrity.
iii. The Property Tax outputs are being used by the Audit Department to verify daily collections. Thus a manual link is established between Accounting and the Property Tax systems.
iv. The arrangement with bankers (collection and deposit of amounts on the next day into a single bank account) has ensured better working capital management by the MCH.
v. The data source behind the Property Tax module is available in-house. This makes software modifications, improvements, deletions, etc. relatively easier.

Weaknesses

i. The system is not fully online with the central database and data updating taking place in batches.
ii. The high turnover rate in the internal team has made running the system difficult, since there is no adequate documentation of the implementation or of the software development process.
iii. Connectivity is a problem due to non/delayed payment of network charges.
iv. The software is not comprehensive in the sense that, though the front-end is built, it does not provide for certain features and a lot of data corrections have to be done directly in the database back-end.
v. Even within MCH there is no standard procedure followed for software development and implementation. Amongst Circles, too, there are variations in the sub-modules followed.
vi. The Property Tax module enabled MIS is not aligned to user needs thereby resulting in duplication in reproducing reports in Excel in the desired format.

b. Birth and death module

The Birth and Death module in MCH has been developed in-house. The computerization is aimed at enabling the citizen to obtain these certificates with minimum delay and a database is built up of births and deaths for a number of years. The main features of this module are given below:

Former process measures vs. redesigned process

The previous processes followed at MCH for the Birth and Death module was time consuming, error prone and the citizen had to follow a lengthy process. The citizen had to contact the respective Ward Inspector for the birth and death certificates after which a Sanitary inspector would verify the authenticity of the event and then the Certificate would be issued. Likewise if the births and deaths were at hospitals, the records would be sent to the corporation and these records would then be sent to the respective wards, and other processes would follow. Corrections in details of the certificates, etc. would take a long time. Under the redesigned processes, when the data is sent from the hospital or by the sanitary inspectors to the Corporation, it is entered by data entry operators at the Corporation and the data are verified. The citizen under the redesigned process has to approach the Citizen Service Centres, get the application and submit it with the necessary records. The application is scrutinized, data is verified by the concerned officers and the certificates are issued. Mainly, the time consumed is reduced and the data genuineness is maintained. The citizen had to go to MCH before while it has been changed to the CSCs after the redesigned processes.

Processes and procedures followed

The procedures that were followed earlier have been retained. The data centre at MCH looks after the operation of various modules.

Functional areas covered

The Birth and Death module covers the Statistical Department only. There are no direct links with the Finance and Accounts Department.

Process outputs

The system generates Birth and Death Certificates on payment of the requisite fees. The details are also available for the citizens over the internet.

Impact of laws and regulations

Operationally, there are no major changes required in the legislative framework. Once MCH decides to go in for online payments, online downloading of forms, etc., certain changes may be required to facilitate the same.

Strengths and weaknesses of the system

Strengths

i. Simple to use.
ii. Contains around 15 lakh records.
iii. Pilot project of providing terminals at certain hospitals for updating directly from the hospital.
iv. Details of births and deaths are available on the internet.

Weaknesses

i. Since this module also has been developed in-house, the same weaknesses as applicable to Property Tax, also apply to the Births and Deaths Module.

c. Financial Accounting System

The Financial Accounting System (FAS) is in operation in MCH from June 2002 onwards. The implementation was handled by A.F Ferguson and Co. The FAS is based on double entry and accrual based accounting. The FAS also incorporates Electronic Funds Transfer to the contractors. The main features of this initiative are given below:

Former process measures vs. redesigned process

In the traditional cash system of accounting, information collected were not accurate, long delays between collection of revenue and its recording, MIS limited to 'Receipts and Payments' statement, budgetary control weak, cost of service delivery not known, lack of proper audit trails and poor working capital management were the key features limiting the Management of MCH from getting updated and complete information. Under the redesigned processes, double entry accounting system is being followed, and there is accuracy in information collected, revenue collection is being accounted on a daily basis and Asset–Liability position can be ascertained with reasonable accuracy. The passing of expenditure bills and budgetary control earlier followed a single file movement system; the same has been computerised to a certain extent with the concept of 'entering and posting' of vouchers. Budgetary controls have also been strengthened, and working capital management streamlined by co-ordination between the corporation and the banker.

Processes and procedures followed

i. The regular activities of the accounts staff were redesigned to suit the computerization initiative. Activities like audit of collections and passing of vouchers are done through the system. A system of posting and saving of vouchers ensures that every voucher is scrutinized before the entry is passed. A system of day-end cheque printing is followed for payments. To the extent possible payments are made through Electronic Funds Transfer.
ii. An external Chartered Accountancy firm has been appointed to aid in reconciliation of bank accounts, passing of accrual and adjustment entries, finalization of accounts, etc.

Process outputs

There are a wide range of output forms for the FAS. For example the audited Daily Collections Statement serves as the basis for passing revenue entries. Similarly, the vouchers serve as the supporting documents for expenditure accounting. The MIS reports generated from the system are used by the staff for their day-to-day operations. Financial

Statements are also generated by the FAS. Statutory records like Cash Book, Ledger, etc. can also be generated.

Impact of laws and regulations

i. The modern double entry, accrual system of accounting has not been prescribed under the laws governing the MCH. In order to provide legal backing for such an accounting system, it was understood that that a GO had been passed (copy of Order not available in MCH). Electronic Funds Transfers are also being made. No specific regulations were passed to support this.
ii. The security, disaster recovery and Business Continuity Planning policies are yet to be framed by MCH.

Functional areas covered

The FAS primarily relates to Finance and Accounts Department activities with links to other modules like Property Tax, Birth and Death, etc. through manual procedures. There is no well established '**Hub and Spoke**' relationship between the other modules and the FAS as would be required. Geographically, expenditure accounting in FAS is centralized in the Head Office.

Strengths and Weaknesses of the System

Strengths

i. It is based on modern, double entry accounting system.
ii. The day to day revenue and expenditure accounting is handled by the staff in-house.
iii. It incorporates Electronic Funds Transfer and cheque printing.
iv. There is a mechanism for bank reconciliation. The bank reconciliation is based on electronic data received from the bank.
v. Involvement of CA firm for the day-to-day running of FAS is a good move since help is always at hand when the staff faces certain problems, doubts, etc. and for preparation of financial statements.

Weaknesses

i. The process reengineering that was required in allied departments for the introduction of the FAS has not been done.
ii. Budgeting does not form part of the FAS.
iii. It is not integrated with other modules running in MCH. This results in duplication in recording of data twice and also compromises on controls.
iv. The internalization is not fully complete since an external agency is involved in day-to-day accounting activities.
v. Even though there are a number of reports, there is no formal MIS in place. Also the reports are not aligned to user needs. Many of the reports like Cash Flow Statement and Fund-wise financial statements have to be done externally in Excel.
vi. Accrual entries for Property Tax and other revenues are not passed with fixed regularity.
vii. The software is not web-enabled and was developed around three years back.
viii. Connected modules like the IBRS module (for bank reconciliation) are not being used fully.

d. Parishkruthi – Citizen Complaint System

Parishkruthi is a Citizen Grievance and Redressal System in operation in MCH for the past three years wherein citizens can register their complaints over the web and the complaints are monitored by the MCH officials. The web based complaint redressal system was not a success and its usage has substantially reduced. Recently, MCH has set up a call centre for receiving and forwarding complaints to the respective departments. The complaints are tracked by means of a complaint number. The main features of this initiative are given below:

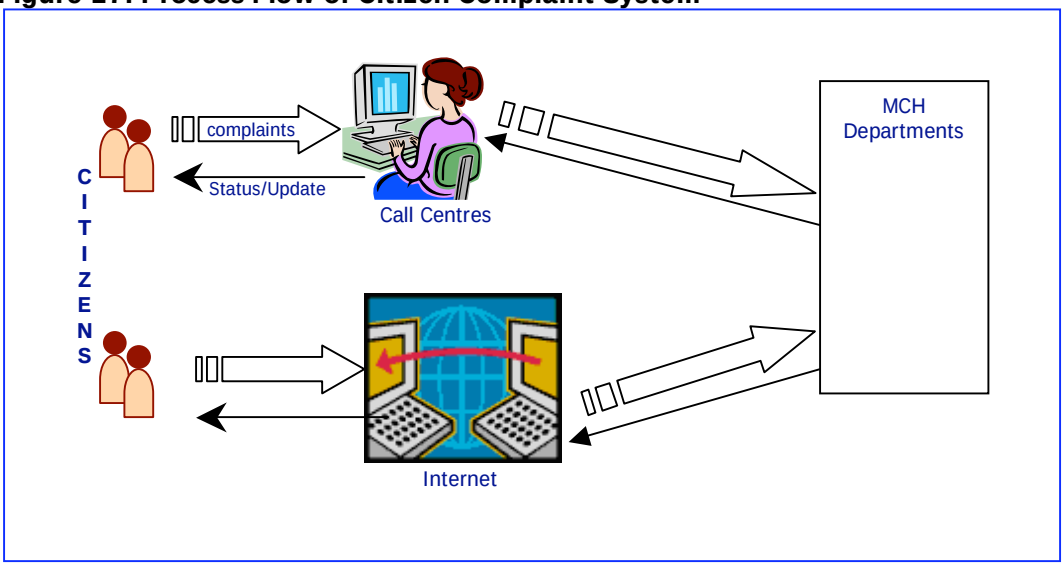
Former process measures vs. redesigned process

The former processes of addressing citizen grievance were drawing complaints in the forms of letters to the Commissioner or to the respective departmental heads by either post or hand delivery. These had no follow-up action or a system for forwarding the necessary complaints to the respective departments, etc. and this led to non-addressing of the citizen complaints. There were huge delays in action to be taken and no proper response. Under the redesigned processes, MCH gathers the complaints of the citizen through its website and call centres. Complaints registered at the website and the call centres by the citizens are given reference numbers which make them traceable. Status updating is also done for the complaints and can also be known by the citizen anytime thus allowing the citizen to keep track of his complaint. Handling of complaints and action taken on them are stated to have improved significantly.

Processes and procedures followed

A broad overview of the process involved is given in **Figure 17.**

Figure 17: Process Flow of Citizen Complaint System



Process outputs

i. A complaint number is given to the citizen which serves as reference for future follow up. A status update is also done based on the progress of the complaint. The citizen can at any time find out the status of the complaints using the complaint number.

ii. There are no printed forms or documents involved in this module apart from reports indicating the status of the complaints received.

Impact of laws and regulations

The call centre operations are outsourced. No attempt has been made to assess the impact of laws and regulations on the Grievance Redressal module.

Functional areas covered

While the operation of the call centres themselves are outsourced, the complaints received relate to all departments of MCH. They are forwarded accordingly. Geographically, the system covers all areas coming under the jurisdiction of MCH.

Strengths and weaknesses of the system

Strengths

i. The call centre concept is a unique concept of its kind. This reduces the amount of work to be done by the citizen to register a complaint and also gives a human touch to the Complaint Redressal System.
ii. Certain aspects like the nature of the complaint, the person it should be forwarded to, etc. can be decided more accurately by trained personnel at the call centres as against the citizen himself deciding them over the web. This also reduces the cycle time.

Weaknesses

i. The web-based system has not been a major success even though it is in operation for the last three years.
ii. There is no system of automatic escalation of unattended complaints.
iii. There is no system of internal performance monitoring accompanying the Complaint Redressal System to ensure that the problems are promptly attended to, and after attending are promptly updated in the database.
iv. There is a lot of scope for building analytical reports to support performance evaluation.

e. Ward Works System

The Works module of MCH captures basic details of works and displays them over the internet. This serves as a comprehensive record of the non–financial aspects of works. There are a total of 30,000 works starting from the year 2000-01 onwards. The main features of this initiative are given below:

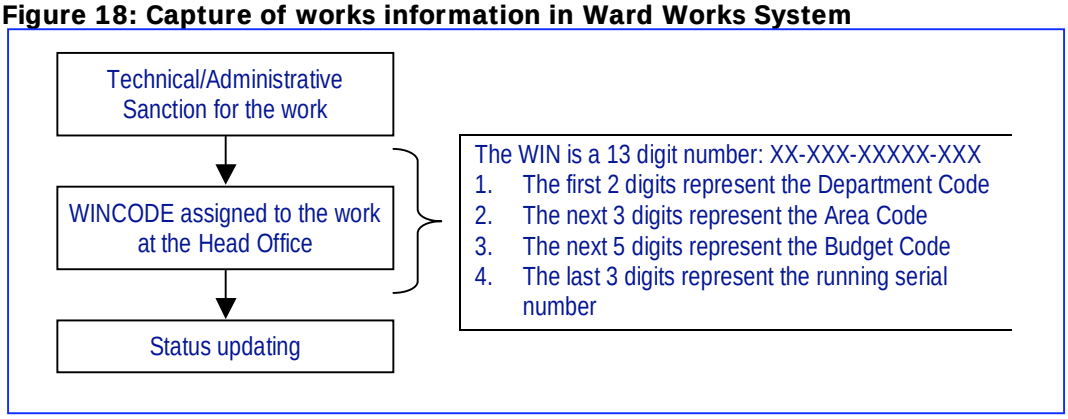
Former process measures vs. redesigned process

The former processes dealt with manual maintenance of records and registers for each work carried out at MCH. Each work was coded and the same code was marked in all the files for easy reference. The referencing between these files and finding out the status of each work, amount of money spent, etc. were difficult, resulting in deficit budgets for the Corporation. In the redesigned processes, as all the processes are computerized, status of a project, the money spent on it, timely completion of the work, planning for the budget for new works, allocation of money for the existing works, future planning for new works, payment to be made to contractors, balance to be paid to them, etc, can be known resulting in the efficient functioning of the department and the corporation.

In the earlier processes, the contractors had to pressurise the officials of the engineering department for their payment; but this has entirely changed with the redesigned processes with information available for every contractor's work and payments made.

Processes and procedures followed
The procedure followed for capture of works information is shown **Figure 18**.

Figure 18: Capture of works information in Ward Works System



The procedures have not been changed much except for the fact that each work gets a WINCODE number to be used thereafter. The status updating is done either by the engineers or by the Computer Section staff.

Process outputs
One significant feature of this module is the WINCODE. In addition to this, status is put up on the web for the citizens' access. There are also a few basic reports to view the information available.

Impact of laws and regulations
No major restructuring of activities has been done to necessitate changes in laws/regulations. Further, no financial information is involved in this module.

Functional areas covered
This module mainly covers the Engineering Department only and is centralised. Even though the module is available in the Head Office and the Circles, it is being used only in the Head Office.

Strengths and Weaknesses of the System

Strengths

i. The concept of identifying each work with a Work Code is a significant step towards establishing control procedures in the Engineering Department.
ii. Putting up information on the web provides citizens with a very convenient way to access information about the status of works.

Weaknesses

i. The module covers only a part of the information and totally ignores financial information relating to works which has reduced the utility of the system.

ii. The module is only partially implemented as it is operational only in the Head Office and not in the Circles.
iii. There is no system of monitoring the progress which would ensure that status updating is promptly done by the Engineering Department staff.
iv. While the system provides certain basic reports, there is no prescribed MIS structure in place to provide information for decision making.

f. Personnel Management System

The PMS is a small module in MCH which is used to maintain a database of employees working in MCH. It is used to generate monthly paybills and payslips. It also generates some minimal reports to take care of day-to-day operations. The system is not integrated with FAS and other modules. The same has not been dealt with in detail here.

Former process measures vs. redesigned process

There have not been any significant changes in the redesigned process over the former process. The module does not have many features, and linkages to other modules are absent.

g. Advertisement Tax Module

The Advertisement Tax module is used to maintain a database of all billboards and big hoardings. It is also used to record the details of permission given, raising of demand notices, etc. The system is not fully implemented in MCH. The main features of this initiative are given below:

Former process measures vs. redesigned process

The former process followed for Advertisement Tax module was maintenance of basic registers and records containing the names and details of the lessee parties, with details of the properties of the corporation leased out for the purpose of advertisement. The demand raising and the arrear collection were not proper, leading to misappropriation of funds collected and also wrong calculation of the dues and arrears, by the officials. In the redesigned process, the above details are computerized thereby having the correct calculation of dues and arrears and prompt generation of demand notices for the lessees. Except for the check on fraudulent practices there have not been any significant changes. Bills generation in the former process did not happen in a systematic way whereas it has been streamlined under the redesigned process.

Processes and procedures followed

The procedures followed are the same as in the earlier system. Minor modifications are made in the processes to ensure that the necessary (additional) information flows into the system.

Process outputs

Demand notices can be generated from the system, though no sanctions or approvals can be printed by the module. However, certain basic reports like collections reports are generated and used.

Impact of laws and regulations

While the demand notices generated by the system are being used, no changes have been made in the governing legislation. Once the system is scaled up to accept online

payments and issue online receipts/approvals, certain changes may be required to suit such aspects.

Functional areas covered

The Advertisement Tax module is not comprehensive in coverage even of the activities of the Advertisement Department. Only billboards and big hoardings are covered. Neon signs and other forms of advertisement are not covered. Geographically, the module is in use only in the Head Office and not in the Circles.

Strengths and weaknesses of the system

Strengths

i. Simple to use.
ii. Demand notices can be generated from the system.

Weaknesses

i. Not fully implemented. It is not complete in terms of coverage either functionally or geographically.
ii. The implementation is not accompanied by process reengineering.
iii. Though reporting features are available, there is no comprehensive MIS to cater to the users' needs at various levels.
iv. The module is not integrated with any of the other modules.

h. Trade License Module in MCH

The Trade License module has not been fully implemented in MCH. This module is in the data entry stage (database creation) where the manual records are being entered into the module. The software for data entry has also been designed in-house. Once the data capture is over, the other sub-modules will be implemented. The same has not been assessed in detail.

Former process measures vs. redesigned process

There are no significant differences between the former and the redesigned processes as the module is still under implementation.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiatives in MCH is given in **Table 5.**

Table 5: Snapshot view of the e-Governance initiatives in MCH

Parameter	Details of Hyderabad Initiatives
1.No. of Modules implemented	8
2. Platform/ Programming Language(s)/ Technology	Oracle D2K, ASP
3. Software Architecture	2-tier
4. Deployment Architecture	Centralized
5. Database	Oracle
6. Connectivity	Leased Lines
7. Hardware Platform (Servers)	Xeon, Pentium
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Unix, Linux
10. Operating System (Clients)	Windows 2000 - Professional

Parameter	Details of Hyderabad Initiatives
11. Software Applications	Property Tax Birth & Death FAS Complaints Mgmt Works Mgmt. Personnel Mgmt Advertisement Tax Trade License
12. Build or Buy	In-house development
13. Development Process	No recognized process
14. Backup Procedures	Backup daily to tapes.
15. PPP Arrangements	e-Seva
16. Citizen Interfaces	e-Seva, circle offices, call centre, Website
17. Documentation	Limited documentation
18. Use of Local Language	Not used

4.1 Description of the technical architecture

a. Hardware

MCH has a data centre located in the head office. The data centre has three high-end database servers, two web servers, two proxy servers, one authentication server, one content inspection server and one mail server. The detailed configuration of the servers is provided in the **Annex B6.**

b. Software

MCH has both web-based applications and non-web-based applications. The web-based applications are hosted on IIS and the client-server applications use Oracle Forms (Developer 2000).

c. Operating System

MCH uses Red Hat Linux 7.1 and AIX 4.3 Operating System for their database servers, mail servers and development servers and Windows 2000 – Server Edition for the content inspection server and authentication server.

d. Network communication software

No evidence of usage of network communication software was found.

e. Systems management plan and network management plan

MCH as such does not have any specific systems management plan. The systems enhancement/upgrade plan is prepared annually for the fiscal year and periodically as and when system changes are required. There is no specific plan for maintenance. All maintenance requirements are catered to by some of the contracted data-entry operators. MCH does not have any specific network management or maintenance plan.

f. Details on applications and programming languages

The applications of MCH are used either via the intranet or through the internet. The applications which are on the Internet, are developed using Active Server Pages (ASP), while those on the Intranet are developed using Developer 2000 (D2K) as the core transactional system in the various departments with a combination of Active Server Pages (ASP) mainly for data viewing (except for certain instances, where forms have been provided for data-entry as well). The details on various modules developed and deployed in MCH including the programming languages, etc. are provided in the **Annex B7**.

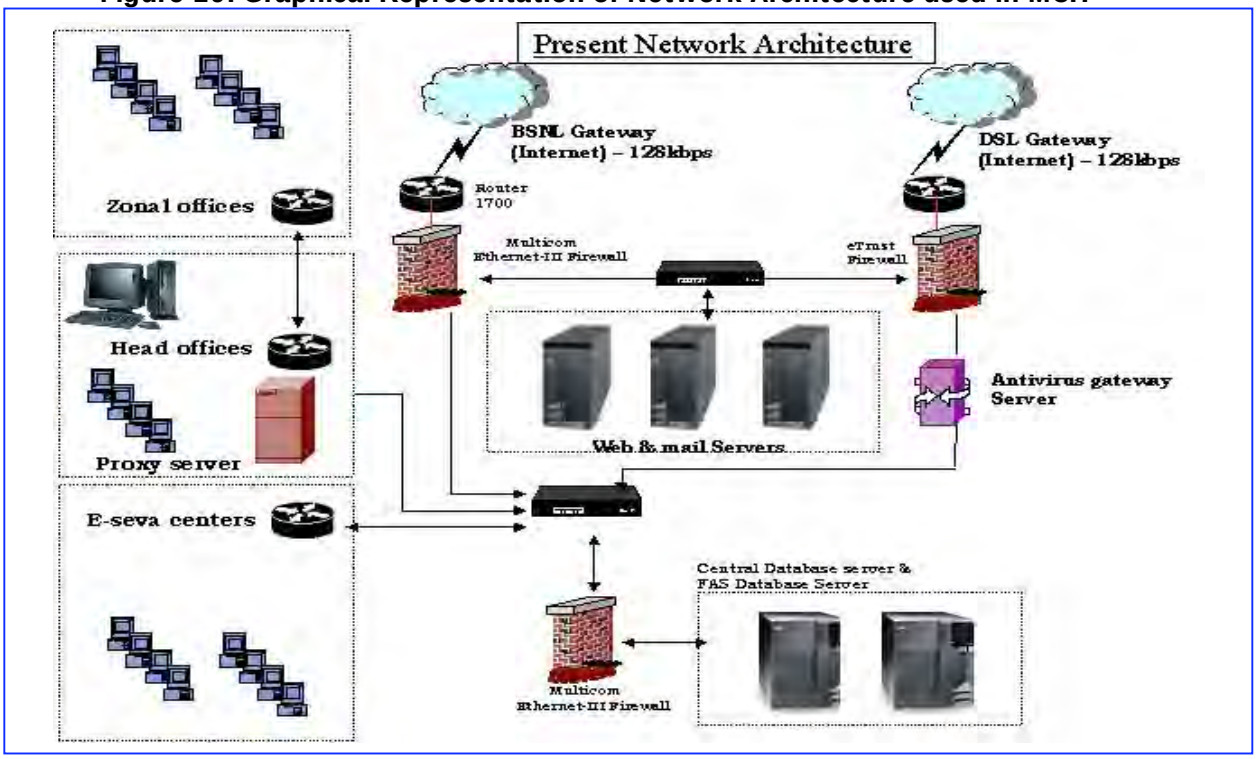
g. Details on database system

Oracle is used as the database software in MCH for all the applications. MCH has three database servers in their data centre. One of the three database servers holds real time data. Of the other two, one acts as the backup database server and the other holds the database for development purposes. More detailed information of the database system like memory, hardware, etc. is provided in **Annex B8.**

h. Details on current network architecture

The MCH data centre which is located at the head office is connected to other circle offices by a 64 kbps leased line with a 128 kbps ISDN line as backup. MCH has two domains to host its internet based applications which provide the citizen a window to the various modules. Details of network configuration are provided in **Annex B9**. **Figure 19** gives a graphical representation of the network architecture present in MCH.

Figure 19: Graphical Representation of Network Architecture used in MCH



i. Internet/Intranet components

Almost all the transactional modules have been developed on a client-server mode and are served over the intranet. However, most of the modules have a web-based information and reporting system with varying levels of access to data for citizens and Corporation staff. Some modules also provide a web-based transactional interface (such as Complaints Redressal module, etc.).

j. System interfaces with other systems

At present there is no interface provided to other systems such as GIS, EDMS, etc. However, integration of Property Tax with GIS is proposed.

k. Citizen interface

The citizen's interaction with MCH is through the Internet, at e-Seva centres, at citizen facilitation centres or through the call centre (used for lodging complaints). The website of MCH is packed

with features and functionality to aid the citizen in almost all the G2C based activities of the ULB. This one-stop shop provides on demand information such as Property Tax particulars, Birth/Death details as well as status, and details on Trade Licenses and Advertisement (hoarding specific).

l. Level of computerization

At present the core operational transactions are carried out electronically at all the circle offices and in a few ward offices. The typical configuration of a desktop computer is provided in **Annex B10**.

m. Quality of project documentation & user manuals

Project documentation for all the modules of MCH is very limited. The existing ones have insufficient coverage and currently all knowledge of the system is localized to the project team. There are no proper or standard user manuals and no documented training procedures. Very few content-limited user manuals were available at the time of assessment.

n. Business continuity plan and disaster recovery plan

Data is backed up daily in tapes at the MCH central data centre and stored in the same location. Apart from this there is no separate Disaster Recovery plan or Business Continuity plan.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The hardware infrastructure currently in place is suitable for the current application load, but the capacity of the database servers has to be increased to hold additional data if all the modules are completely implemented and fully functional across all the zones. The current provisioning of hardware is not sufficient and the MCH IT team is aware of this situation. Plans to upgrade the hardware have already been made and steps have been taken in this regard by placing orders for IBM RISC servers with a recognized hardware and IT infrastructure vendor.

With regards to communication/network infrastructure the MCH operations are plagued to a certain extent by connectivity issues which could be sorted out by effective planning and provisioning. On the other hand as mentioned, the software deployed at present does a pure-play mapping of existing processes which calls for re-design and development using a well designed and tightly integrated set of modules which will provide a fully consistent, secure and easily manageable system.

The infrastructure in place has some problems regarding leased line connections, which are being managed temporarily by a backup ISDN line; otherwise the infrastructure is pretty stable. Most of the 2-Tier (Client/Server) systems are not very scalable because of the inherent limitations of the architecture that has been chosen.

a. Potential of the current application and new application to be integrated/operated/hosted

Integration between any of the modules is not provided in the current phase of computerisation. The IT team of MCH develops the majority of the modules due to which there are no unknown barriers to integration with any other module or to the hosting of new modules using the same infrastructure. Plans are afoot to build an integrated solution by converting all the modules to a J2EE based architecture in the next phase of activities. Furthermore, the MCH modules have also been successfully integrated with the e-Seva software (which is a State Government initiative) wherever appropriate.

b. Vendor dependence to independence

The projects were built by the in-house development team of the Corporation and hence the entire source code is available with the Corporation. Therefore there is no dependence on vendors.

c. Information security management and systems security

Role-based security is built into the transactional systems for authentication and authorization purposes. Online payment facilities are not provided at present.

d. Systems auditing

There was no record of system audits having been carried out.

5.2 System Deployment and Training

a. Project management, monitoring and system development process

The project management is directly under the control of the Additional Commissioner (IT) of MCH. He is supported by an Additional Engineer to manage and monitor the entire life cycle of the project. The Corporation has basically a 30 member IT team on contract basis, which is used for all development purposes. The team is periodically trained on the required technologies. The team consists of developers, database administrators and network administrators. The typical approach to development is as follows:

- Requirements gathering based on discussions with department staff.
- Development using the appropriate technologies based on delivery.
- Initial round of testing by the developers based on requirements taken up for development.

As seen, the development process follows the generic system development process. However, there is no recognized Software Development Life Cycle method that is being followed.

b. Speed in deployment/procurement - system installation time

MCH has developed its projects, mostly on a web environment. So hosting is a one-time process and future modules can be deployed on the same base. No proper documents are available to assess the speed of deployment by the in-house team.

c. Implementation approach and plan

Data collection and data digitization are a major effort and are a pre-requisite for a successful implementation of any module. Data digitization of the existing and collected manual records is contracted to a private organization. The typical implementation approach is as follows:

- Start of data-entry as soon as database design is fixed which will run in parallel with the other system development activities.
- Thorough testing of application for aspects of functionality, performance and security. The testing is done by both the developers as well as some of the Corporation staff in order to give a well rounded finish to the application.
- Installation on host systems (servers and clients).
- Training provided to the operational users before and during the start of continuous functioning of the system.
- Close monitoring of application by development team till the module stabilizes and any bugs if any have been identified and fixed.

The general approach adopted for data digitization is as follows:

- Data entry by operators.

- Print-out is taken and is validated by corporation staff of respective departments against original data.
- These corrections are then entered again into the system.
- On this corrected data a random audit is performed to ensure the integrity.

d. Manpower required to operate the system

The MCH system has a couple of dedicated support staff, one for the network and the other for the database. Further, the Corporation has also deployed data entry operators at key points in order to facilitate the usage of the system by the Corporation staff.

e. Amenability of service delivery through PPP mode

The system has been coupled with the e-Seva software for certain application which proves its capability to be interfaced with other external applications.

f. User training

The user training is taken care of by the IT team. There is no documentation available on the methodology.

g. Support

Due to all development being done in-house, all applications are well supported and maintained up-to-date. All support requests are handled by the IT department.

5.3 Details on Cost

Cost details could not be gathered during the study because of the lack of coherent information on various attributes of cost such as hardware, software, etc.

5.4 Functionality

Due to the lack of any process reengineering, the Corporation has only computerized the existing system. However, the Corporation is satisfied with the functionality the system provides currently. The system has not been designed for use of local language interface. Overall the presence of an electronic system has enabled the delivery of better service to the citizen and has also enabled better transparency in operations. The applications so far have resulted in better realisation of revenue, saving of time, etc.

5.5 Stakeholder Participation

a. Stakeholder usage and ease of access

The internal stakeholder usage is very high and do not have any issues with access to the system. Furthermore, the citizens have very good access to relevant and detailed information through the corporation website which is user-friendly and easy to use.

b. Cost of accessing

During the study details at this granularity could not be obtained.

c. Popularity

The acceptance and usage by citizens is very good due to the very high level of convenience offered in comparison to the older system. The citizen response has been very positive and the efforts have been lauded. Furthermore, the corporation employees have also recognized the benefits offered by the system and have been pro-active in its usage.

6. Lessons Learnt

- User/citizen interface key and primary aspect of implementation.
- Clarity on objectives of the total e-Governance exercise required.
- Clarity in contracting (through proper RFP and contracting methodologies) required.
- Political will and champions within the ULB enable proper implementation.
- Clarity in requirements and systematic approach for implementation enhances the implementation process.
- Matching of roles and responsibilities with qualification is required to hasten the process of implementation.
- Hardware/network infrastructure planning and updating helps in the long run.

Municipal Corporation of Visakhapatnam

1. Linkages of State Level Initiatives to ULB Level Initiatives

Municipal Corporation of Visakhapatnam (MCV) is a very good example of a Corporation acting out of its own initiative to set up systems in place for e-Governance without support from the State Government or policy directives. Such a pro-active initiative was mooted a long time ago in the 1990s and has been implemented using only departmental IT staff with local resources. Further, the e-Seva (a state wide initiative to provide services to the citizen under one window) initiative has also been integrated to these systems as a result of which MCV has been able to offer a very efficient/innovative method of service delivery.

1.1 Objective of the e-Governance initiative

The e-Gov initiative of MCV is based on some basic issues affecting good governance. Governments are the principal users and disseminators of information and the general perception is that they do not do a good job. Just as the survival of any business depends on the material and mental satisfaction of its customers, survival of the governments too is hinged on the contentment of its citizens. Besides this, the internal relationship between various partners within the government needs also to be combined with the benefits of technology. MCV has taken steps to address these issues.

The current initiatives started internally at the Corporation towards the end of the year 1999. The purpose of the e-Governance initiatives was to deploy cutting edge technologies to bridge the gap between citizens and Corporation and to leverage information technology to enhance quality of services and ensure citizen satisfaction.

The major initiatives taken in Visakhapatnam in relation to e-Governance are

- Soukaryam.
- Fusion of e-Seva and Soukaryam.
- Web-enabled services.

'Saukaryam' (which means 'facility') has been commissioned by the Visakhapatnam Municipal Corporation (VMC) to improve the delivery of municipal services through information and communications technology. The aim of the project is to bring about transparency, accountability and speed of delivery, and reduce citizens' unnecessary visits to the government offices. The awareness among the public regarding Soukaryam is about 70% and the usage of services is to the maximum.

These services include online payment of municipal dues, online submission of building plans and water tap applications, facility for instant issuance of birth and death certificates, online filing, forwarding and disposal of complaints and grievances. Besides, the corporation through its web site offers instant access to live information on infrastructural works, sanitation work, water supply and street lighting plans and a host of other related information.

2. Organization Structure

2.1 Organisation Structure

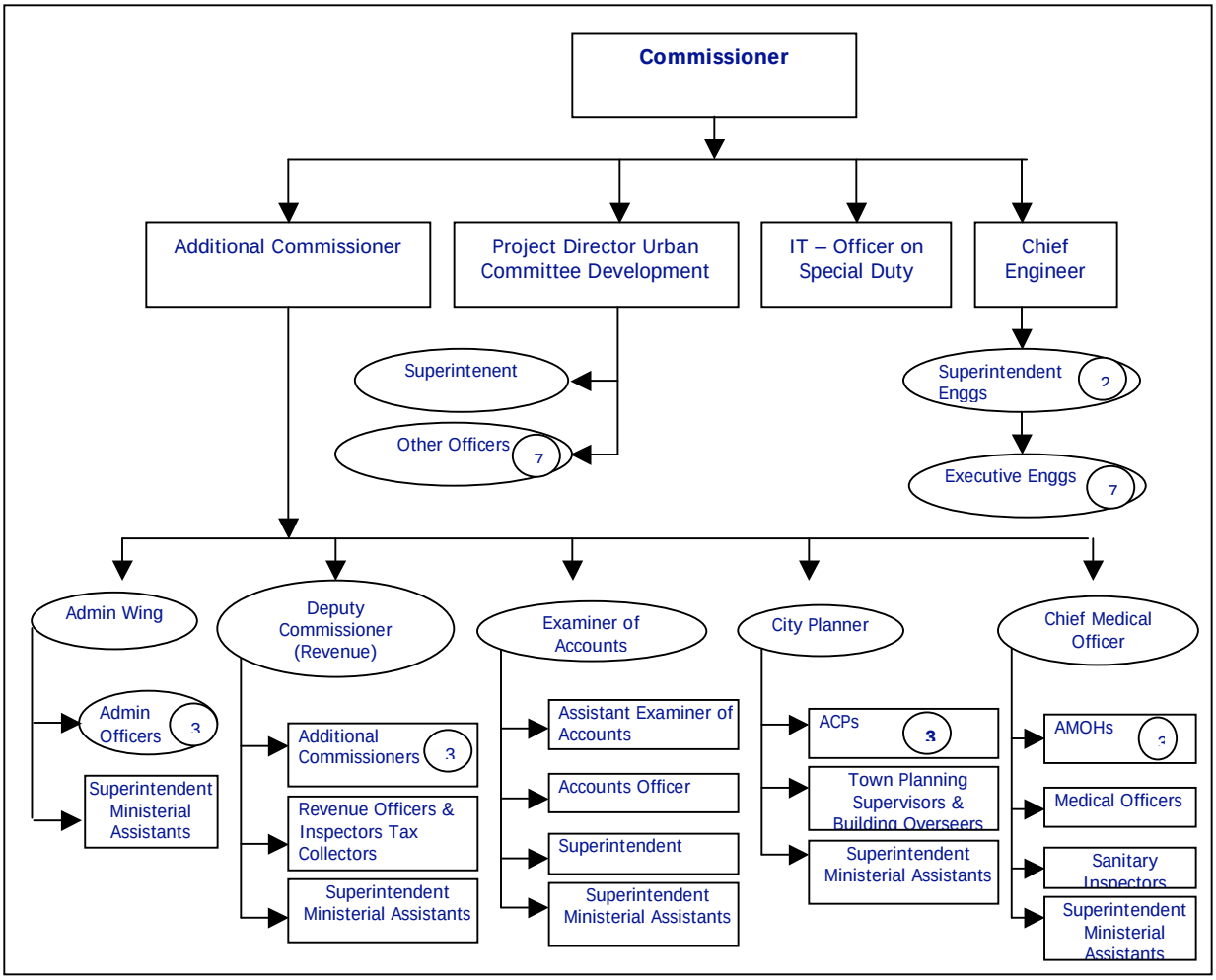
Municipal Corporation of Visakhapatnam, with an area of 111.60 sq.kms. is serving the estimated population of 12 lakhs with 4,534 officials and staff. The total annual revenue of the Corporation was about Rs. 100 crores.

The Visakhapatnam Municipal Corporation has been performing a variety of functions ever since it was established as a Voluntary Municipal Association in as early as 1858. The number and extent of its functions have been on a steady increase with the passage of time under different municipal laws. MCV has grown in its Municipal limits due to the incorporation of new areas and thus the need for conversion to Municipal Corporation occurred in the year 1979.

The council of MCV has an elected Mayor with 50 elected corporators and 5 ex-officio and 7 co-opted corporators. A five member standing committee with a chairman is also present. The Corporation has 50 wards and 3 circle officers.

Figure 20 gives an indicative organisational structure of the executive body in MCV.

Figure 20: Organisation Structure of Municipal Corporation of Visakhapatnam



2.2 Distribution of Roles and Responsibilities at MCV

According to the Visakhapatnam Municipal Corporation Act 1979, the Municipal Authorities will consist of:

- A Corporation.
- A Standing Committee.
- A Commissioner.

The roles and responsibility of the management of the MCV is distributed between the standing committee and an administrative team headed by Commissioner and his team.

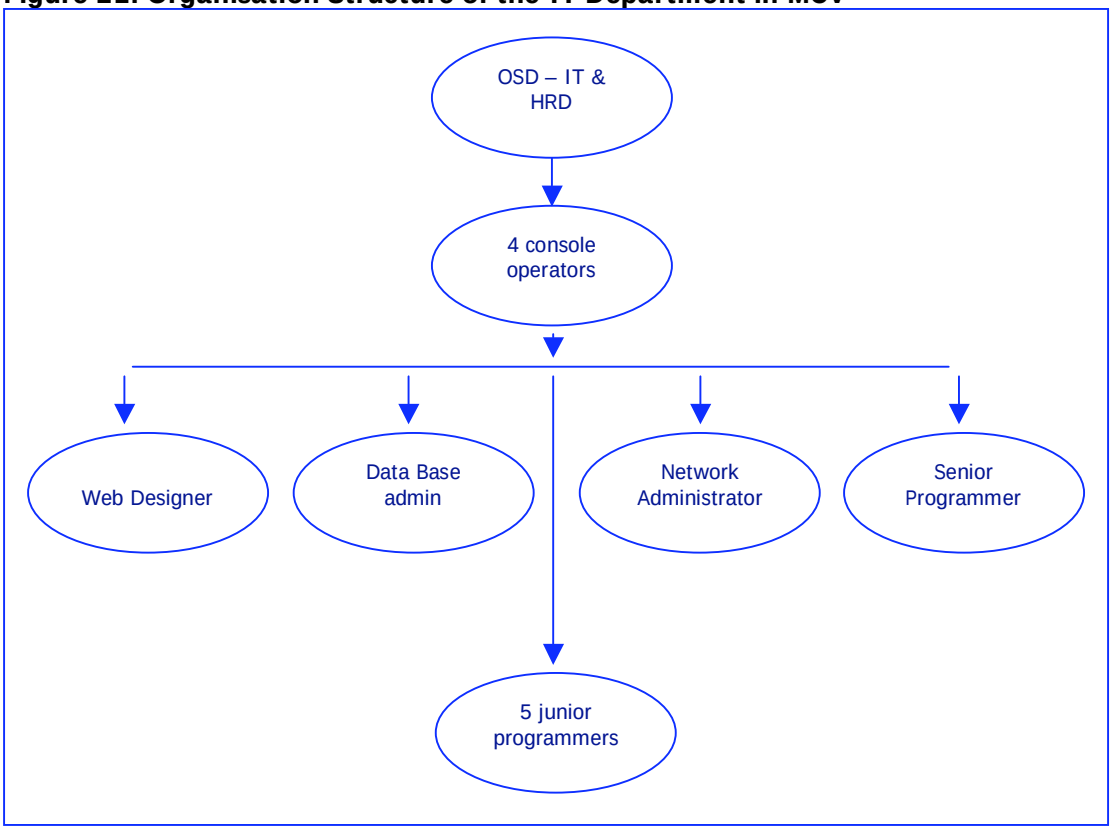
- Commissioner.
- Additional Commissioner.
- Chief Medical Officer.
- Examiner of Accounts.
- Chief Engineer.

2.3 New Organisation Structure

Since the initiatives started way back in 1999, there has been an internal participation from the employees of the Visakhapatnam Corporation towards the development/setting-up of the IT department internally, and with the e-Governance initiatives taking a

progressive step in Visakhapatnam, an effective department has been put in place. **Figure 21** shows the structure of the IT Department in Visakhapatnam.

Figure 21: Organisation Structure of the IT Department in MCV



2.4 Decision Making Process within the ULB

The decision making process of various officials within the Visakhapatnam Corporation lies with the powers delegated by the Commissioner to his officials at regular periods.

Commissioner

- Power to decide any works, activities, developments, etc. with regard to the Corporation.

Additional Commissioner and other department heads

- Authorized to call for tenders and also empowered to accept tenders.
- Power to decide on actions done at various departments.
- Power to decide on the inspection of all sections of main office, circle offices, e-Seva centres and others belonging to Corporation.
- Scrutiny files relating to transfers, promotion, disciplinary cases, work distribution, etc.
- Initiate disciplinary action against all officers.
- Grant leave to a section of officers.
- To draw and disburse salary, increments, claims, and issue retirement notices to the employees of the Corporation.
- Authorised to appoint employees of a particular section.
- Service regulation and declaration of probation.

- Matters relating to legal cases, public health and sanitation, town planning and revenue matters.
- Decisions regarding sanction of expenditure.

Officer on Special Duty (OSD) – IT & HR

- Power to decide to develop new application software in relation to the Corporation.
- Take decisions on purchase of software and hardware for the Corporation.
- Power to conduct feasibility studies for areas of improvement.
- Power to decide on the IT infrastructure needed for the Corporation.
- Estimate approval on purchase relating to IT.

Examiner of Accounts

- Decisions under the act or rules with regard to audit of accounts of the municipal funds.
- Specify duties of subordinates.
- Exercise supervision and control over the acts and proceedings of the said auditors and assistant auditors.
- Claim pay and allowances of staff working under him and authorize payments of such bills.
- Sanction grade increments to staff working under him.

3. Key Municipal Functions

3.1 Key Municipal Functions of MCV

The functions of the Municipal Corporation of Visakhapatnam may broadly be classified according to the respective department heads. These are:

a. **Revenue:** The revenue department takes care of all the revenue that flows into the Corporation from the citizens and from other sources of revenue through various tax and non–tax receipts. The Deputy Commissioner heads the department with three Assistant Commissioners of various zones, Revenue Officers, Revenue Inspectors and Tax Collectors.

b. **Engineering:** Handling Public Works was the earliest function of the Corporation. At present, it consists of four sections viz roads, drainage, water works and lighting. This department deals with development works like construction of roads, bridges, buildings, etc. done at various parts in the city. This department is interlinked with the city planning division of the Corporation in matters relating to buildings and structures being built in the city. Various Executive Engineers are supervised by the superintendent engineers who in turn come into the control of the Chief Engineer. The Town planning division is headed by a City Planner.

c. **Public Health:** One of the primary functions of the Corporation is Public Health. The Public Health section of Visakhapatnam Municipal Corporation has been dealing with medical relief, preventive medicine, sanitation and conservancy, maternity and child welfare, control of food adulteration and some other functions under the Public Health regulations. The Health department has a Chief Medical Officer under whom the Assistant Medical Officers of Health, Medical Officers, Sanitary Inspectors, etc. function.

d. Accounts and Audit: Single entry system of accounting is followed at the Visakhapatnam Corporation and is being done at this department.

e. UCD Project: This deals with the projects undertaken for the urban development works in the city. Various loans are sought from international banks and funding agencies for development of cities. This department has a Project Director to whom various administration officers, community organizers, developers, social workers and superintendents report.

3.2 Modules at Municipal Corporation of Visakhapatnam

The project involved data collection, computerisation, networking and establishment of call centres as outsourced to entrepreneurs. While the corporation staff carried out the data entry and updating, the software development was taken up as a joint exercise between the in-house software wing and the private site developer taking stake in the project. The networking all across the city was done by a private bandwidth supplier, who in return was offered rights to run the line for other commercial applications in the city. Most of the call centres were opened in the local bank branches that invested in the provision of necessary hardware, in exchange for which they were allowed to retain collected funds for a fixed period. By roping in many stakeholders, the project could be completed in three months time from conception to commissioning, without putting any additional burden on the corporation's already stretched financial resources. From this it was observed that anything is possible provided there is will and the ability to persuade partners to join in, by giving them stakes in a seemingly public non-commercial activity.

a. Water charges

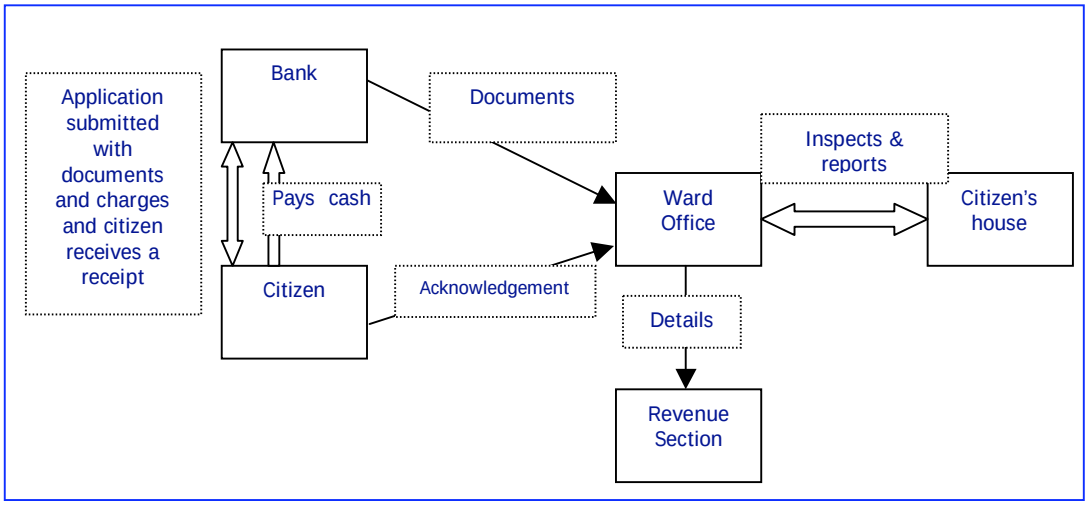
The major revenue source for the Corporation is through the water charges collected from the citizens and industries located in Visakhapatnam locality. Water charges account for nearly 40% of the income generated at the Corporation. Water charges are classified according to the classification ascertained by the Corporation as per the Visakhapatnam Municipal Act of 1979. They are :

i. Domestic.
ii. Bulk.
iii. Semi Bulk.
iv. Excess.

Each of the classification applies to the category the user has been divided into, for eg. Bulk stands for industrial customers. Nearly 8000 connections are yet to be assessed. Water tax has a link to property tax by the assessment number by which the official can relate to payment of property tax arrears before sanctioning a new tap connection for the citizen. **Figures 22 and 23** show the earlier and present system followed at MCV.

Processes and procedures followed

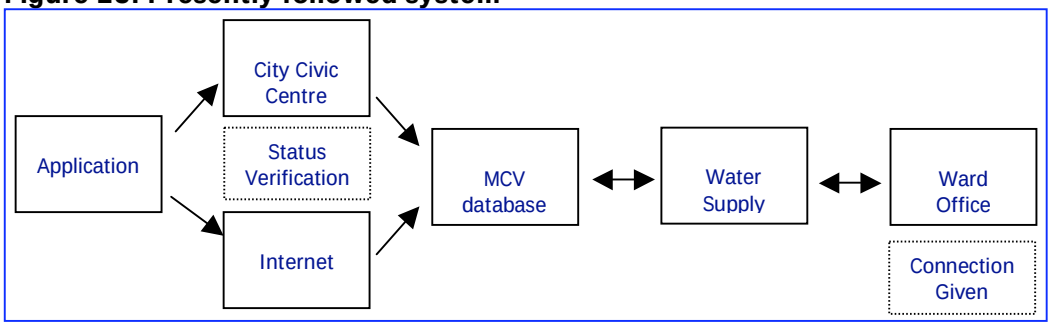
Figure 22: Manual Procedure followed previously



Former process measures vs. redesigned process

The previous process of water charges collection was done manually. Banks were designated to collect water charges. The citizens were paying in the banks or at the Ward offices. There was delay in information flow from the banks which led to inconvenience and delay in accounting of the water charges collected. Even for granting of new water connections, the manual system was followed where the citizens submit the application to the ward office, and after the inspection process, the water connection was being granted. This process was also time consuming. In the redesigned process, City Civic Centres were setup where the citizens can submit their applications. The citizens can also submit their application over the internet. This is updated in the database directly, which is taken up for further processing by the Water supply department.

Figure 23: Presently followed system



Process outputs

- Various control aspects established for monitoring.
- Pending connections can be easily known and reduced.
- Status of current connections, repair, new, their classification, etc.
- Various status outputs available at any time for action and verification.

Impact of laws and regulations

Due to the new system, a data entry operator had to be recruited for each ward of the Water Supply Department. Process re-engineering has been done to bring data into electronic form.

Functional areas covered
Revenue Department and Water Supply department.

Strengths and weaknesses of the system

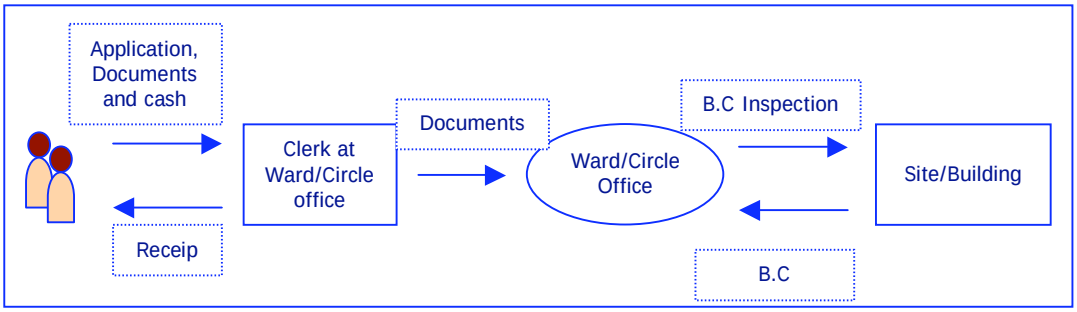
Strengths
i. Water connection established quickly.
ii. Repairs rectified soon.
iii. Control aspects for higher officials.
iv. Online availability of dues.
v. Procedural delays avoided.
vi. Stoppage of pilferage of collections.
vii. Citizen convenience.

Weaknesses
i. Many connections still not assessed.
ii. Faulty meter readings.
iii. Classification of connections needs to be addressed.
iv. Duplicate entries can be made.
v. Demand existing even for paid receipts.
vi. Data corrections yet to be done.

b. Property tax
One of the major revenues for the Visakhapatnam Corporation is through the collection of taxes through assessed properties. Around 1,80,000 properties are assessed in the city. It has computerised records from 1987 and has stopped its manual collection of dues through bill collectors. The system of demand generation is half yearly and it is available on the internet for the public to view the amount payable against property tax. In 2000, there was a revision of rates of the taxes which is the latest at Visakhapatnam Corporation.

Processes and procedures followed
The earlier and redesigned processes followed at KDMC are given in **Figures 24 and 25**.

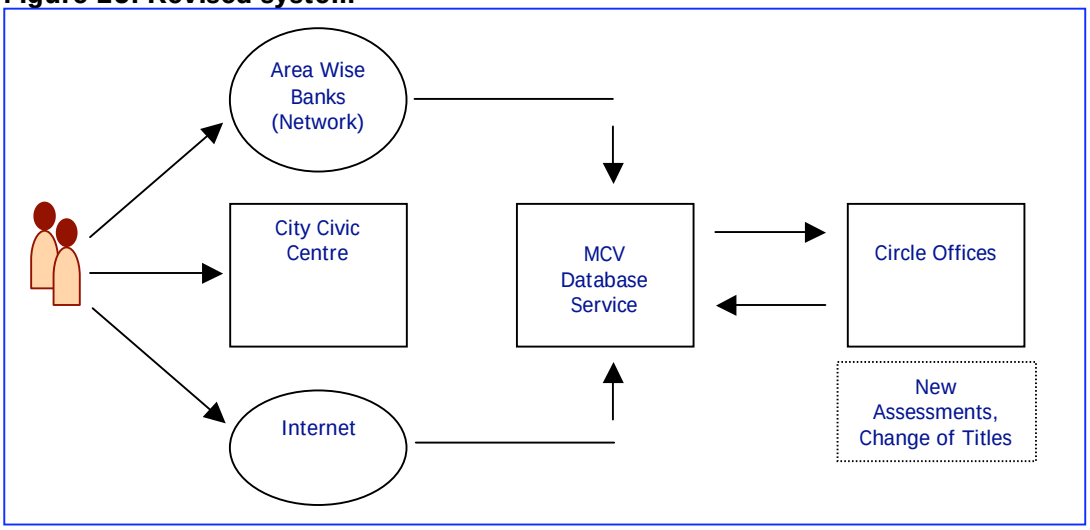
Figure 24: Manual Procedure followed previously



Former process measures vs. redesigned process

Previously, manual system was followed for assessment of properties and collection of property tax. For assessment and payment of property tax, the citizen used to approach the ward/circle office. As the system was manual, there was time delay in information flow. In the redesigned process, the citizen can pay property tax in the designated banks for each area, or in the City Civic Centres or even over the internet. This data is updated in the database, which is used by the MCV staff for accounting and MIS purposes.

Figure 25: Revised system



Process outputs

Demand generation and payment receipts are the outputs from the process.

Impact of laws and regulations

With regard to the impact of regulations, manual collection by the Bill Collector was stopped and the Bill Collectors were redirected to concentrate on the defaulters of property tax. Data entry operators were appointed in each department due to the impact of the law at Visakhapatnam.

Functional areas covered

Water Tax and Financial Accounting System are the areas covered functionally by the module.

Strengths and weaknesses of the system

Strengths

i. Minute-to-minute monitoring collection of revenue.
ii. Total transparency to citizens with regard to collection which in turn builds faith in them.
iii. Easy collection through City Civic Centre, e-Seva and Banks.
iv. Tracking of arrears, defaulters, etc.
v. Area/ward/circle wise revenue records.

Weaknesses

i. Lack of control features to prevent basic corruption of data.
ii. Not integrated with the workflow, leading to the old lethargy of working by the employees.
iii. Wrong data can still be given by the Bill Collectors for new assessment, extension and bifurcation of properties.

c. Birth and death module

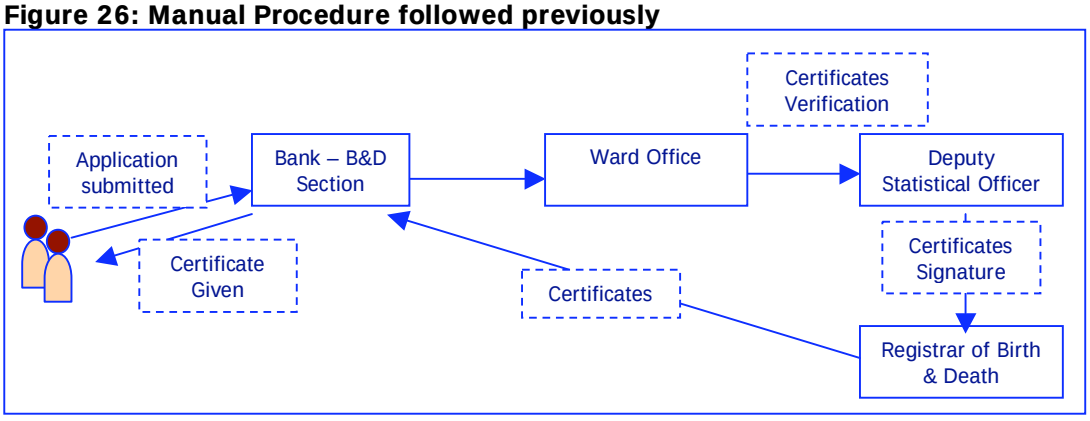
The Birth and Death module in MCV has been developed in-house. The computerization is aimed at enabling the citizen to obtain these certificates with minimum time delay and a database is built up of births and deaths from 1997. A code is automatically assigned by the computer each time for a registration of Birth/Death. The main features of this initiative are given below:

This project has computerised the data regarding birth and death certificates and the citizens can access this information easily and are also able to get these certificates instantly through the city civic centres. This has also minimised the paper work and increased the speed of data transmission from the hospital to the corporation server.

Processes and procedures followed

The manual and redesigned processes are shown in **Figures 26 and 27.**

Figure 26: Manual Procedure followed previously

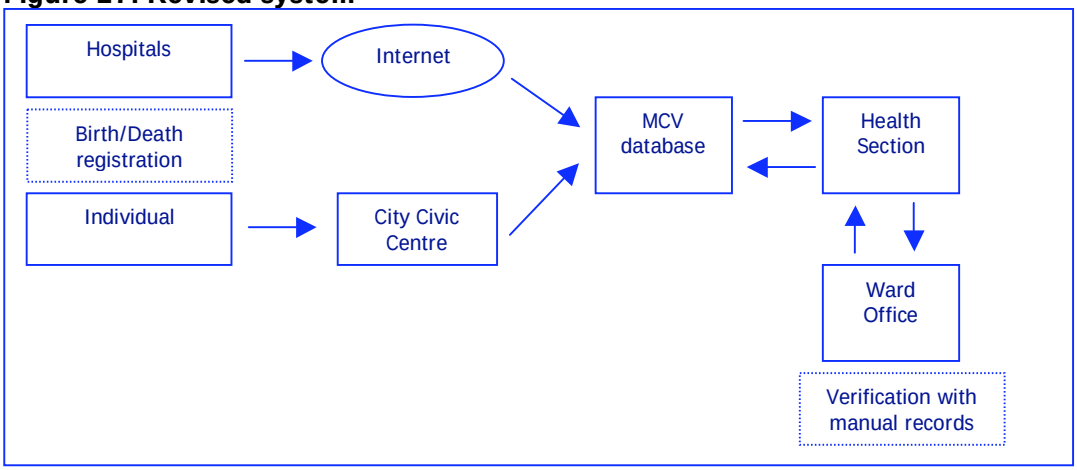


Former process measures vs. redesigned process

The former process was manual which used to take more than a week for issue of birth and death certificates. The citizen can apply for a birth/death certificate at the City Civic Centres. The Health department uses this information from the database to verify with manual records, after which the certificate is issued to the citizen. In the current system,

the data related to births and deaths is received from hospitals over the internet, which was absent in the earlier system.

Figure 27: Revised system



Process outputs

The system generates Birth and Death Certificates on payment of the requisite fees. The details are also available for the citizens over the internet.

Impact of laws and regulations

A few hospitals have been given online facility for registering of births and deaths.

Functional areas covered

The Birth and Death Module covers the Statistical Department only. There are no direct links with the Finance and Accounts Department.

Strengths and weaknesses of the system

Strengths

i. Simple to use.
ii. Details of births and deaths are available on the internet.
iii. Gives details on the count and this data is very useful for the statistical department.
iv. Reduces manual work and time.

Weaknesses

i. There is no responsibility over the presigned birth and death certificates issued at the City Civic Centres.
ii. Less number of years in the database.
iii. Validation of data from the hospitals with online connectivity is less.
iv. Money received for application and other forms are to be manually entered in the system.
v. All details are displayed which are against law.
vi. Fraud is possible; deletion of records, duplicate entries can be made.

d. Central accounts system

The Central Accounts System (CAS) is a system developed in-house by MCV. It enables tracking of Receipts and Payments against the Budget Heads. The CAS has computerized and streamlined the traditional governmental accounting system (budget oriented/cash basis) and does not incorporate double entry accounting.

Processes and procedures followed

i. The implementation of CAS was centred around computerization of the manual system. No major process re-engineering was done in the Accounts Department. However, the manual procedures were simplified and certain control points like cheque printing and pre-audit were built in.
ii. The implementation of CAS has eliminated certain procedures like maintenance of Budgetary Control Register and compilation of accounts information for decision making.
iii. A Chartered Accountant has been appointed as Finance Manager. His responsibilities are financial analysis, preparation of reports, etc. With the help of this CA, attempts have been made to prepare a Balance Sheet for MCV using the Tally accounting package. However, such efforts are still in preliminary stages.

Former process measures vs. redesigned process

This revolves around computerisation of existing accounting procedures. There is no major process re-engineering done. As a result, the old processes are still followed in the current computerised system. This is integrated with other modules and it is ensured that the collection and expenditure information is updated in the accounts automatically.

Process outputs

There is no major change in the input forms forming part of the accounting system since the procedures are similar. There is a wide range of output forms providing information on revenues and expenditure. Budgetary control reports also have been enabled. Certain reports have also been web enabled for the citizens for viewing (for example report showing cheque status, etc.).

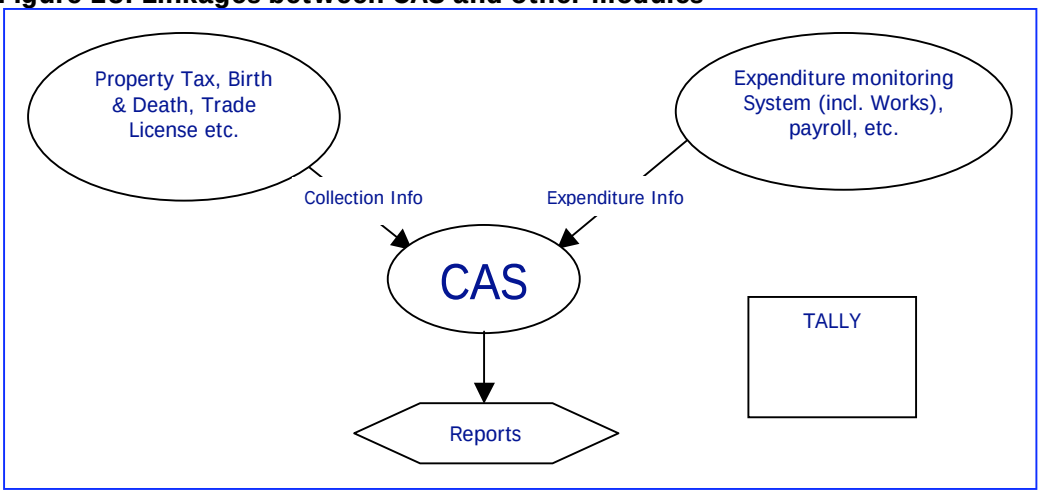
Impact of laws and regulations

No changes have been required in the governing legislation for the implementation of CAS. As and when VMC decides to shift to double entry accounting certain regulatory changes may become necessary.

Functional areas covered

The CAS primarily affects the Accounts Department. However, care has been taken to ensure that the CAS is integrated to other modules running in VMC. But the CAS and Tally accounting package (procured for preparation of financial statements) are not integrated. **Figure 28** shows the inter linkages between CAS and the other modules.

Figure 28: Linkages between CAS and other modules



Strengths and weaknesses of the system

Strengths

i. Simple and easy to follow for the operational staff.
ii. Does not deviate from the traditional governmental accounting system.
iii. Has reduced the job of operational staff.
iv. Budgetary control and audit are built into the system.
v. The system is integrated with other modules operating in MCV.
vi. Since the software has been developed in-house, maintenance and modifications, if any, can be handled by the IT Section itself.

Weaknesses

i. The CAS is only a system of Budgetary Control and cannot be called an accounting system.
ii. The CAS concentrates only on Receipts and Payments thereby ignoring other aspects like Assets and Liabilities.
iii. While the intention to convert to double entry accounting system is present, there is no proper plan for the transition.
iv. In addition to the CAS, Tally accounting package has been purchased without considering whether the same is suitable for the accounting system proposed.

The Tally package and CAS are not integrated. Any changes in the CAS are not updated in Tally. Even if the financial statements are prepared in Tally, there is no assurance of the correctness and completeness of the statements.

e. Expenditure management system

The Expenditure Management System (EMS) enables VMC to manage and account its expenditure under various heads. While the EMS provides a simple system of recording, passing and payment of bills with regard to general expenditure, with regard to works it provides a

detailed system of tracking individual works from the date of approval. The discussion here is limited to the EMS being used to manage works expenditure.

Processes and procedures followed

i. EMS enables tracking of works with a unique Work Code, which is assigned at the Commissioner's office at the time of approval.
ii. Subsequent updating of the database with information at various stages is handled by the Engineering Department.
iii. The audit, passing and payment of work bills is done in the Accounts Department.
iv. The existing procedures have been modified and streamlined to suit the EMS. The re-engineered processes ensure that once the work is approved, all subsequent actions, whether at the Engineering Department or the Accounts Department, are related to the Work Code.

Process outputs

A key output of the EMS is the Work Code itself, which is unique to each work. In addition to this the EMS provides for a number of reports, which give comprehensive information related to works for decision makers. The list of works and their status has also been put up on the web for the benefit of the citizens. The contractors can also enquire about the status of payments on the web.

Impact of laws and regulations

There is no major impact on existing laws and regulations as a result of implementation of EMS since the focus has been on modifying and simplifying the existing procedures.

Functional areas covered

The EMS covers the Administrative Department, Engineering Department and the Accounts Department. The functional areas covered are shown in the following table:

Activities	Department
Approval of the work	Commissioner's office
Updating of works information like tender status, billing, etc.	Engineering Department
Audit of bills, payments, etc.	Accounts Department

Strengths and Weaknesses of the System

Strengths

i. Enables identification of each work with a unique Work Code.
ii. Works information is available to the citizens over the web.
iii. The EMS is integrated with the CAS.
iv. The EMS has brought about standardization in procedures in the way works are managed.

Weaknesses

i. The MIS reports need to be strengthened to enable analysis of works data, identify trends, etc.
ii. The procedures for updating of status of works have not been clearly defined (with regard to who, how and when the same has to be done). Presently the status updating is done by the Draftsman based on information in the file.

iii. The EMS does not incorporate assessment of work progress vis-à-vis defined parameters.

f. Payroll

The payroll system in VMC is used to manage the monthly processing of salaries of over 4,000 employees with a monthly financial outgo of approximately Rs. 2 Crores.

Processes and procedures followed

i. No major re-engineering of processes has been done as part of the payroll computerization.
ii. A typical monthly payroll processing cycle is shown in **Figure 29**.

Former process measures vs. redesigned process

The former processes have been computerised. There is no reengineering of processes. However, certain reports like deduction statements, monthly checklists etc., have been computerised which has reduced the manual work.

Process outputs

Process outputs are basically the monthly checklists for verification by the departments, monthly paybill, bank statement and the payslips. In addition to this, employee Provident Fund (PF) statements are also generated. Reports for remittances of deductions are also generated from the Payroll module.

Impact of laws and regulations

The procedures for monthly payroll processing have been computerized and have not been changed per se. As such there is no legal implication. The Payroll module enables the preparation of monthly statements and maintains some basic records of employees. It does not affect the service rules as such.

Functional areas covered

The payroll module affects the Administration and Accounts Department to the extent required for monthly payroll processing.

Strengths and weaknesses of the system

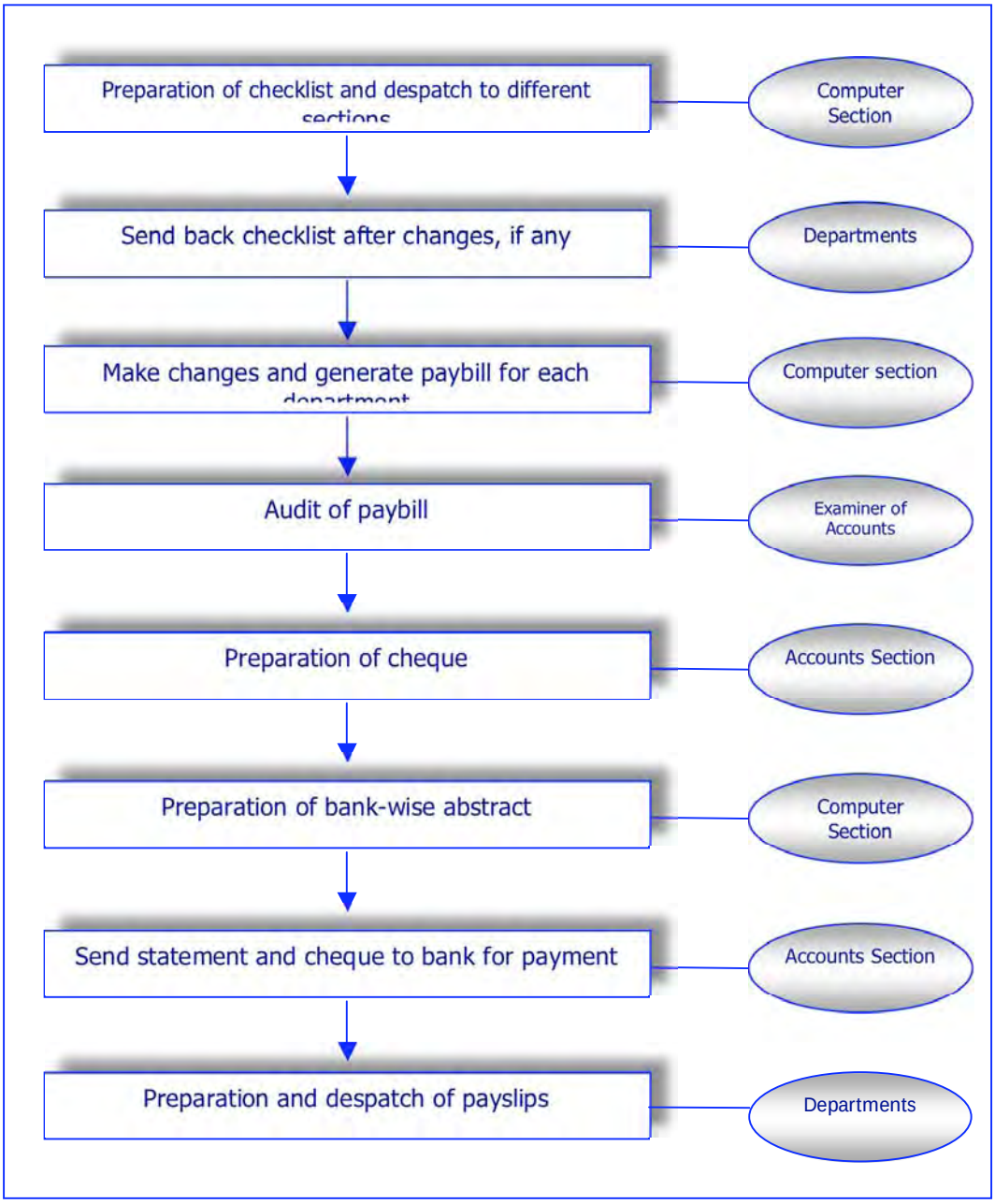
Strengths

i. Simple to use and designed in-house.
ii. Has decreased the monthly payroll processing time.
iii. Is integrated with the CAS.

Weaknesses

i. Is not comprehensive enough to cover aspects like calculation of Income Tax, leave computation etc.
ii. Not very flexible due to the fact that it does not allow the staff to add or modify pay structures.
iii. Does not cover HR aspects like training, capacity building, performance assessment, etc.

Figure 29: Monthly payroll cycle



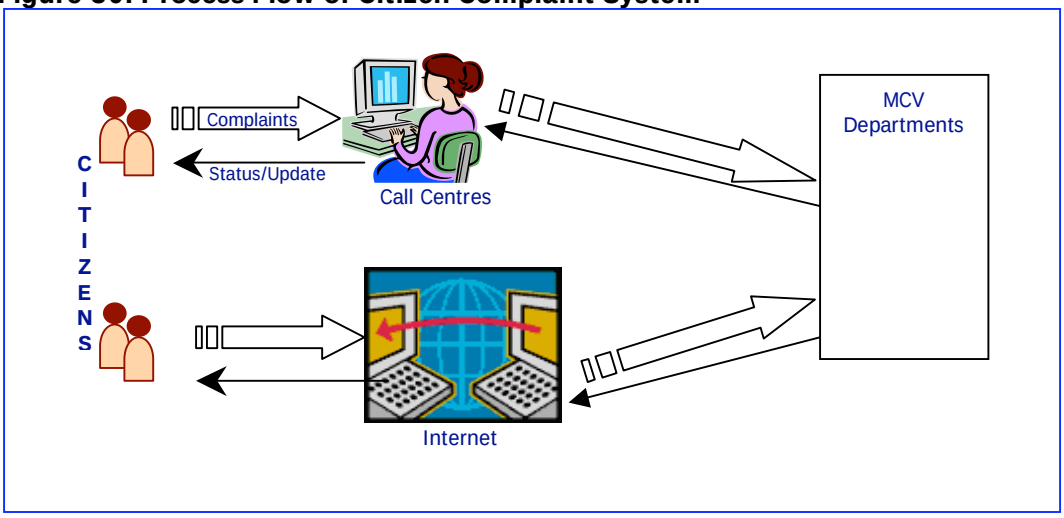
g. Citizen Complaint System

The facility of citizen complaint system is done well in Visakhapatnam. There are nearly seven modes of registering a complaint. The citizen can register through any of the following ways, which are accepted at Visakhapatnam:

- Call Centre.
- Civic Centre.
- Government of Andhra Pradesh.
- Government of India.
- Directly in person.
- Newspaper.
- Website.
- Postal.

Processes and procedures followed
A broad overview of the process involved is given in **Figure 30.**

Figure 30: Process Flow of Citizen Complaint System



Process outputs
The outputs are the redressal of the complaints lodged by the citizens and no specific outputs are available.

Impact of laws and regulations
No such impacts on the laws and regulations with regard to this module.

Functional areas covered
This relates to all the departments of the Corporation but does not cover any department in particular. However it looks into each department in case a complaint is given for that department.

Strengths and Weaknesses of the System

Strengths
i. Copy of the complaint sent to the Commissioner.
ii. Availability of the complaint on the internet.

Weaknesses
i. Only available status is 'pending'.
ii. No escalation of complaints after a particular period.
iii. Status of the complaint can be always seen as 'pending'.

h. Tax (Collections) Modules
These are the modules provided by the Corporation for the citizens' payment of taxes of all kinds for which the citizen needed to come to the corporation offices earlier.

- Property Tax.
- Water Tax.
- Shop Rent.
- Trade License.
- Advertisement Tax.

- Vacant Land Tax.

These above taxes are collected at the City Civic Centres, which are located in the Corporation of Visakhapatnam itself. These above services are also offered at the e-Seva counters in Visakhapatnam except the issue of birth and death certificates. Other collection centres are 6 banks which have branches in various areas.

As Property and Water Tax have been covered in the modules explained earlier, a brief explanation of the other modules is given below:

i. Shop rent:

This is in relation with the properties rented and leased out by the Corporation. The occupant pays rent/lease once a year to the Corporation.

ii. Trade License:

The Corporation issues various trade licenses, which its citizens can claim by applying for them through the facilitation centres. Trade licenses include licenses for market, various common trades, dangerous and offensive trade, food license, etc. An application has to be procured by the citizen from these facilitation centres and submitted with the necessary documents. After verification process, the citizen provides the receipt issued at the first place and receives his license.

iii. Advertisement tax:

This tax is collected from the agencies, individuals, etc. who use the Corporation property for advertisement purposes. The tax is on a yearly basis. This module is used partly by the Corporation and data availability is less. The same process as the above module applies for this tax too.

iv. Vacant Land tax :

Vacant Land tax is charged for the lands that lie vacant within the limits of the Visakhapatnam Corporation. This is levied once a year and is mostly paid by the citizens when a building is planned to be constructed. When the citizen comes and applies for building permission, the total vacant land tax including arrears for the previous years are calculated and collected.

4. e-Governance Infrastructure

The intranet applications have been developed by using tools like ASP, SQL Server, Visual basic and Oracle on Windows NT operating system. The operating system used comprises Windows NT, Windows 98, UNIX and Linux, while the RDBMS is on SQL Server 7.0 and Oracles 8.0. The component object Module is used as a middle ware, while the front-end is on Visual Basic 6.0., ASP 2.0., and JSP. The entire system comprises over 10 server class computers and over 100 nodes with peripherals connected through a broadband network.

A snapshot view of the e-Governance initiative in Visakhapatnam is given in **Table 6.**

Table 6: Snapshot view of the e-Governance initiative in Visakhapatnam

Parameter	Details of Vizag Initiatives
1.No. of Modules implemented	8

Parameter	Details of Vizag Initiatives
2. Platform/ Programming Language(s)/ Technology	VB, ASP
3. Software Architecture	2-tier
4. Deployment Architecture	Centralized
5. Database	SQL Server
6. Connectivity	Optical Fibre
7. Hardware Platform (Servers)	Xeon
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Windows, Linux
10. Operating System (Clients)	Windows
11. Software Applications	Water Charges Property Tax Birth & Death Central Accounts System Expenditure Mgmt Payroll Complaints Mgmt Collections
12. Build or Buy	In-house development
13. Development Process	No recognized process
14. Backup Procedures	Backup daily to tape. Every week to CD.
15. PPP Arrangements	e-Seva, banks
16. Citizen Interfaces	e-Seva, city civic centres, banks, website
17. Documentation	Limited documentation
18. Use of Local Language	Not used

4.1 Description of the Technical Architecture

a. Hardware

MCV has adequate server hardware located centrally in the server room in its premises. MCV has one web server and one database server with a backup database server. Detailed configuration of the servers is provided in **Annex B11**.

b. Software

MCV has both web-based and non web-based applications. Web-based applications are developed using ASP and non web-based applications are developed using VB. The ASP applications are hosted on IIS. SQL Server is used as the standard back-end database across all the applications.

c. Operating System

Windows 2000-Server Edition is used as the operating system in both the database and application servers. Windows 98 or Windows 2000 - Professional Edition is used as the desktop operating system.

d. Network communication software

There was no evidence of usage of any network communication software.

e. Systems management plan and network management plan

MCV as such does not have any specific systems management plan. The hardware is currently being maintained using in-house expertise. MCV does not have any specific network management or maintenance plan.

f. Details of applications and programming languages

The applications in MCV have been developed using Visual Basic (VB) for the client-server applications and Active Server Pages (ASP) for the browser-based applications. The details on the various modules developed in MCV are provided in **Annex B12**.

g. Details on database system

MCV uses SQL Server as the database software. MCV has one database server and one server for replication and backup. More detailed information on memory, hardware, etc. is provided in **Annex B13**.

h. Details on current network architecture

MCV has a centralized server room located at their head office. The various access points for the IT systems (i.e. the circle offices, banks and bill junctions) have various methods of communication. The head office and the three circles are connected via fibre optic cables. The various Bill Junctions (e-Seva centres) are connected via 64 kbps leased-lines. Some of the banks which serve as collection points have RF based communication systems.

The network infrastructure in a graphical form is shown in **Figure 31**.

i. Internet/Intranet components

Almost all the modules have been developed on a client-server model and are served over the intranet. Further, most of the modules have a web-based informational and reporting system with varying levels of access to data for citizens and Corporation staff. Some modules also provide a web-based transactional interface (such as Complaints Redressal Systems).

j. System interfaces with other systems

The current system does not have interfaces with other software such as EDMS, GIS, etc.

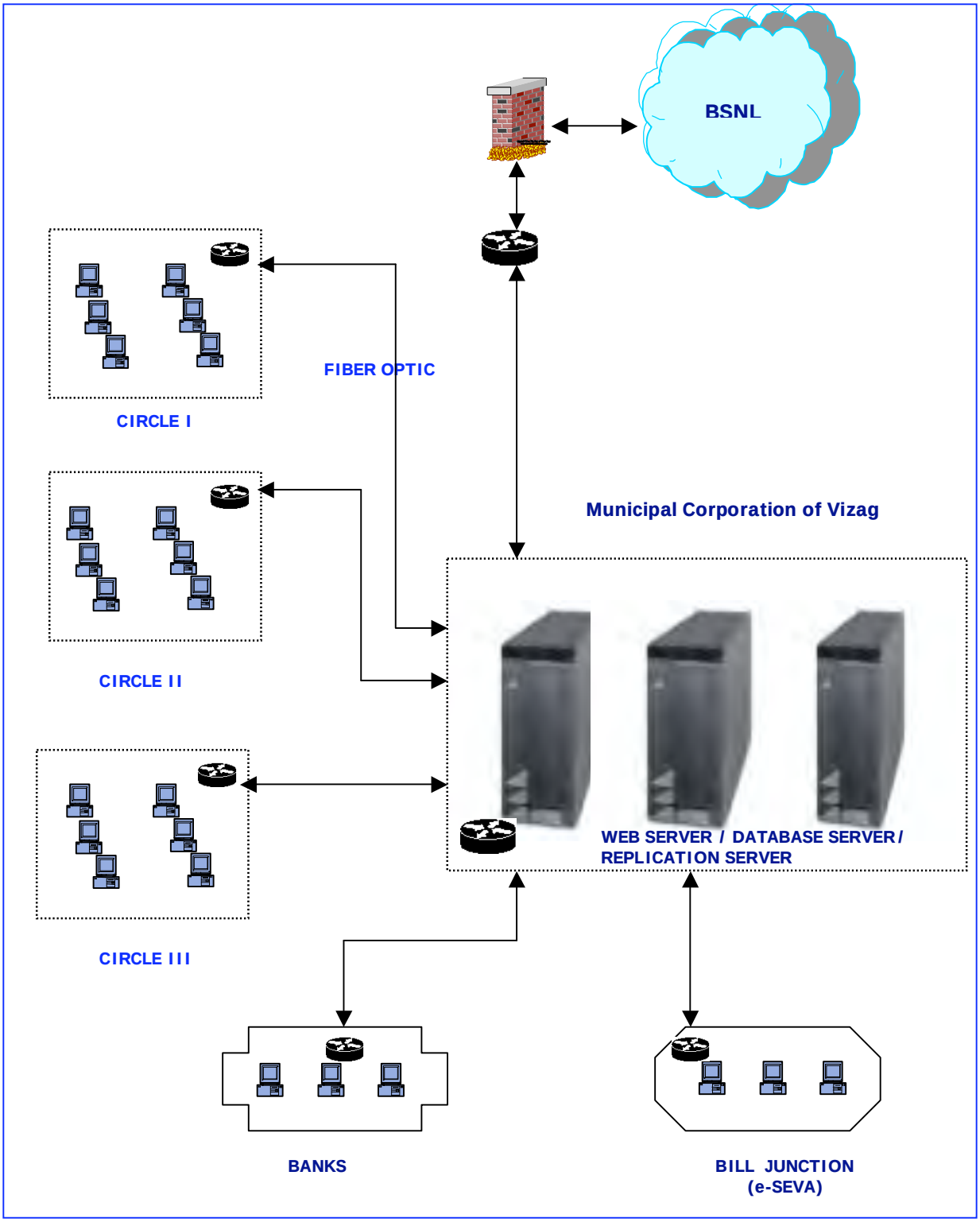
k. Citizen interface

The primary citizen interface in the MCV instance are the e-Seva centres (also called Bill Junctions). These provide a one-stop shop for all collection based services (tax and non-tax). The various certificates issued by the Corporation (like Birth and Death Certificates, building permit sanction, etc.) are issued only at the Citizen Service Centres. The website of the Corporation is good and provides a host of services and access to pertinent information. Overall the web interface improves transparency and citizen confidence.

l. Level of computerization

At present the core operational transactions are carried out electronically at all the circle offices and in a few ward offices.

Figure 31: Graphical Representation of Network Infrastructure



m. Quality of project documentation & user manuals

Project documentation for all the modules of MCV is very limited. However, effort has been taken to at least document some major areas of the system though it does not cover all

aspects of the project in a comprehensive manner. Good effort has been taken to provide clear and simple end-user documentation for almost all the modules at MCV. The documentation is quite readable and provides clear screen by screen coverage of the key usage of the software.

n. Business continuity plan and disaster recovery plan

Data is backed up daily to tape and a weekly backup to CD is done. However, this backup media is kept in the same location. This procedure would serve to protect against hardware faults but would prove to be insufficient in the event of major disasters. There is no evidence of any kind of Disaster Recovery or Business Continuity Plan.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The hardware infrastructure currently in place is adequate as it meets the requirements of performance under current load. The network speed is slightly inadequate and can be increased for improving connectivity. The infrastructure in place has certain issues regarding leased line connectivity, which is being handled by a temporary backup ISDN line; otherwise the infrastructure is stable. The use of client-server systems limits the scalability of the system.

a. Potential of the current application and new application to be integrated/operated/hosted

Integration between the modules is provided to a limited extent. New modules developed can be hosted and operated in the same infrastructure. However, to effect integration, it might be necessary to re-develop bulk of the software.

b. Vendor dependence to independence

All the modules have been developed in-house and therefore the Corporation has complete independence from vendors.

c. Information security management and systems security

On-line payments are not envisaged at this point of time.

d. Systems auditing

There is no evidence of the presence of formal systems audit processes.

5.2 Systems Deployment and Training

a. Project management, monitoring and system development process

The modules are developed by the in-house team. The process adopted for system development is as follows:

- Functional requirements gathering by discussions between Corporation staff and IT department.
- System design.
- System development by IT team.
- Testing by developers.

b. Speed in deployment/procurement - system installation time

The team found that the modules developed by the IT team were developed and rolled-out in moderately good time considering all factors.

c. Implementation approach and plan

The typical implementation approach adopted by MCV is as follows:

- Data entry using contracted console operators.
- Training to staff and this also serves as testing ground for the software.
- Data check and verification by staff.
- Final roll-out.

d. Manpower required to operate the system

MCV has deployed data entry operators at various departments to facilitate the internalisation of the system. It also has some key support staff in the IT department who look after day-to-day operations.

e. Amenability of service delivery through PPP mode

The MCV system has a Collections Module which is deployed at all the e-Seva Centres and bank terminals. (Note: This instance of e-Seva deploying the Corporation's software is very unique in Visakhapatnam and has not been adopted anywhere else in Andhra Pradesh). Thus the system has been adapted to service delivery via the PPP (Public Private Partnership) mode.

f. User training

The user training is taken care of by the IT team. There is no documentation available on the methodology.

g. Support

Due to all development being done in-house, all applications are well supported and maintained up-to-date. The IT department handles all support requests.

5.3 Details on Cost

The available cost details are given in **Table 7**.

Table 7: Details of cost for e-Governance Initiative at MCV

Sl. No.		Particulars	Rs in lakh	Source of funding
1		**COST OF HARDWARE**		
	A	Cost of server class computers and peripherals	25	Visakhapatnam Municipal Corporation
	B	Establishment of local area network within the municipal corporation	25 apprx	Visakhapatnam Municipal Corporation
	C	1. Establishment of metro area network on broadband (capital cost)	20 apprx.	Excel Media Network (stakeholder)
		2. Establishment of metro network on leased circuits	10	Visakhapatnam Municipal Corporation/Starnet Online Services
	D	Establishment of collection centres in banks, including the hardware and furniture	30	Banks
	E	Establishment of the city civic centres	20 apprx.	Visakhapatnam Municipal Corporation
2		**COST OF SOFTWARE**		
	A	Data collection and entry	15 *	Visakhapatnam Municipal Corporation
	B	Software/package development	10**	Visakhapatnam Municipal Corporation
	C	Web site development and hosting	5	Net Savant
	D	Sensitisation, training and other miscellaneous expenses	10	Visakhapatnam Municipal Corporation
		TOTAL	170	
* done in-house and cost indicated as notional ** done in-house in collaboration with a private agency				

5.4 Functionality

The modules developed currently serve their specific purpose of computerization of existing processes and cover the necessary functionality. The user interface is only in English and the need has not been felt to provide local language support in any of the modules. The deployment of these applications has resulted in better realisation of revenue, saving of time for administrative staff, etc.

5.5 Stakeholder Participation

a. Stakeholder usage and ease of access

The usage of the modules is very high by the internal users and citizens in the absence of the manual system in most of the cases. The internal users do not have any issues with access to the system. Furthermore, the citizens have very good access to relevant and detailed information via the Corporation website which is very user-friendly and easy to use.

The facility of submitting the building plan applications and water tap applications through the City Civic Centres and being able to monitor the status of their disposal through the web site has increased the transparency and has brought in accountability among the staff, thereby benefiting the citizens.

b. Cost of accessing

The assessment of this was not possible due to the lack of such detailed data.

c. Popularity

The acceptance and usage by citizens is very high due to the benefits of the system. The citizen satisfaction is very high and the efforts have been lauded. Further, the Corporation staff have also recognized the benefits of the system and have been pro-active in adoption of the new systems.

6. Lessons Learnt

- The coordination between state and ULB level initiatives enables better e-Governance and uniformity.
- Very early start has enabled sustenance (for over a decade).
- Need for arrangements with service providers (for providing quality service) to ensure better liquidity of funds by increased tax collections.
- Literacy and commitment levels affect implementation.
- Dedicated role of bureaucracy (particularly the leadership) helps in proper implementation and sustainability.
- Need for ensuring adequate control while implementing e-Governance for conservation and proper utilisation of the available resources.

Bangalore Mahanagara Palike

1. Linkages of State Level Initiatives to ULB Level Initiatives

In Bangalore Mahanagara Palike (BMP), the resolution to adopt Fund Based Accounting System and the decision to computerize proved to be the trigger for e-Governance initiatives in the Corporation. The early efforts of e-enabling the processes in accounting were taken forward slowly to other functions. Seeing the success achieved in terms of establishment of tight and transparent systems proved to be an inspiration for the state to attempt to achieve similar progress/results in other parts of the state via the 'Nirmala Nagara' program.

Further, the BMP case has also proved to be a success in terms of the pioneering establishment of a PPP model for e-Governance (through the involvement of BATF). This ground-breaking approach has also been the base for the state level arrangement with E Governments Foundation by the State Government in its program and has proved to be a clear differentiator (at least in terms of cost).

The initiatives in BMP started in the year 2000 and the focus was on financial accounting reforms. The formation of Bangalore Agenda Task Force (BATF) by the then Chief Minister, bringing in the experts and leaders in industry to participate in governance exercise proved very fruitful both technically and financially. The BATF consisted of prominent citizens and IT leaders of the state; through its corpus the BATF funded the design and implementation of the Fund Based Accounting System (FBAS) in the BMP. Until 2003 the complete reformation was funded by BATF by appointing consultants for the exercise. The accounting reforms included a gamut activities right from drafting of accounting policies, drafting/passing of accounting regulations, preparation of accounting manuals, design and implementation of FBAS software along with linkages to revenue collection, works management and monitoring, bottom-up budgeting, etc. The key aspects of the reforms were establishing relationship with bankers for providing timely information, MoU with Finance Department of the State for release of funds (grants) based on the achievement of FBAS implementation milestones, etc. This BMP experiment paved way for the understanding of all aspects of reforms for the municipal sector. This experience has been the base for the State to draw up the Nirmala Nagara Plan for enabling e-Governance initiatives in 57 municipalities.

The corporations in Karnataka come under the Karnataka Municipal Corporations Act, 1976 as against the Karnataka Municipalities Act, 1964 which cover the non-corporation ULBs. Also, the 1976 Act empowers the Corporation Council to decide its own accounting system. Hence the Government intervention/approval was not mandatory for migration to the new system. However with regard to approval of the Accounting Regulations, etc. the approval of the Urban Development Department (UDD) was required. The Directorate of Municipal Administration (DMA) that works under the UDD has taken the artefacts of the BMP experiment as a base for the state level municipal reforms.

2. Organization Structure

2.1 Objective of the e-Governance initiative

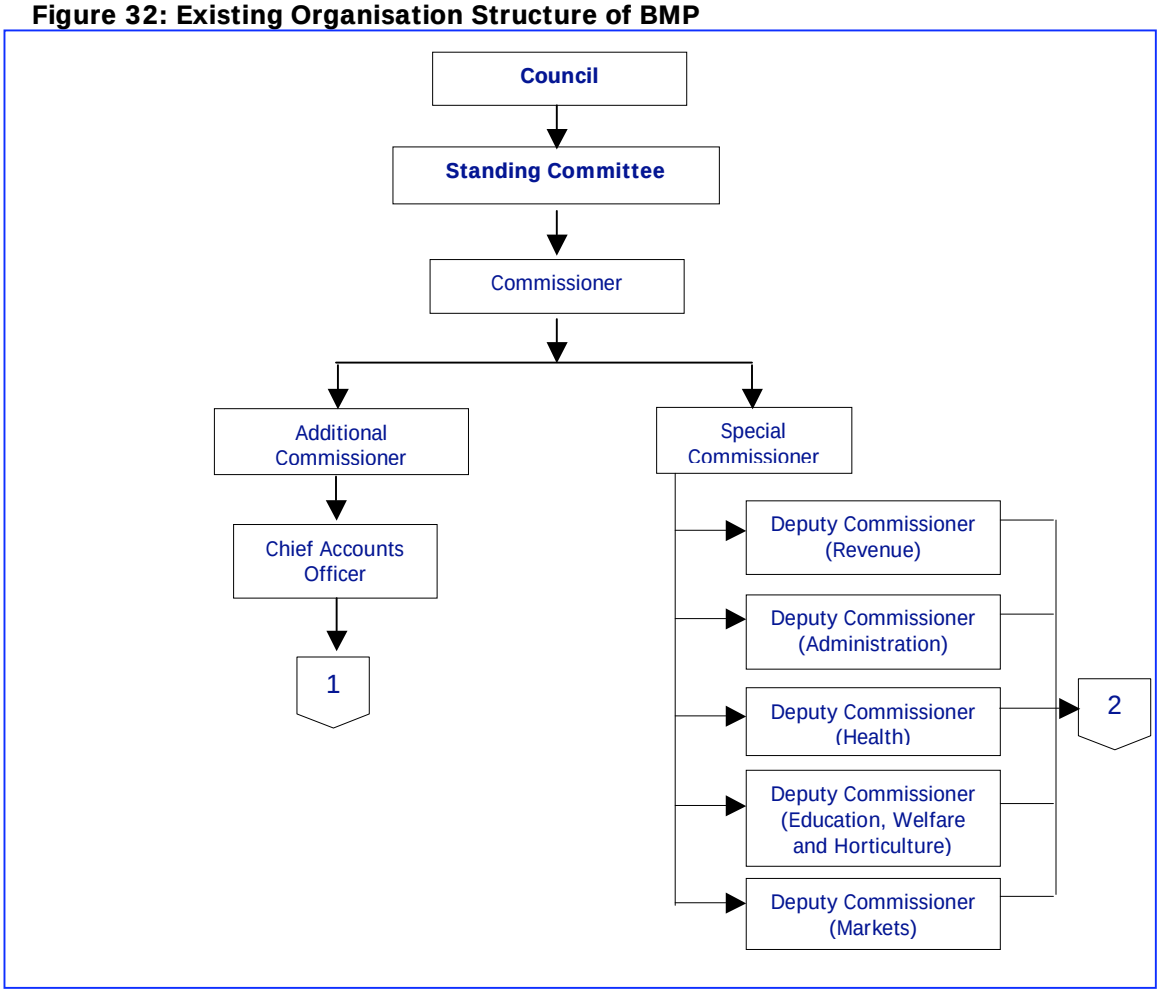
The overall objective of Karnataka towards e-Governance is to enhance and promote the use of information and communication technologies in the functioning of the Government to make the required information available to the citizens and to provide all services in an efficient way on an online basis. Following the same lines, BMP's objectives of e-Governance initiatives are to transform the city government processes into citizen-centric and citizen-friendly processes. The vision is to make BMP as one of the comparable modern organizations, which will enable

citizens, departments and other franchisees to interact with BMP without difficulty and to get services round the clock.

2.2 Organisation Structure

The City Municipality and Cantonment Municipality were amalgamated to form the Corporation of the City of Bangalore in December 1949. The Bangalore City Corporation is the fourth largest metropolis in the country covering an area of about 226 kms with a population of 4.3 million.

Figure 32: Existing Organisation Structure of BMP



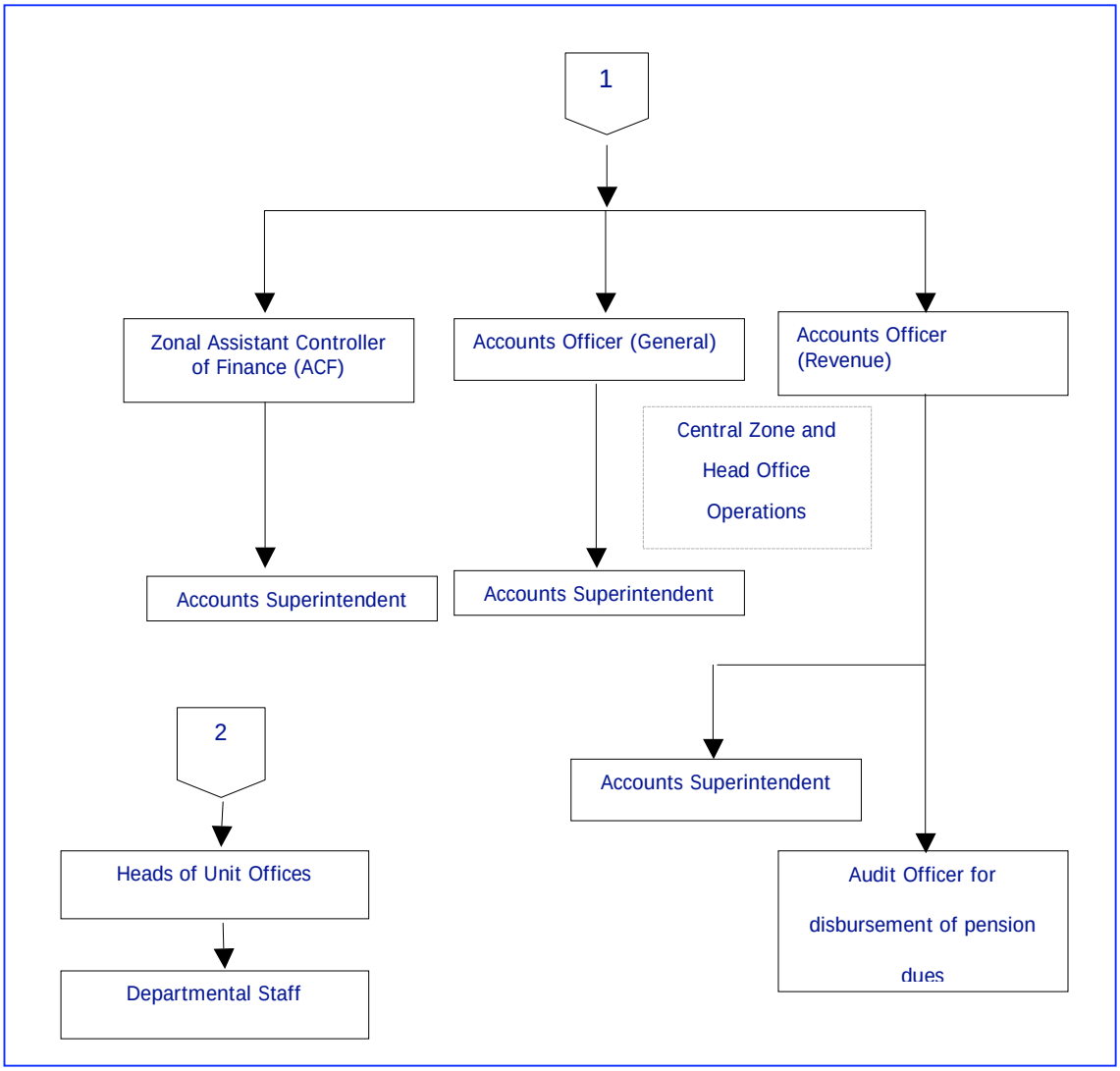


Figure 32 shows the organisation structure of BMP. The Council is the highest level of authority with regard to BMP. The Standing Committee advises and informs the Council in all operational matters of the BMP. The Commissioner, who heads BMP is directly involved in the day-to-day functioning of the ULB. Below him is the Additional Commissioner for Finance, Special Commissioner, the Deputy Commissioners with charge of various functional departments of BMP, and the Chief Accounts Officer for the accounting operations.

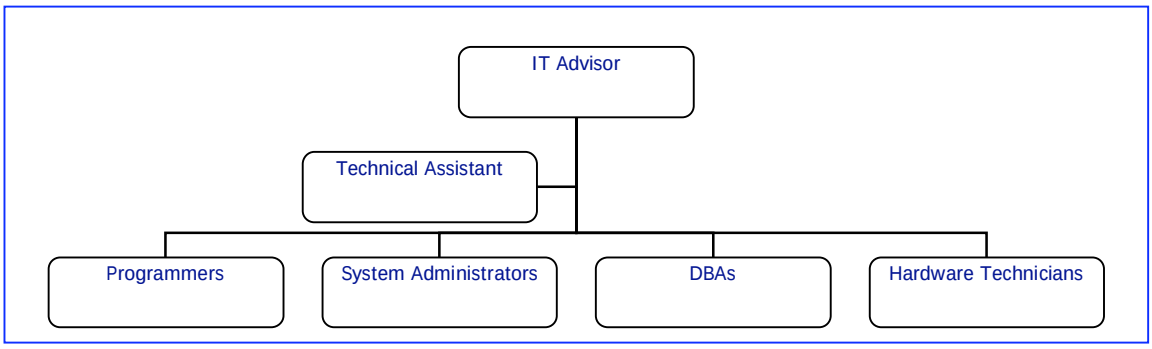
The Chief Accounts Officer is assisted by the Zonal Assistant Controller of Finance, and Accounts Officers in charge of various areas, who are in turn assisted by Accounts Superintendents. The Accounts Officer in charge of Revenue is assisted by an Audit officer whose main duty is the disbursement of pension dues of people. Deputy Commissioners discharge their duties with the help of various Heads of units and the departmental staff working under them.

2.3 New Organisation Structure

As a result of the e-Governance initiatives, an IT Dept has been formed in BMP to take care of design and implementation of various initiatives across BMP. The IT department consists of a Advisor (deputed from ISRO), supported by technical assistants, programmers and hardware

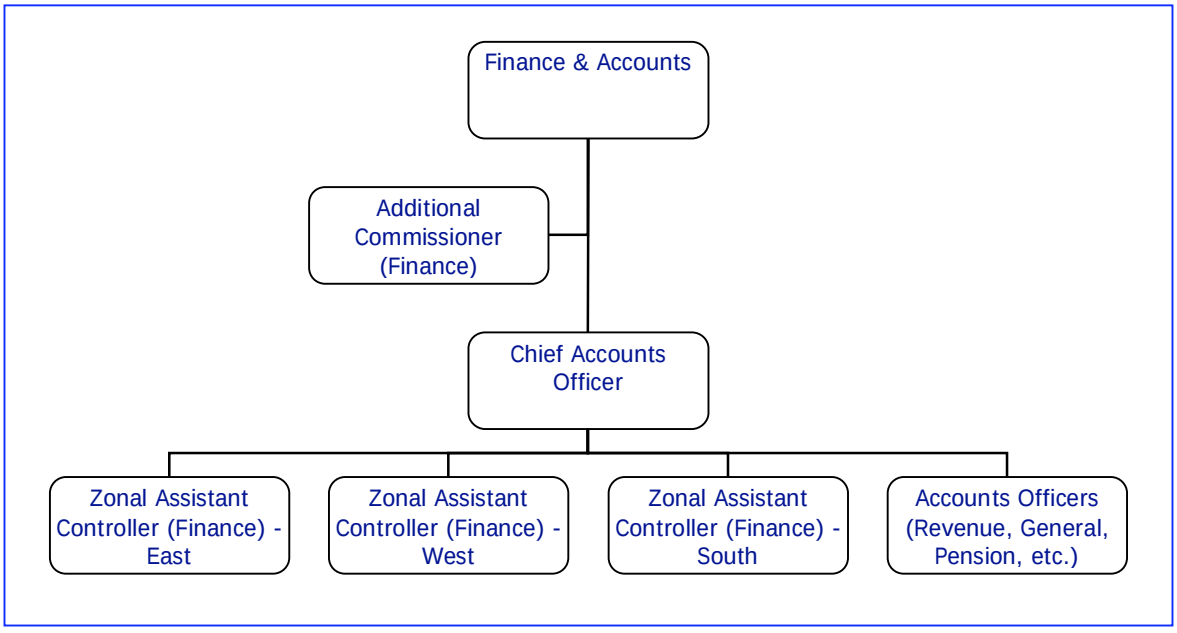
technicians for various areas like systems administration, database management, etc. All the staff are on contract basis and are not permanent staff of BMP. **Figure 33** shows the IT department, which is an addition to BMP in the recent times. This new department has been coordinating with all the functional departments to provide them with IT infrastructure as per BMP plans, provide support for identification of software requirements, arrange for evaluation/procurement/development of the hardware/software, handle hardware maintenance and trouble-shooting. The presence of this new structure has greatly helped the BMP in furthering its e-Governance implementation plans.

Figure 33: IT Department in BMP



The FBAS implementation at BMP has also triggered certain changes in the organisation structure of BMP, as decentralisation and process reengineering were part of the reform programme. As a result of FBAS implementation the following new structure has evolved in the Finance and Accounts Department of BMP which is shown in **Figure 34**. The zonal structure has been added now to handle decentralised accounting.

Figure 34: Finance and Accounts Department in BMP



As a part of implementation of FBAS, certain new posts were created namely, Additional Commissioner Finance and Zonal Assistant Controller Finance, with specific job descriptions covering roles and responsibility. Information and document flows were also streamlined as part of the implementation process. Certain control aspects were introduced as a part of this initiative.

2.4 Decision Making Process within the ULB

The policy level decisions within the BMP are taken by the Council and all matters of this nature require to be presented to the Council for their approval.

a. Commissioner

The Commissioner is in charge of policy level decisions for all administrative purposes and for the overall management of the Corporation. He also coordinates with the elected representatives, council, standing committees, etc. The Commissioner takes all major decisions regarding the Corporation and acts as a channel between the elected representatives and the administration.

b. Additional Commissioner Finance

The Commissioner is assisted by the Additional Commissioner (Finance) for policy level decisions related to finance management and budgeting. The Additional Commissioner heads the finance department and controls the accounting and budgeting functions. The Additional Commissioner also takes decisions on matters relating to the coordination with banks, financial institutions, etc.

c. Special Commissioner

The decisions regarding solid waste management and health sections of the Corporation are taken by the Special Commissioner. The Special Commissioner also takes in areas not relating to finance covering certain activities, specific projects and functions as delegated to him by the Commissioner. The Special Commissioner also has overall control of various departments of the BMP.

d. IT Advisor

The IT Advisor is in charge of all IT initiatives in BMP. Also, he controls over the ongoing e-Government initiatives and the management of the IT activities of BMP. The IT Advisor assists the Commissioner and Additional Commissioner Finance in decisions related to hardware and software procurement and those involving introduction of technology. initiatives.

2.5 Distribution of Roles and Responsibilities in BMP

The roles and responsibilities of the officials according to the hierarchy in the organisation structure play a vital role in deciding the governance of the ULB.

- Council.
- Standing Committee.
- Commissioner.
- Additional & Special Commissioner.
- Deputy Commissioners of various departments.
- Chief Accounts Officer.
- Zonal Assistant Controllers of Finance.
- Accounts Officer.
- Accounts Superintendent.
- Audit officer – pension.
- Heads of Unit Offices.

3. Key Municipal Functions

3.1 Municipal Functions of BMP

The functions of BMP can be broadly classified as Obligatory and Discretionary. Obligatory functions are those that have to be performed by the Corporation as per statutory requirements and Discretionary are those that are provided as additional services to the citizens to improve the quality of their living.

a. Functional domain

i. General administration

The functions under this section deal with the overall administration of the Corporation. As the name denotes the function of this department/section is to provide support to all the functional departments and the Commissioner's office for the day-to-day administration of the Corporation. The department also handles providing information to the public in matters relating to taxes, transport, housing, educational facilities, etc. In addition, maintenance of various personnel and legal records of the Corporation are some functions handled by the General Administration.

ii. Core functions

These are functions that have been identified as 'core' due to the importance they have in ensuring a safe and healthy environment for the city dwellers. Provision of street lights, sanitation facilities and drainage/sewerage facilities to all residents are some of the key functions in this regard. Garbage removal and spraying of disinfectants in all residential and commercial areas are the other functions that ensure a better quality of living for the inhabitants. In addition, the Corporation also handles professional town planning so that the residents are provided with the required residential environment.

In order to perform the above functions and related ones, the BMP is divided into departments. The departments in BMP are:

- Estates and asset management
- Statistics
- Revenue
- Markets
- Advertisements
- Horticulture
- Education
- Welfare
- Health
- Town Planning
- Solid Waste Management
- Engineering – Zonal and Projects
- Storm Water Drains
- Electrical

iii. Miscellaneous functions

The BMP also executes projects on behalf of the State and Central Government and other agencies as part of its fiduciary activities.

b. Fiscal domain

Karnataka Municipal Corporations Act, 1976 provides for levying of a number of taxes, duties, charges, etc. by the Corporations of the state to finance its functions and services. Major ones are:

- Tax on land or buildings popularly known as Property Tax.
- Toll on vehicles other than Motor Vehicle Tax.
- Tax on advertisements.
- Entertainment tax.
- Surcharge on stamp duty.

The last two taxes are shared with the State. In addition to the above, Corporation receives grants from state governments and also raise revenues through non-tax sources such as user charges, betterment charges, building license fees, penalty for late tax payment, rent from properties, interests from deposits, profits and other money accruing by gifts or transfers from the government or private individuals or otherwise, etc.

The above functions in BMP are carried out by various departments like Revenue, Engineering, Markets, etc. The complete accounting and financial planning of these departments are done along with the Finance and Accounts department of BMP.

3.2 Processes and their Linkages

Each of the above discussed functions is discharged through processes that enable timely and efficient delivery of services. It is important that there is smooth data flow in order to facilitate these processes. The processes of the municipal functions that have been brought under the e-Governance initiative are discussed here. Software application modules have been developed in the following areas to enable smooth functioning of BMP

- Fund Based Accounting System.
- Property Tax.
- Works Management Systems.
- Geographic Information System.
- Birth and Death Certificates.
- e-Tendering.
- Time & Attendance.
- Public Grievance Redressal System.

Of the above functions/modules some of them like FBAS and Property Tax have been implemented and modules like birth and death, e-tendering are being implemented. GIS is slowly getting built up. Based on the levels of implementation the linkages of various processes have taken place. For instance the Property Tax module is linked to FBAS. This means that all the property tax collected gets accounted in the FBAS by interfaces provided between the systems. Though there are certain hiccups faced with regard to the collections made at the collection counters, the system has been set. This has influenced the reduction of accounting the same through manual processes. Similarly various revenue collections (from various departments) are accounted through manual/electronic transfer of data on a daily basis. This way the property tax, birth and death certificate and time and attendance data through payroll get into the accounting process. Another process that has been integrated is the works management system. The complete coded works details are dovetailed to accounting system and any time the liabilities of BMP towards works is clearly and completely known. E-tendering

is independent though it is expected to greatly influence the paper based system. GIS is yet to be integrated and the process of master creation/testing is currently underway; once the base data is made available and linkages to other modules provided, the power of e-Governance at the BMP will enhance considerably. Public grievance redressal system is under implementation.

3.3 Modules in Bangalore Mahanagara Palike

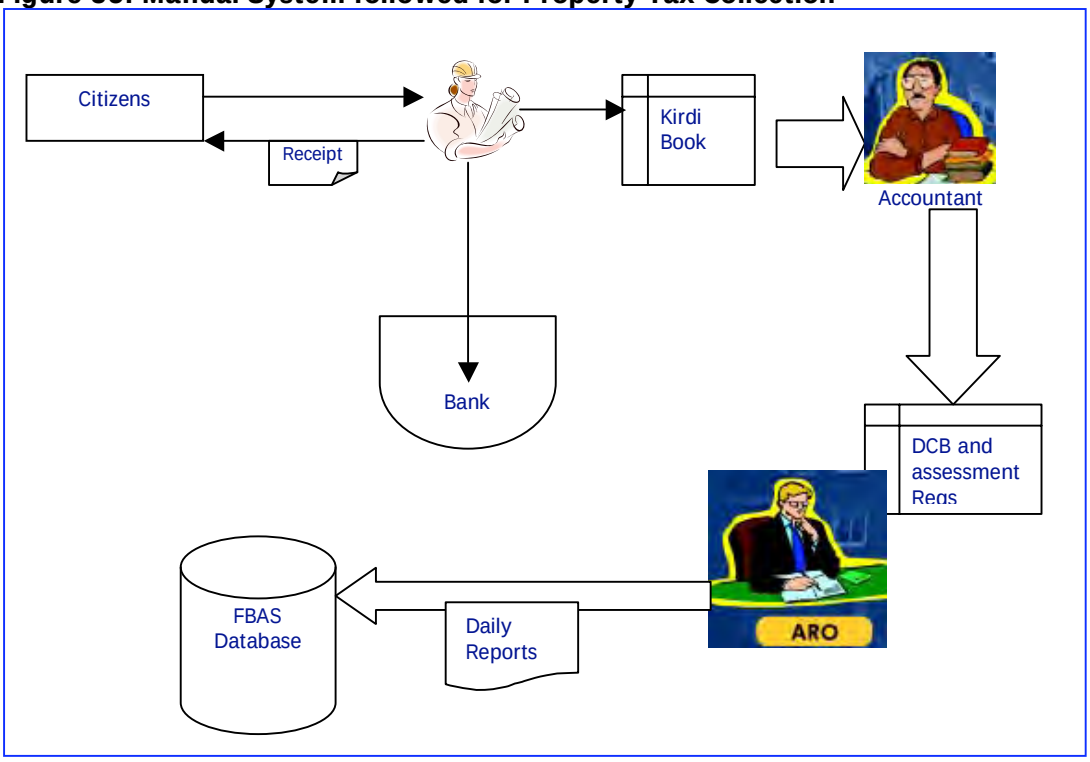
a. Property tax

The Property Tax module is in use in BMP since 2003. A database of all assessees has been created. This system enables the citizens to pay their property taxes anywhere in the city irrespective of the ward they reside. It also generates an instantaneous receipt for the tax paid and the property record is updated with details of the amount paid. A Khatha Certificate can also be obtained by the citizens directly by paying the required fees. The system also enables calculation of annual demand of property tax for each property. As part of the implementation exercise one time updating of the database was taken up. The long term plan is to integrate this module with the GIS module which is under implementation in BMP. The software for the Property Tax module was provided by E Governments Foundation.

Processes and procedures followed

The manual system and the modified system implemented in BMP are shown in **Figures 35 and 36.**

Figure 35: Manual System followed for Property Tax Collection

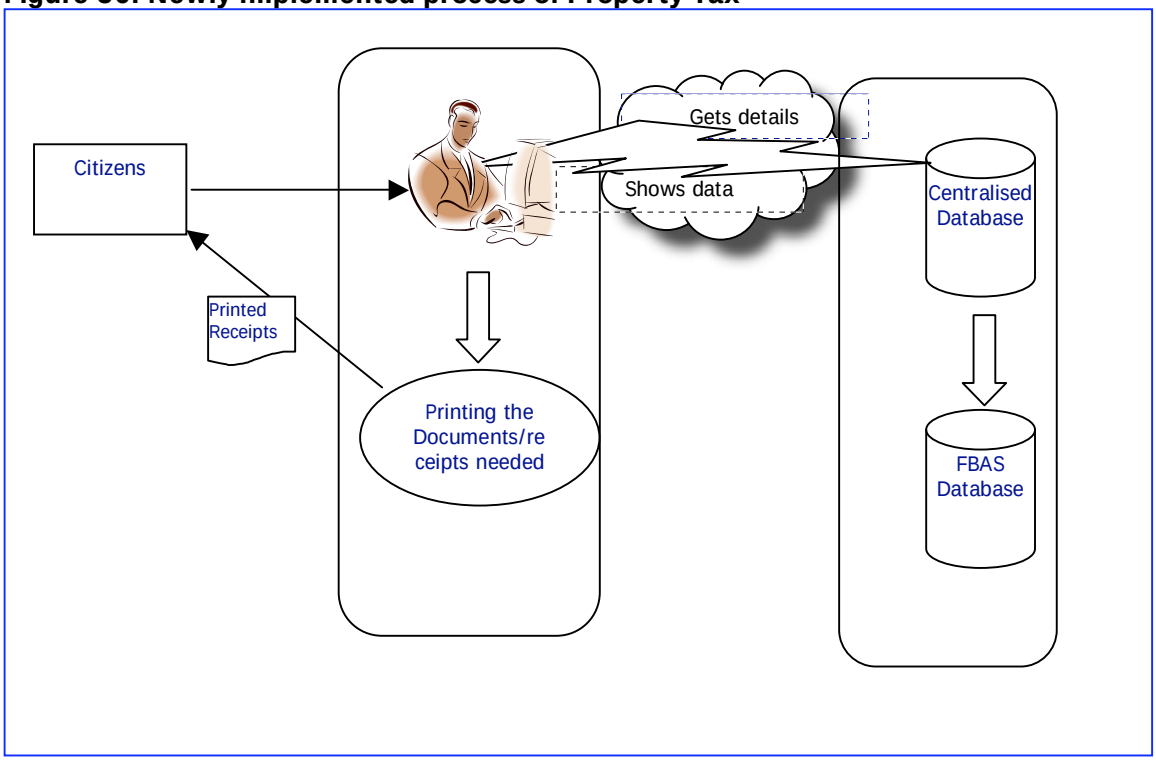


Former process measures vs. redesigned process

Previously, assessment of properties and collection of property tax were done using manual procedures. The bill collectors used to visit the citizens in their wards for collection

of property taxes. Some citizens used to visit the Ward Offices, for payment of property tax. This led to delay in the processing and receipt of payments. Moreover, there was huge time delay in information flow to the accounts department of BMP. In the current system, Citizen Service Counters have been established by the BMP, where the citizens pay their taxes. The citizen gets an immediate receipt for the taxes paid. This information, stored in a single database, is used by the Revenue department for MIS. However, this is still not completely integrated with FBAS.

Figure 36: Newly implemented process of Property Tax



Process outputs

i. The module prints out a receipt for amounts received.
ii. Khatha Certificate and Khatha Extract are also printed.
iii. A daily Kirdi (Cash summary) report is also printed and used by the operational staff.
iv. The module does not provide any other MIS report.

Impact of laws and regulations

There is no major restructuring of activities as a result of introduction of the Property Tax module necessitating changes in governing rules and regulations. Online payments are not being contemplated at the moment. However there is no security policy of the BMP as of now either for the Property Tax or the other modules.

Functional areas covered

The Property Tax module is in operation in the Head Office and in 30 ARO Offices across the City. It is also in operation in four Citizen Service Centres across the City. Functionally, the Property Tax module covers the Revenue Department. It is yet to cover the functions of Finance Department, which would mean automatic updating of records and providing variance reports.

Strengths and weaknesses of the system

Strengths

i. The database has been refined over the last two years and is relatively free of errors.
ii. The module can be used for Self Assessment Scheme (SAS) collections and office collections.
iii. This module has made the life of the citizens easier since it is user-friendly. A survey conducted during the Study also corroborated this claim.

Weaknesses

i. The necessary Process Reengineering which should have accompanied the implementation of such a module has not been fully done.
ii. While the system is citizen-friendly, it has resulted in avoidable duplication of work to the internal staff like filling up of challans to deposit money collected even though a system generated challan is available.
iii. The system has not achieved full integration. Accounting entries for amounts collected have to be passed separately in the FBAS since the two modules are not yet integrated. While increasing the workload on the operational staff, this also compromises on control aspects.
iv. There is no established MIS reporting. Only a few reports (like the Kirdi Book) are enabled.

b. Geographic Information System (GIS)

BMP has developed a GIS in-house. The GIS in BMP has completed a pilot run in one ward and will be scaled up to cover the entire city. ISRO has been brought in as a partner for this project. The GIS in BMP appears to be more comprehensive compared to the one being implemented by the DMA under the Nirmala Nagara Programme. It uses satellite imagery to capture spatial information and uses it for property tax administration, street and property numbering, works management, etc. The idea is to make the GIS and FBAS the central modules and build all modules around and interacting with, these two modules.

A detailed analysis has not been possible since the system is yet to be implemented. Functionally, the GIS in BMP is expected to cover the Revenue and Engineering departments.

c. Birth and Death Module

The Birth and Death Module which was developed by BMP in-house is used to record births and deaths and issue certificates. The database of records has been built up for the last 54 years for births and 34 years for deaths as part of the implementation process. External agencies were given the task of updating the records for the previous years.

The main features of this module are given below:

Processes and procedures followed

The process followed earlier and the one followed now are shown in **Figures 37 and 38** below.

Figure 37: Manual Process in Birth and Death Module

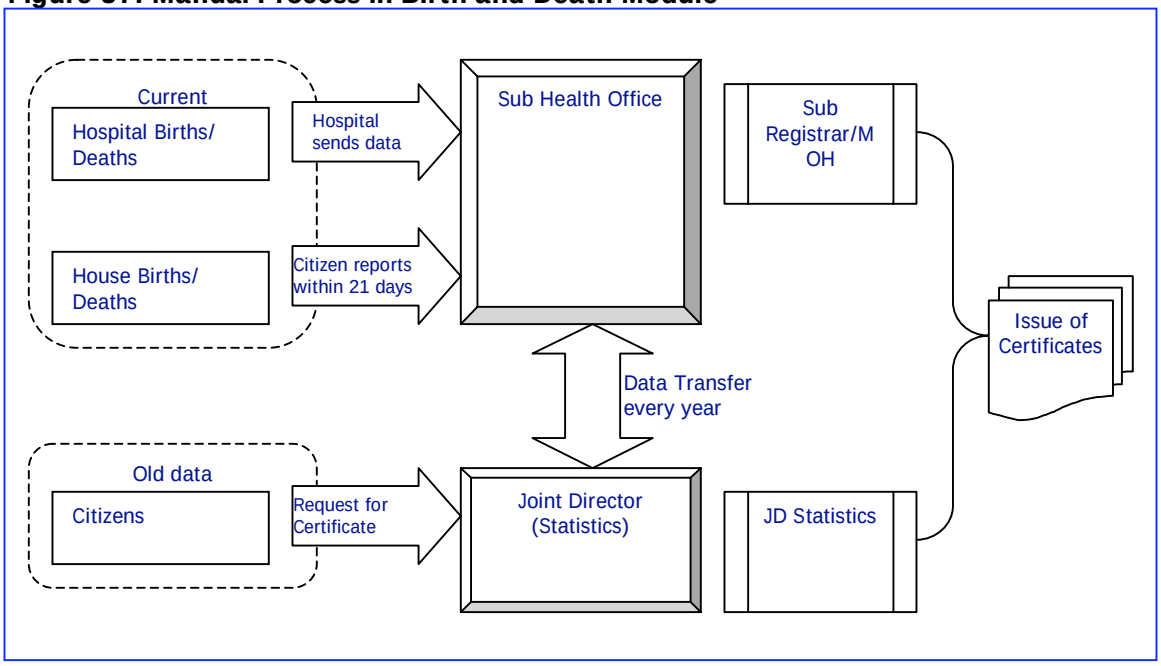
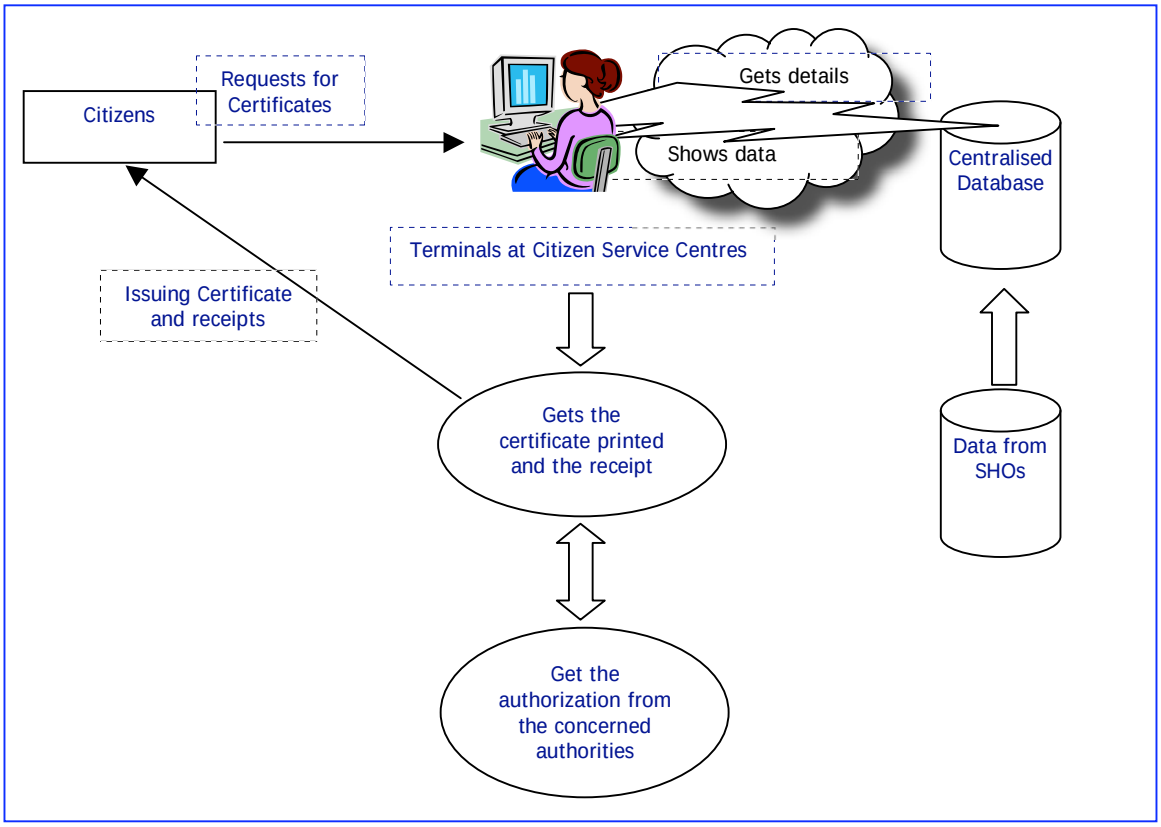


Figure 38: Newly implemented Process in Birth and Death Module


Citizens
Requests for Certificates
Gets details
Shows data
Centralised Database
Terminals at Citizen Service Centres
Issuing Certificate and receipts
Gets the certificate printed and the receipt
Data from SHOs
Get the authorization from the concerned authorities

Former process measures vs. redesigned process

Previously, birth and death certificates were issued following manual processes. When a applied for these certificates, the process of verification with records, verification with the office of Registrar would take time. In the redesigned system, the citizens apply for a certificate at the Citizens Service Counters. This application is verified by the Central database, which also contains the data sent by Sub health offices. After verification, the certificate is sent for authorization from the concerned officials and given to the citizens.

Process outputs

i. The module prints a receipt for amounts received.
ii. A citizen can also obtain a birth or a death certificate by paying the applicable charges. Such certificates are printed on pre-printed stationery.
iii. A few MIS reports are also built into the module.

Impact of laws and regulations

No major changes were necessary in the existing rules and regulations. Online payments are not yet planned for the Births and Deaths modules. A formal security policy is to be drafted.

Functional areas covered

The Birth and Death module is operational in the four Citizen Service Centres in the city. It affects the Statistics Department. It is yet to link to the Finance Department.

Strengths and Weaknesses of the System

Strengths

i. Has reduced time delay in the generation of certificates.
ii. Provides a one-stop source of information for past births and deaths.
iii. Reduces harassment of the citizens.

Weaknesses

i. Very little process re-engineering has been done to streamline the processes. A major portion of the activities are still dependent on human intervention which could have been automated.
ii. The reporting module is weak in terms of the number, coverage and utility of the MIS reports. For example, status checks have to be done manually by generating reports and reminders have to be sent in the traditional file movement system.
iii. Even though records are available for the last five decades, computerized certificates are issued only for the births and deaths occurring in the last four years.
iv. It is not integrated with the FBAS module.
v. The entire process of implementation is not being supported by sufficient documentation.

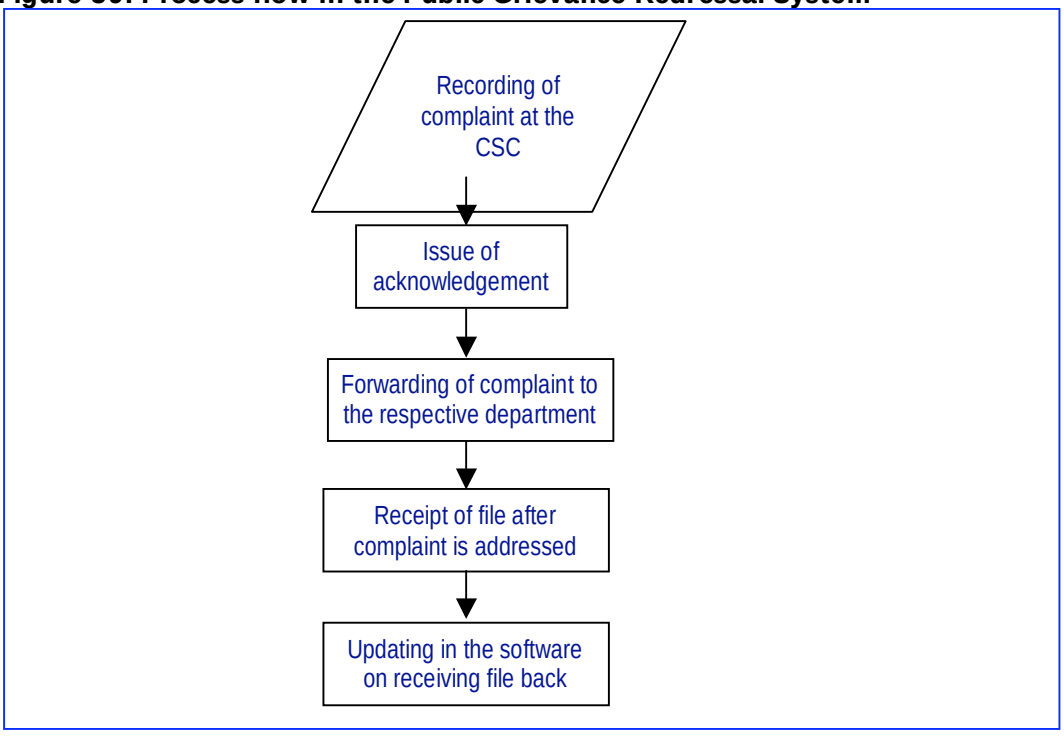
d. Nivarana – Public Grievance Redressal System

This system was developed in-house. This system enables the recording of citizen complaints, forwarding to the respective officers concerned, updating, and reviewing the status of the complaints. Even though the system is in operation in BMP for the last one year, it is not being widely used. The main features of this initiative are given below:

Processes and procedures followed

The general process flow of the Public Grievance Redressal system is given in **Figure 39**.

Figure 39: Process flow in the Public Grievance Redressal System



Process outputs

i. An acknowledgement is generated and issued to the citizen as soon as the complaint is recorded. The complaint number serves as the key for further processing. A complaint forwarding sheet is also prescribed which is printed out and physically sent.
ii. MIS reports showing the status of complaints, statistical analysis of complaints, etc. are also provided for in the system.

Impact of laws and regulations

The system is too superficial to affect any laws or regulations in force. System and Information Security policies are yet to be designed.

Functional areas covered

The system covers complaints received pertaining to all departments of the BMP. However, the same is in operation only in the Head Office.

Strengths and Weaknesses of the System

Strengths

i. Simple and user-friendly system.
ii. Enables the citizen to keep track of the status of his complaint using the complaint number.

Weaknesses

i. Apart from generation of the complaint number and acknowledgement, most of the activities are manual.

ii. The screens for forwarding of complaints, status updating, etc. are all post-mortem activities. These events are updated based on physical file movements and are recorded as and when the events occur.

iii. Automatic escalation of complaints is not handled in this module. Also reminders are in the form of reports which are generated by the counter clerk and a print-out is forwarded to the person concerned.

e. Fund Based Accounting System

The initiative was taken by the Bangalore Agenda Task Force (BATF) under the Chairmanship of a leading software company CEO. BATF was an advisory body formed by the then Chief Minister to foster Public Private Partnership (PPP) for betterment of functioning of a select set of governmental organizations in the city. BMP is one of the partners of BATF in this regard. The funding for BMP initiatives with regard to FBAS was provided by the BATF. The financial/accounting reform initiatives at BMP were aimed at two very clear objectives:

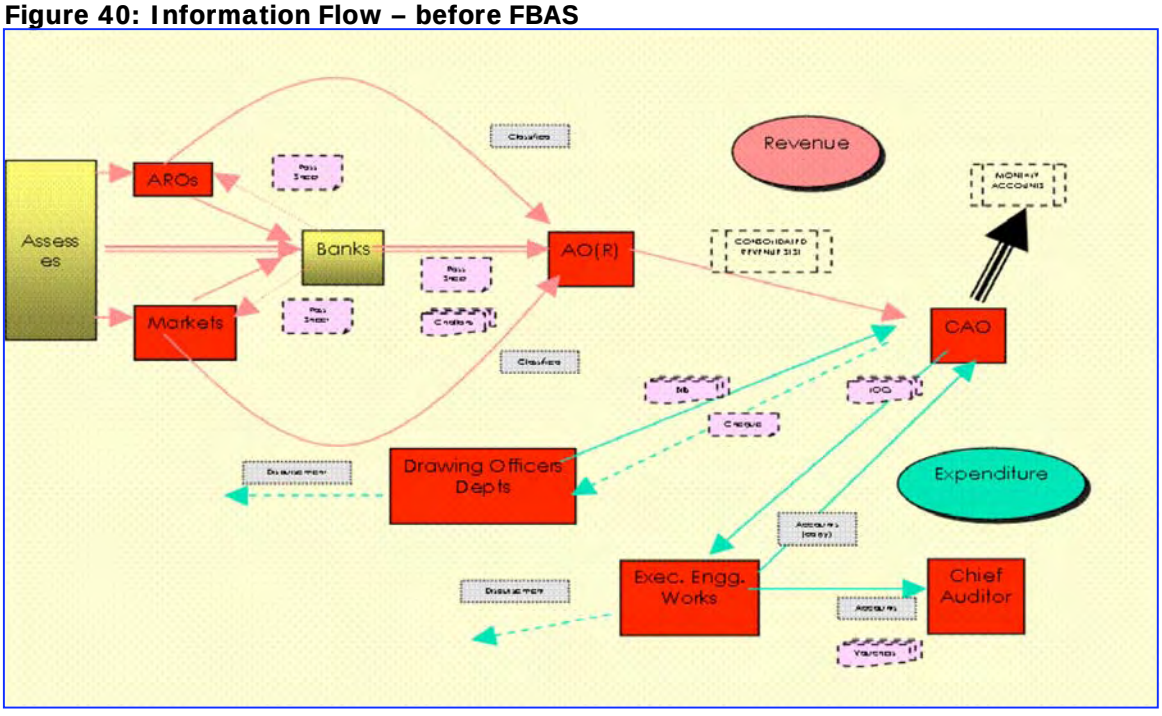
i. To implement Modern Accounting System as per the tenets of the 74th Amendment to the Constitution of India.

ii. To enable BMP manage the new system independently.

Processes and procedures followed

The process flows before implementation of FBAS, and after the same are shown in **Figures 40 and 41**. The main features of this initiative are given below:

Figure 40: Information Flow – before FBAS



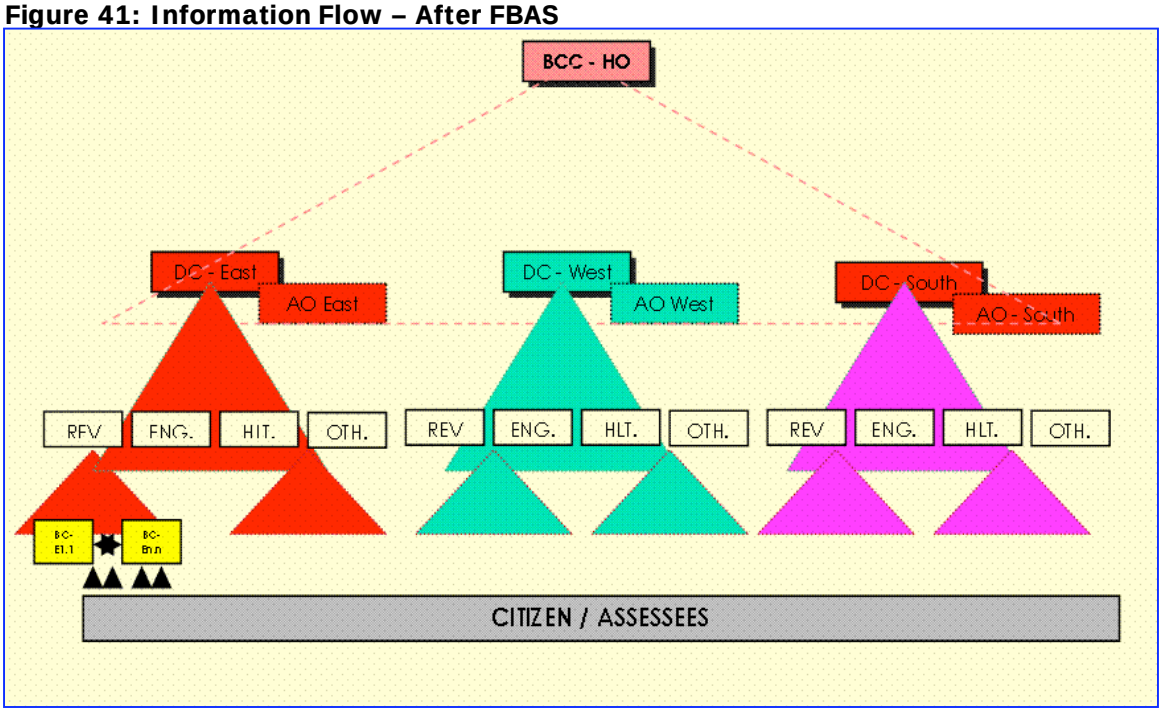
Former process measures vs. redesigned process

Earlier, Accounting was totally done manually without requisite controls. Cash accounting system was followed and the transactions were not recorded completely. There was lack of structured information flow from revenue offices, banks on revenue collections. There

was no single database as the data had to be compiled from various registers and records manually in various offices. This also led to multiple data flow to management, resulting in confusion in decision making. Also, reconciliations were not done in a scientific manner. No accounting manual or regulations were available to guide the accounting process.

In the redesigned process, the FBAS Accounts Regulations 2001, have been passed and FBAS Accounting Manual prepared to guide the accounting process. The time lag between the occurrence of the transaction, its recording and its analysis has come down drastically. Earlier the accounts of the BMP remained incomplete for a substantial period after the close of the financial year. Now BMP presents its accounts for public discussion on a quarterly basis general in the month following the quarter end.

Figure 41: Information Flow – After FBAS



Process outputs

i. The major outputs of the System are the Balance Sheet, Revenue & Expenditure Statement, Cash Flow and related Financial Statements generated by the system automatically.
ii. The Management of BMP is using a wide range of system generated MIS reports (over 50 in number) to carry on the day-to-day administration. MIS reports have been designed to cater to the individual needs of each level of management separately.
iii. BMP has been regularly publishing its half yearly results in leading financial dailies.
iv. Budget Variance reports are used by the management for analyzing the performance against their budgets.

Impact of laws and regulations

To give a legal backing to the system introduced and to ensure sustainability and continuity, the BMP Accounts Regulations were passed in 2001 and were adopted by the BMP Council. The BMP has also framed Accounting Policies and Budget Regulations.

Functional areas covered

i. Accounting and Financial Management (Finance).
ii. Budget & Controls (Finance & all line departments).
iii. Financial Management in other Departments also like Revenue, Health, etc.
iv. Works Management (Engineering Department).
v. Bills Payable & Receivable (Finance Section).
vi. Assets and Liability Management (Estates & Projects/Finance respectively).

Strengths and Weaknesses of the System

Strengths

i. The implementation was accompanied by suitable process re-engineering which has resulted in streamlined information flows.
ii. FBAS ensures correct and complete accounting of all transactions taking place in the Corporation.
iii. There is widespread acceptance among the Corporation staff about the need for FBAS.
iv. FBAS enabled MIS caters to information needs of different levels of Management.
v. Revenue and expenditure information is accounted on a daily basis with minimum delay.
vi. FBAS model has been accepted and is under replication across all ULBs in Karnataka.
vii. The key success factors are:
    - Clear mandate from the State Government for initiating the change, and will of the BMP Management;
    - Committed external change agents: BATF and NCRCL (design and implementation consultants);
    - Well planned technical content;
    - MIS initiated for operational aspects enabling users to take part in the change;
    - Frequent reviews by BATF and BMP;
    - Full funding made available in one shot by BATF;
    - It was not just an accounting exercise but shifting of accounting from terminal to core activity.

Weaknesses

i. The FBAS software is more than four years old and is not web-based.
ii. While the operations and decision making in the Finance Department have been decentralized, the core accounting function is still centralized.
iii. FBAS in its present form does not provide for accounting of online payments.
iv. Bank reconciliation is not an integral part of the FBAS software.
v. FBAS is not integrated to the other modules running in BMP, though such provisions have been made in the FBAS software.

f. Computerized Works Management System

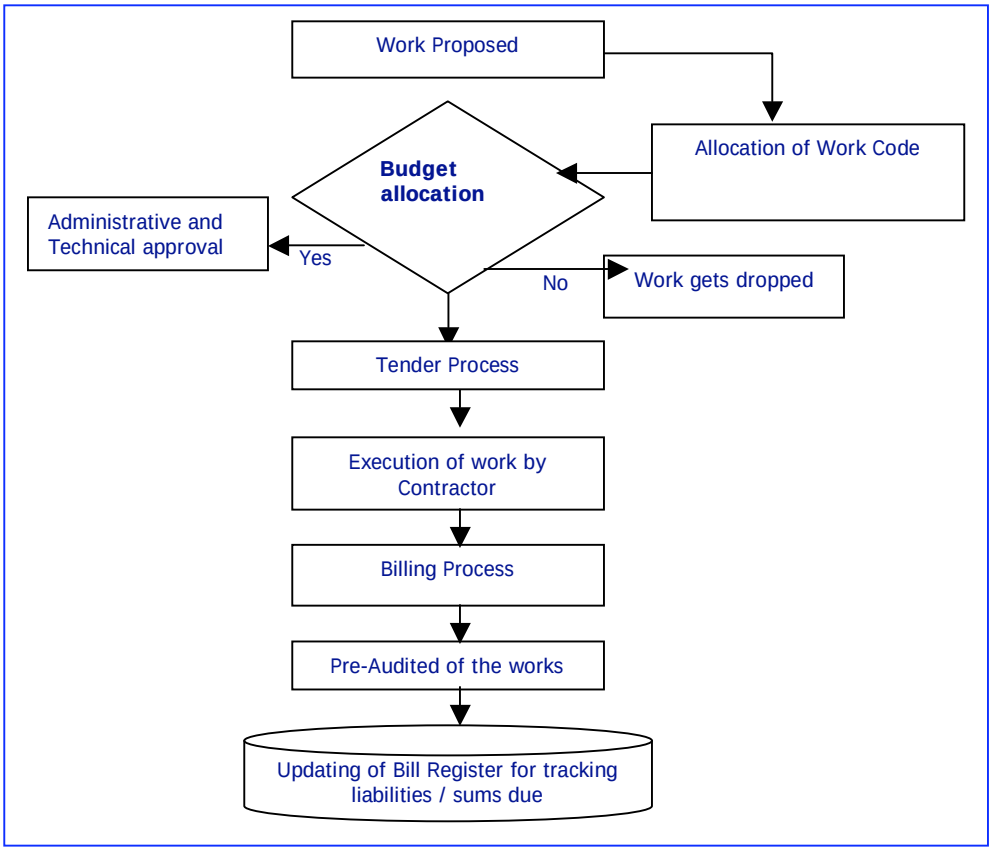
The Works Management System was implemented in BMP as a part of Fund Based Accounting System. The objective was to completely streamline Ward Works management, to provide liability status of individual ward works and to provide information to various stakeholders (staff, citizens, elected representatives) on the status of individual ward works. All the works pertaining to Zonal Engineering and 7 other departments (like Projects, Electrical, Solid Waste Management, etc) are covered under CWMS. Presently, a database of 24000+ works is built in the CWMS and annually about 6000+ works are added to the database.

Former process measures vs. redesigned process

Previously, there was no system for management of works. The engineering works were taken up by the engineering department as per the budget documents. The head of Engineering department was not having precise control over the works being undertaken and executed. In the current system introduced, all the works being undertaken and in progress in various stages, are tracked using a single database. This database is used by the Management for review and decision making. Earlier, the department did not even know the number of works being executed at a particular point of time. In the current system, a unique 14 digit work code is assigned, by the software based on input of various work related details, to each and every work which helps the database keep track of ongoing works as well as closed works. Comparative analysis of works related information across geographical segments/functional departments has become possible. In the redesigned process, the processes relating to accounts and the engineering sections are interlinked. For example, no payment for a civil contractor is made until a work code is given for the work executed.

A general procedure of CWMS is represented in **Figure 42**.

Figure 42: CWMS Workflow in BMP



Process outputs

i. The module prints a work code approval form, which is referred to by the Engineering department for all future transactions on the work
ii. A wide range of MIS reports (Detailed, Summary and Analytical) are available in this module catering to various levels of the management
iii. Various registers like Bills Register, Work Register etc. are generated by this module
iv. The system also generates a Work Closure form when the work is being physically or financially closed.

Impact of laws and regulations

No major changes were necessary in the existing rules and regulations.

Functional areas covered

This module covers the Engineering Department's functions relating to maintaining works records and monitoring the same. The financial aspects relating to the engineering works are integrated with the FBAS

Strengths and Weaknesses of the System

Strengths

i. CWMS provides a system of coding of all works undertaken. The Work Code is unique to each work and facilitates tracking of the work throughout its life cycle.

ii. The need to maintain multiple records is eliminated. Information is captured only once and different registers/statements can be generated out of CWMS
iii. There is a single common database of all works. All information is generated from this database.
iv. CWMS contains interfaces for integration to Financial Management module.
v. A wide range of reports catering to different levels of Management, Elected representatives and Public. These reports are categorized as Detailed, Summary and Analytical reports to suit the decision making needs of different levels of management.
vi. Monitoring of Works Liability position and seniority of pending bills, has enabled better working capital management.

Weaknesses

i. The process is not fully computerised and hence certain manual procedures still exist.
ii. The lifecycle of a work and the financial aspects of it are covered, but for certain technical processes like tender details, work order etc, only the dates are captured.
iii. The MIS generated is not fully utilised by BMP.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiative in BMP is given in **Table 8.**

Table 8: Snapshot view of the e-Governance initiatives in BMP

Parameter	Details of Bangalore Initiatives
1.No. of Modules implemented	4
2. Platform/ Programming Language(s)/ Technology	J2EE, ASP, VB
3. Software Architecture	3-tier, 2-tier
4. Deployment Architecture	Centralized
5. Database	Oracle
6. Connectivity	Leased Lines
7. Hardware Platform (Servers)	Xeon, Pentium
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Windows
10. Operating System (Clients)	Windows
11. Software Applications	FBAS Property Tax Birth & Death Complaints Mgmt.
12. Build or Buy	In-house, contracted, provided by BATF
13. Development Process	No recognized process

Parameter	Details of Bangalore Initiatives
14. Backup Procedures	Backup daily to tape.
15. PPP Arrangements	eGovernments Foundation
16. Citizen Interfaces	citizen service centres
17. Documentation	Limited documentation
18. Use of Local Language	Limited to user interface

4.1 Description of the Technical Architecture

a. Hardware

BMP has a server room located at the BMP head office. BMP has two Application servers, three database servers, a backup server and an anti-virus server. The FBAS module is hosted in a separate server. Detailed configuration of hardware is provided in **Annex B14**.

b. Software

BMP has both web-based and non web-based applications. Web-based applications are developed using ASP or JSP and non web-based applications are developed using VB. For ASP applications BMP uses IIS as application server and for JSP applications BMP uses a Tomcat server. For the Property Tax module which is J2EE based the JBoss Server is used. Oracle is used as the standard back-end across all the applications.

c. Operating System

Windows 2000 Server Edition is used as the operating system in both the database and application servers. Windows XP or Windows 2000 - Professional Edition is used as the desktop operating system.

d. Network communication software

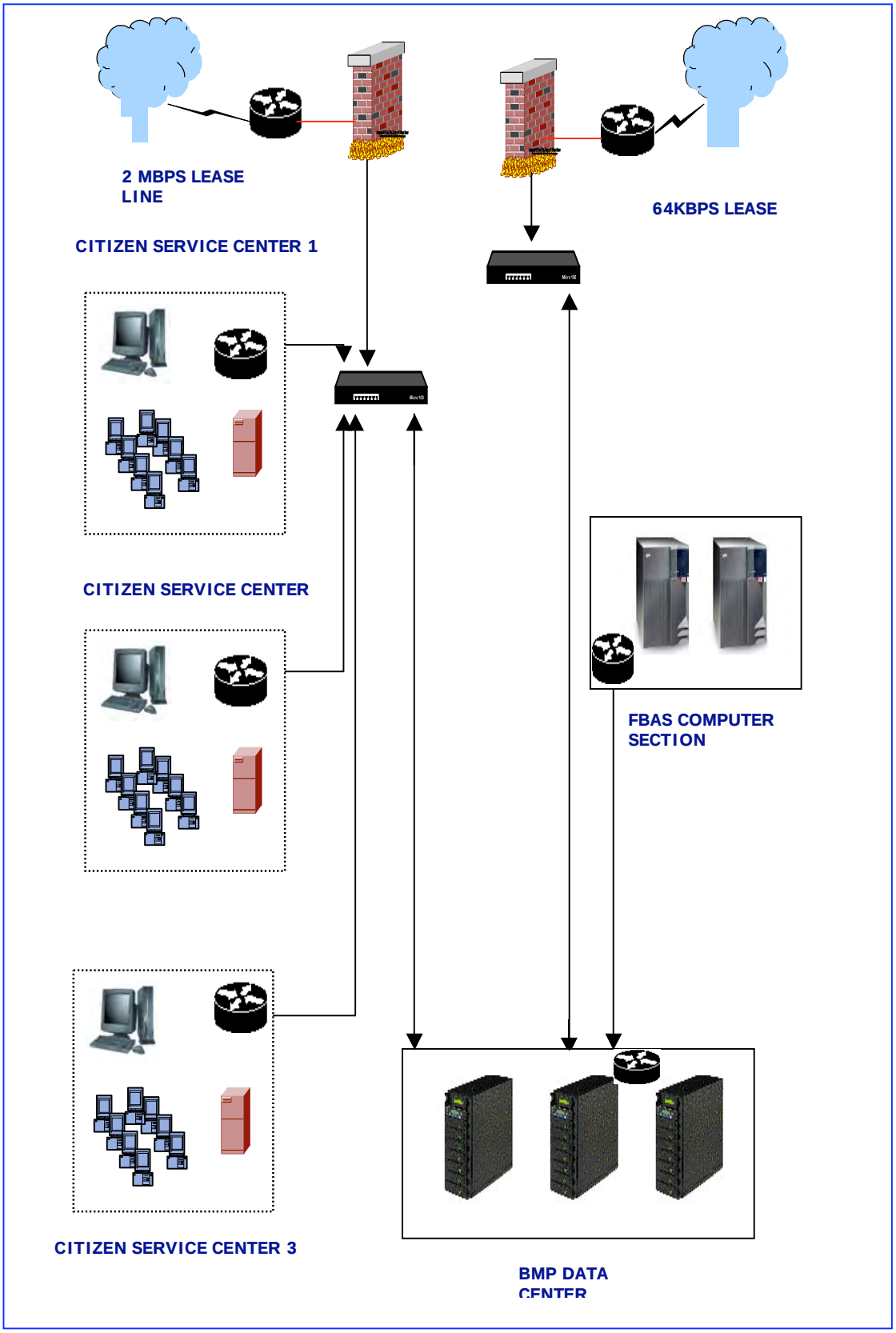
There was no evidence of usage of any Network Communication software.

e. Systems management plan and network management plan

BMP as such does not have any specific Systems Management Plans. There is no documentation provided about their Systems Management Plan.

BMP does not have any specific Network Management or Maintenance Plan. The network infrastructure in a graphical form is shown in **Figure 43**.

Figure 43: Graphical Representation of Application Infrastructure


2 MBPS LEASE LINE
64KBPS LEASE
CITIZEN SERVICE CENTER 1
CITIZEN SERVICE CENTER
FBAS COMPUTER SECTION
CITIZEN SERVICE CENTER 3
BMP DATA CENTER

f. Details of applications and programming languages

The applications in BMP are created using Visual Basic, Active Server Pages, Delphi and Java Server Pages. The Client/Server applications are developed using Visual Basic, while the FBAS data capture screens are developed using Delphi. Various modules developed in BMP and their front-end and back-end are provided in the **Annex B15**.

g. Details on database system

The database of BMP is in Oracle. BMP has 3 database servers in their server room. One of the three database servers holds real time data for accounting system; Of the other two one acts as the database server for property tax module and the other holds the database for other modules. More detailed information on memory, hardware, database, etc. is provided in the **Annex B16.**

h. Details on current network architecture

BMP has a centralized server room located at their head office. The head office and exchange are connected through 2 mbps leased line, and from the exchange to Citizen Service Center (CSC)/Zonal Offices, a 64 kbps-leased line is provided. At present there is no system interface provided to interface with other systems such as GIS and wireless technology. Detailed network configuration is provided in the **Annex B17**.

i. Internet/Intranet components

The modules have been developed on internet-ready technology though they are currently being operated on an intranet environment.

j. System interfaces with other systems

The current setup does not have interfaces with other software such as EDMS, GIS, etc.

k. Citizen interface

The citizen's interaction with BMP is through the Citizen Service Centres and kiosks provided at various places. The kiosks provided are for paying water taxes and for issuing birth and death certificates.

l. Level of computerization

Computerization of the existing manual system such as property tax, birth and death certificate registration, Customer Grievance, e-Tendering, etc. has been done. New Accounting system called as FBAS (Fund based accounting system) that is more suited to governmental accounting has been designed and implemented successfully. Steps have been taken to build a data warehouse for more sophisticated reporting. Typical Configuration of the Desktop PC is provided in the **Annex B18.**

m. Quality of project documentation & user manuals

Project documentation for all the modules of BMP is not available. Available documentation for the FBAS module has been provided, and documentation of other modules are not provided. Even in FBAS there is no technical documentation, so the quality of the documentation cannot be determined. Due to lack of documentation, estimating the quality of manuals is not possible.

n. Business continuity plan and disaster recovery plan

Data are backed up daily and stored in the same location. Apart from such a poor backup procedure there is no evidence of any kind of Disaster Recovery or Business Continuity Plan.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The infrastructure currently in place is suitable for the current application. The network speed has to be increased for better connectivity. Infrastructures at the citizen service centre are insufficient. There are shortages of laser printers in the citizen service centre.

The infrastructure in place has some problems regarding leased line connection, which are being managed temporarily by a backup ISDN line; otherwise the infrastructure is pretty stable. The scalability of the current solution is inherently present due to the architecture but it has not been tested.

a. Potential of the current application and new application to be integrated/operated/hosted

Integration between the modules is not provided completely. However there is some extent of integration of Property Tax module with FBAS. New modules developed can be hosted and operated along with the other modules without any changes to the current setup.

b. Vendor dependence to independence

The modules have been developed in the following modes:

- Built by the in-house development team of the Corporation.
- By external vendors either through product purchases or by an innovative PPP modus operandi.

The interesting contract with the e-Governments Foundation for the Property Tax module provides scope for a symbiotic relationship with the vendor (a Non-profit Organisation) in this case. Several important aspects have arisen out of the MoU such as vendor independence due to the creation of a Maintenance Service Organisation (MSO) which can operate independently from the vendor.

c. Information security management and systems security

Role-based security is provided for Information Security Management in certain modules. Some modules even lack role-based security.

d. Systems Auditing

BMP does not have any documentation of system audits.

5.2 Systems Deployment and Training

a. Project management, monitoring and system development process

The project is managed by the IT Advisor. The projects are developed by an in-house team and some are purchased from vendors. Monitoring of the project is done by the BMP. The development process of the in-house system is monitored by the IT-Advisor.

b. Speed in deployment/procurement - system installation time

The modules developed in-house are totally in the control of the Corporation, hence the speed in deployment and procurement of the project is with the Corporation. For other

modules such as Property Tax, the speed has been controlled due to tight agreements with the vendor.

c. Implementation approach and plan

There is no specific documentation of the implementation plan and approach.

d. Manpower required to operate the system

The BMP infrastructure is currently being maintained by the IT department which has been created for the purpose to provide operational support.

e. Amenability of service delivery through PPP mode

Service delivery through PPP mode was not witnessed in BMP. This aspect could not be examined as a test case for observation and study was not available. However no roadblocks to such delivery have been observed.

f. User training

The user training is taken care of by the IT team and in the case of external modules, by the vendors themselves. There is no documentation available on the methodology.

g. Support

In BMP the applications that have been developed by vendors have inconsistencies in support, in the sense that some are well supported due to the presence of contracts/MoUs while others lack even basic support.

5.3 Functionality

The system in BMP is operational and functional to a great extent; but the inter-module communication is not fully functional. For example, Property Tax module is not able to communicate with the Accounting module. User Interfaces are provided in the local language apart from English, for greater ease in deployment and usage. However, this is limited to the interface and has not been carried through to the data which is still in English.

6. Lessons Learnt

- Accounting as the first and key initiative could provide fast gains for Management and could provide data integrity.
- Integration to accounting part of design and implementation is key for success.
- User/citizen interface though part of implementation has not been the key aspect.
- Clarity on objectives of the total e-Governance exercise required to phase various activities.
- Political support and involvement helps in smooth implementation.
- Championship within the ULB is a must for implementation and sustainability of initiatives.
- Business Process re-engineering is the key for implementation.
- Training is required at all levels of management.
- Separate IT department within ULB enhances implementation speed and clarity.
- Novel PPP (with BATF/eGF) for technical advice has enabled cost free software development and support.
- A PPP model if administered properly can result in substantial savings for the Government.

Brihan Mumbai Municipal Corporation

In Brihan Mumbai Municipal Corporation (BMMC), the functionality of **only** the Citizen Grievance Redressal System was studied as per the TOR of the Assessment Phase. The observations on the same are discussed.

1 Complaints Management System in BMMC

1.1 Introduction

In general the complaints management system serves as an interface for the citizen to direct his/her grievances to the Corporation Staff on different issues. This feedback link is vital for any ULB because of the near-impossibility of higher officials to keep track of each and every aspect of service delivery on real-time or even on a daily basis. This is because of the sheer size and complexity of operations in even a reasonably-sized ULB. BMMC is the largest municipality in the country in terms of any attribute of measurement and thus a Complaints Management System is of prime importance.

In BMMC, the Online Complaints Management System (OCMS), under the auspices of 'PRAJA', and the Corporation's internally adopted system which is called 'CARE' ,limited to only a few wards, are under operation. The complain management system is operated with the support of a call centre, dual-time data entry, etc. While the need for such a dual system is not clear, the BMMC has been able to address the citizens complaints in increasingly efficient manner.

1.2 System Architecture

A snapshot view of the Complaint Management System in Brihan Mumbai Municipal Corporation is given in **Table 9**.

Table 9: Snapshot view of the Complaint Management System in BMMC

Parameter	Details of CMS Initiative in Mumbai
1.No. of Modules implemented	1 (Studied)
2. Platform/ Programming Language(s)/ Technology	OCMS - JSP & Servlets CARE – ASP
3. Software Architecture	2-tier
4. Deployment Architecture	Centralized
5. Database	OCMS – MySQL CARE - Oracle
6. Connectivity	-
7. Hardware Platform (Servers)	-
8. Hardware Platform (Clients)	-
9. Operating System (Servers)	-
10. Operating System (Clients)	-
11. Software Applications	Complaints Mgmt.
12. Build or Buy	OCMS - Provided by PRAJA CARE – Provided by ABM
13. Development Process	-
14. Backup Procedures	-
15. PPP Arrangements	PRAJA
16. Citizen Interfaces	Call centre, website

Parameter	Details of CMS Initiative in Mumbai
17. Documentation	-
18. Use of Local Language	Not used

As mentioned, BMMC has dual systems in place for their complaints management – 'OCMS' and 'CARE'.

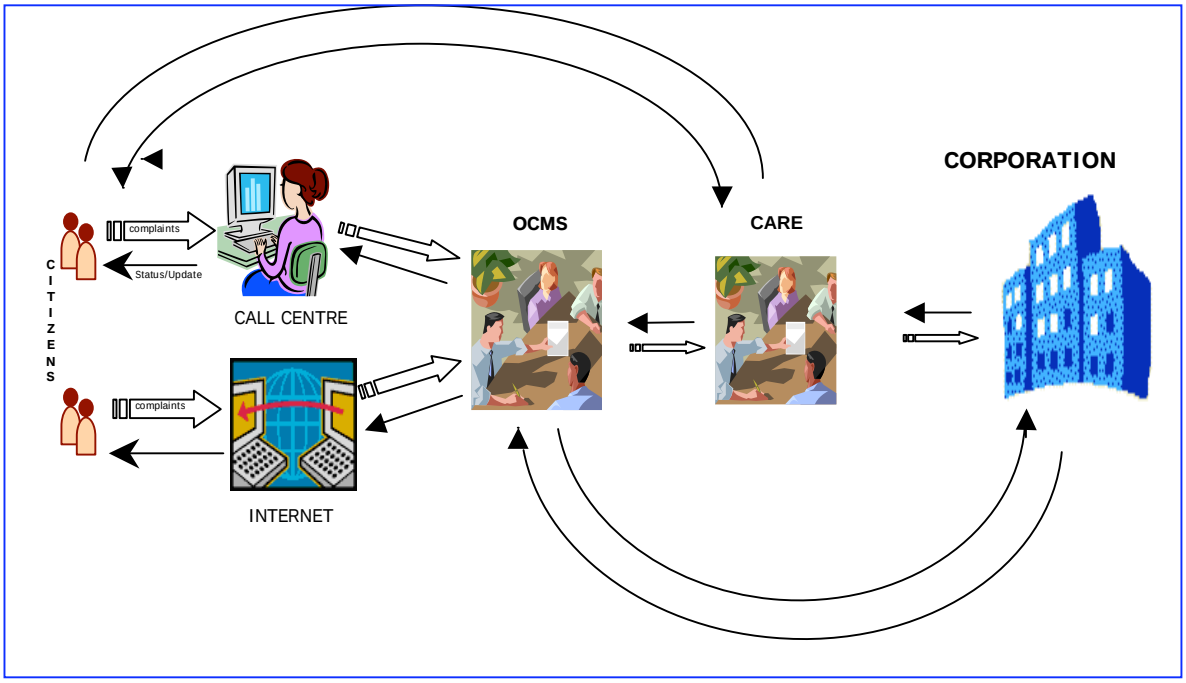
The primary complaint management system - 'OCMS' - has been developed and implemented by 'PRAJA' which is an NGO dealing primarily with citizen interfaces to various civic and governmental services. BMMC has not directly taken this system under its wings (in terms of a clear mandate for implementation in all wards). However, the BMMC call centre which is manned and run by the Corporation uses the 'OCMS' system for their complaint lodging activities. Thus the use of OCMS is restricted to the citizen interface aspects and has not permeated down to being used hands-on by the operational staff as part of their day-to-day activities.

BMMC has also adopted 'CARE' which is another complaint management system supplied by a private vendor (ABM). However, the usage of this system is restricted to select wards and has not been completely internalized into the Corporation activities. Wherever the system is available, the various Department Heads of the Corporation have been given access and are able to stay current on various issues under their purview. However, the reach of the system stops at this level and does not go any further down. Thus again the onus of tracking and monitoring falls back on the staff, thereby not being able to gain all the administrative advantages of complete adoption of such a system.

1.3 Process Architecture

The Process Architecture followed in BMMC was that the citizens can lodge their complaints through the internet and the call centre which is routed to 'OCMS', to 'CARE' and finally to the Corporation, and the information flow is vice versa in giving the status and details of the complaint. The process flow is shown in **Figure 44**.

Figure 44: Process flow of Complaints Management System at BBMC



The different aspects of a Complaints Management System are as follows:

i. Lodging of Complaints – Feedback from Citizens.
ii. Complaints Administration – Internal usage by Corporation staff.
iii. Monitoring and Reply Mechanisms - Feedback to Citizens.

With regards to BMMC, the Complaints Management System takes care of all the above requirements but to varying degrees of effectiveness and using various means. The typical process flow can be explained as below:

i. Lodging of Complaints – The citizen has various mechanisms to lodge complaints. They could do it online through the PRAJA website. They can also contact a toll free number which leads them to a call centre, manned by Corporation Staff, for complaints management and emergency response activities. On lodging a complaint they are given a complaint tracking number which enable them keep track of the status of their complaint. Furthermore, the citizen facilitation centres also have a Complaints Officer who collects their complaints in person. This officer feeds the complaints into the 'CARE' system.
ii. Complaints Administration – Due to the lack of strong links between the point of lodging of complaints ('OCMS') and the administration system ('CARE') the overall system is not as efficient as a single system or even a tightly coupled set of systems could be. However, the Corporation staff play a major role in putting efforts towards synchronizing the systems and trying to keep the information in the system valid. Wherever there are no dual systems, the Complaints Officer of each ward takes a print-out department-wise (from OCMS) and sends it to the respective department heads for their administrational purposes. In case of dual systems, a software bridge has been created through which complaint details along with its status flows between 'OCMS' and 'CARE'. However, this bridge is yet to be fully tested and implemented across all wards.

iii. Monitoring and Reply Mechanisms – The last part of the chain is generally completed by the Corporation initiating the necessary steps to redress the complaint. The citizen has also been provided with facilities to monitor the status of complaints and receive feedback from the Corporation officials on the complaint. The citizen can keep track of his complaint through the website provided by OCMS or he/she could contact the call centre and get information on the complaint's status. The call centre staffs generally also remind the concerned officials in case of delay in redress by directly contacting them and updating them on the outstanding issues.

1.4 Strengths and Weaknesses

Strengths

i. The provision of web-based complaint registration mechanism has reduced hassles to the citizens to get their issue across to the Corporation.
ii. The provision of a call centre has enabled to increase the reach of the system to wider sections of the society and also to properly channel the complaints to the concerned department.
iii. The presence of a system gives confidence to the citizen that his/her complaint would be heard and redressed to the extent possible.
iv. The presence of escalation mechanisms and fixed turn-around time for each type of complaint has made the system more transparent and responsive.
v. Very good MIS reports are available which helps in good administration and monitoring.

Weaknesses

i. The presence of two systems each of which deals with different aspects does not help to improve the efficiency.
ii. The reach of the administrative application ('CARE') is limited to select wards and even where it is prevalent the access is only to the heads of department.
iii. Complete internalization of the system for the complaint management process does not seem to have taken place in terms of adoption at all wards as well as forming a seamless system for all the activities.

1.5 Other Aspects

Apart from addressing governance issues through the IT initiatives, efforts have also been made to provide a better forum for citizen interaction by the creation of Local Area Citizen Committee (LACC). This is a recently initiated concept of providing an opportunity for the citizen to raise issues face-to-face with the concerned officials so as to bring about clear expression of problems and as far as possible a scope for immediate redress of the same. BMMC currently has around 10 LACCs with weekly meetings being carried out. Apart from this, hundred voluntary area representatives have also been identified who could facilitate better interaction between citizens and the Corporation. Thus, BMMC seems to have evolved a creditable approach to good governance by the use of appropriate technology and on-the-ground efforts.

1.6 Significance of OCMS in e-Gov Studies

Mumbai is the biggest city in India in terms of population. It has a blend of haves and have-nots nestling in the overcrowded metro. The demand for the services of the Corporation is very high with a proportionate rate of grievances to be redressed. It is therefore relevant to study the system and review it. Another significant aspect is the recourse to the PPP route to address grievance redressal function. This merits a detailed study. Besides, a 'Complaint Audit' was conducted by A.C. Nielson ORG-MARG to assess the citizens' complaint in all the

24 wards, which highlighted the satisfaction levels (2.6 in a 5-point scale). Hence, CMS has been chosen for a separate assessment as a part of this exercise.

Kalyan Dombivli Municipal Corporation

1. Linkages of State Level Initiatives to ULB Level Initiatives

Kalyan Dombivli Municipal Corporation (KDMC) vide General Body Resolution No. 86 dated 10-12-1999, took a decision of total computerization of the Corporation. The initiatives of computerization and providing citizen friendly services, was driven from within the Corporation, with the continued leadership of the Commissioner.

After successful implementation of the initiatives, KDMC has proposed to the State government a replication of its model in other ULBs in Maharashtra. KDMC itself has tied up with a few other ULBs (Margao in Goa and Nagpur in Maharashtra) for replication of its Citizen Facilitation Centre (CFC) model.

1.1 Objective of the e-Governance Initiative

The aim of KDMC was to create a solid, system driven Corporation with highest levels of Transparency, Accountability and Citizen Servicing Standards. The vision of KDMC was to provide Simple, Moral, Accountable, Responsive & Transparent (SMART) Governance to the citizens of Kalyan Dombivli Municipal Corporation.

The project was carried out under the guidance of experts from IIT, VJTI, NCST and TIFR. The entire e-Governance solution was provided by Mumbai based ABM Knowledgeware Ltd., who are appointed by the KDMC as Total Solution Provider.

The test implementation of the project started in January 2002. Trial runs of CFCs at Kalyan & Dombivli were started on May 2002.

2. Organization Structure

2.1 Organisation Structure

The Kalyan Dombivli Municipal Corporation was established by the Government of Maharashtra under the Urban Development GR No. KCC/1082/229/CR-18-82 (III) UD-20 dtd. 26-09-1983 with effect from 01-10-1983.

The ULB consists of a deliberative wing and an executive wing. While the deliberative wing of the ULB consists of elected members, the Commissioner heads the executive wing. Role of the deliberative wing is mainly confined to the governance of the ULB and laying down of policies, guidelines, according approvals, etc., for various developmental programs. It is the executive wing which is mainly responsible for the administration, regulatory and developmental activities being carried out by the civic body. The functions of the executive wing are discharged by the Assistant Commissioners of each of the functional areas like planning, elections, H & S, etc.

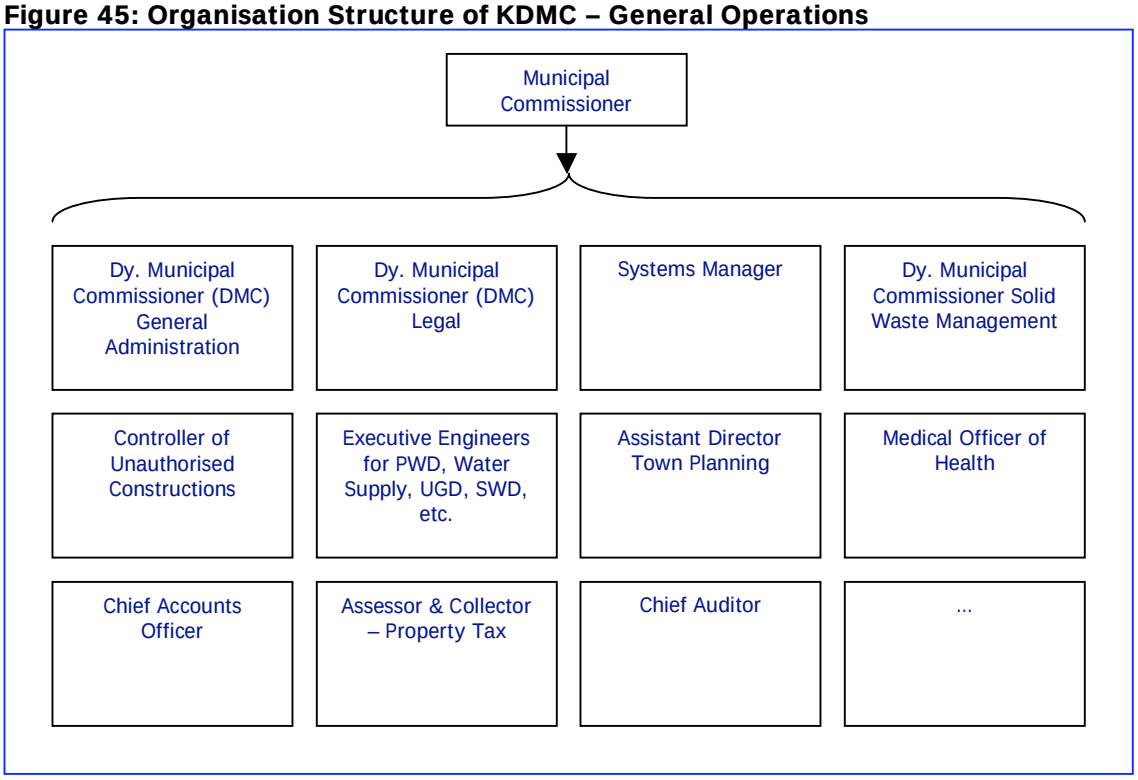
Spread over an area of about 105 sq.km., Kalyan has a population of about 12 Lakhs. KDMC is divided into 7 administrative wards under which there are 40 zones.

The Municipal Authorities charged with carrying out the provisions of BPMC Act, 1949 for the city:

- The Corporation.
- The Standing Committee.
- The Municipal Commissioner.

Figure 45 shows the organisation structure of KDMC.

Figure 45: Organisation Structure of KDMC – General Operations



2.2 Distribution of Roles and Responsibilities

The Commissioner does the functions of the Corporation, which can be broadly classified into two:

- Obligatory
- Discretionary.

The Obligatory functions relate to erection of substantial boundary marks defining the limits of the city, maintenance of public streets, roads, public health and other matters relating to sanitation and improvement of the city, etc. Discretionary functions relate to the general welfare of various classes of the population, transport facilities and furtherance of educational objectives, improvement of socio-economic status of the inhabitants of the city, etc.

Apart from the regular Obligatory and Discretionary functions, the Commissioner is also responsible for good service delivery to the citizens, as a part of good governance.

Functions of the Commissioner

The entire executive power for the purpose of carrying out the provisions of the BPMC Act and other relevant Acts vests with the Commissioner. The Commissioner prescribes the duties of, and exercises supervision and control over, the acts and proceedings of all municipal officers

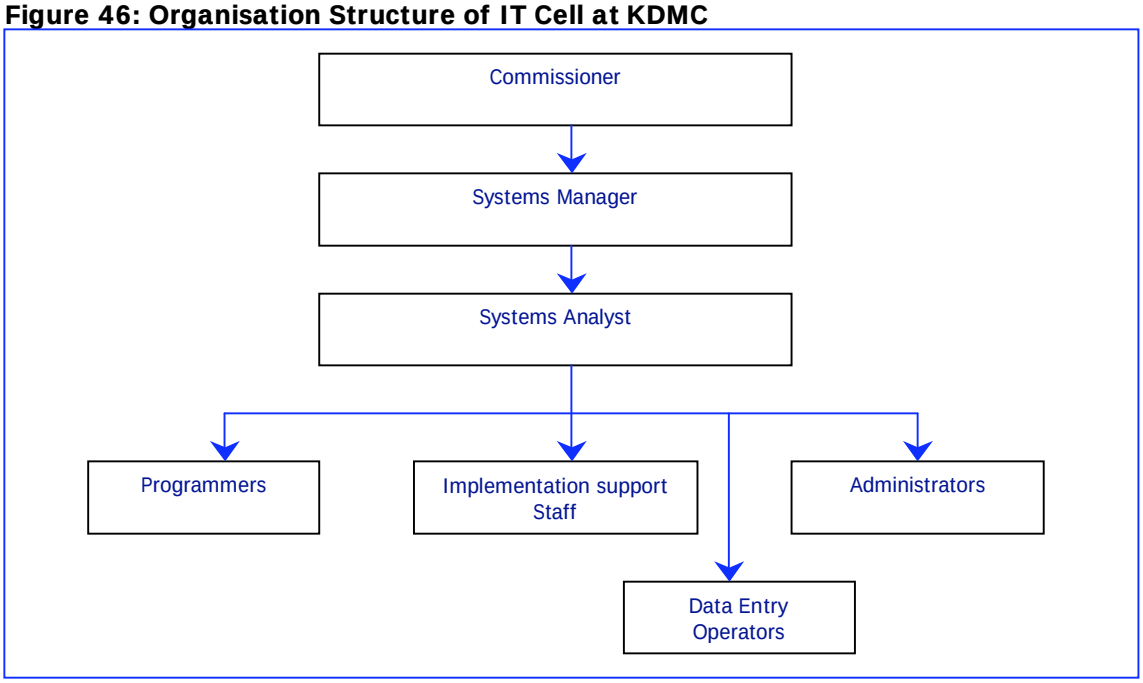
and servants, other than the Municipal Secretary and the Municipal Chief Auditor and the Municipal Officers and servants immediately subordinate to them.

There are about 6 Wards which are headed by Additional Commissioners, who take care of the day to day administration of the Ward operations. The Additional Commissioners report to the Commissioner. Each of the departments in KDMC are headed by the Functional heads of various posts, who are incharge and responsible for, the specific functions of KDMC.

2.3 New Organisational Structure

As a part of e-Governance initiatives in KDMC, a new IT Cell was created by KDMC, which is headed by the Systems Manager. The Systems Manager directly reports to the Commissioner. Another post of a Systems Analyst was created, who is under the Systems Manager. Several other posts like programmers, data entry operators, implementation support staff, etc. in the Computer department were newly created, but no new staff have been recruited. Instead, the staff from various other departments were identified and posted to the Computer department under various designations. The organisation structure of the IT Cell at KDMC is given in **Figure 46.**

Figure 46: Organisation Structure of IT Cell at KDMC



2.4 Decision Making Process within the ULB

The entire executive power for the purpose of carrying out the provisions of the BPMC Act, vests with the Municipal Commissioner. For any of the activities of the functions of KDMC, the Commissioner is the authority for taking any action. However, the functional heads are delegated with powers by the Commissioner as required, for carrying out the regular activities of the respective departments.

For implementation of new systems, the Commissioner has the power for decision making. Even for implementation of e-Governance in KDMC, many of the decisions were taken by the then Commissioner and accordingly, the implementation was carried out.

The Systems Manager who is the head of the IT cell in KDMC, takes decision on the IT infrastructure etc., though the final authority for the same rests with the Commissioner.

All the functional heads of the departments assist the Commissioner in the decision making process.

3. Key Municipal Functions

3.1 Municipal Functions

- Planning for social and economic development;
- Urban forestry protection of the environment and promotion of ecological aspects;
- The watering, scavenging and cleansing of all public streets and places in the City and the removal of all sweepings there from;
- The collection, removal, treatment and disposal of sewage, offensive matter and rubbish and, if so required by the [State] Government. the preparations of compost manure from such sewage, offensive matter and rubbish;
- The construction, maintenance and cleansing of drains and drainage works and of public latrines, water-closets, urinals and similar conveniences;
- The entertainment of a fire-brigade equipped with suitable appliances for the extinction of fires and the protection of life and property against fire;
- The construction or acquisition and maintenance of public hospitals and dispensaries including hospitals for the isolation and treatment of persons suffering or suspected to be infected with a contagious or infectious disease and carrying out other measures necessary for public medical relief;
- The lighting of public streets, municipal markets and public buildings vested in the Corporation;
- The maintenance of a municipal office and of all public monuments and open spaces and other property vesting in the Corporation;
- The construction or acquisition and maintenance of public markets and slaughter-houses and the regulation of all markets and slaughter-houses;
- The registration of births and deaths;
- The management and maintenance of all municipal water works and the construction or acquisition of new works necessary for a sufficient supply of water for public and private purposes;
- Preventing and checking the spread of dangerous diseases;
- The securing or removal of dangerous buildings and places;

3.2 Processes and their linkages

Business Process reengineering was done for about 400+ processes covering various services across all departments. Reengineering of various processes was done with deliberations involving personnel right from the Commissioner to the clerical staff. All the modules developed are integrated to each other, and are also linked to the Accounting Module, where the financial transactions are posted. The modules stand on a common database and the data is shared by these modules. The brief view of the Citizen Facilitation Centre (CFC) is given below with **Table 10** showing the post-initiative and pre-initiative scenario.

Citizen Facilitation Centres (CFC)

For services like payment of taxes, application for new water connection, application for birth/death certificate, application for any other service or simply registration of any civic complaint, the CFC at KDMC has become a single touch point for all the citizens. This has made possible hassle-free interactions with the citizens. It also encourages transparency as citizens can monitor their service applications/complaints at every stage.

The CFCs provide services to citizens like, payments of taxes and fees, requisition for application forms, registrations, certificates, permissions, etc. The citizens can lodge complaints for all services like Water supply, drainage, roads, health, etc.

A separate software module has also been developed for the CFCs at KDMC. This module acts as a gateway to various services for which separate modules have been developed. This module provides for capturing details of various services rendered by the CFC. **Table 10** shows the comparison of post-initiative scenario with the prior situation.

Table 10: KDMC Overall Analysis of Pre and Post Reform Scenario

KDMC prior to 2002	KDMC after launch of CFCs (May 2002)
1. Citizens needed to go to different departments to avail the different services	Single Touch Point services to citizens through totally computerized Citizen Facilitation Centres
2. If one service required interactions with more than one department, it was a Sequential Movement of File. Citizens also needed to interact with more than one Department Eg. New Water Connection application would move to Water Department, Ward Office & Property Tax Department.	Application Scrutiny movement through computer. If any of the services requires file movement to more than one department, Computer internally sends the concerned scrutiny to these departments. The Scrutiny moves parallelly and thus saves overall service delivery time too.
3. Involvement of middlemen (like agents, corporators, influential people, etc.)	No middlemen. Citizen friendly helpdesk counters at CFCs. Citizens who would have hesitated to visit public offices (like Muslim women, small children, etc.) are also seen coming to CFCs and interacting with the Corporation for different services.
4. No fixed process defined for any of the Corporation services No clarity of documents required along with application forms No clarity on whom/when to meet for the service application or collection of Certificate/applied documents	Totally transparent process with total clarity on process of application Check-list of required documents included in the application form. The same is checked at the time of acceptance of the form. (i.e. only completed application forms accepted) Up-to-date information on the status of the application Collection of Certificate/applied document from CFCs
4. No time duration for the service and no monitoring of time taken for the service delivery	Applicant gets a token with assurance of timely service completion. Reports available for the higher management to monitor the performance of all the departments
5. No citizen interaction was possible with Corporation unless he/she had come physically to the Corporation	Citizens can know their dues/status of their application/status of complaint/even apply for certain services through Telephone or through KDMC's website www.kdmc.gov.in
6. Subjectivity in decision making	Total objectivity in decisions like calculation of Property Tax, Bill preparation, Water Connection (decision on whether to grant the connection or reject it or decision on size of connection), calculation of different license fees, calculation of penalty charges for late fees, etc.
7. Lots of Manpower requirement for processes like Calculation of Property Tax, Preparation of Property Tax Bill/Water Bill, Preparation of Birth/Death Certificates	Total automation in the processes resulting in reduction in manpower requirement as well as time.

3.3 Modules at KDMC

a. Property tax module

The Property Tax Module in KDMC is developed by ABM Knowledgeware Limited. This module is implemented by the KDMC for collecting the Property Taxes of about 1.10 lakh assessed properties. KDMC has established six Citizen Facilitation Centres, which enable the citizens to pay their property taxes anywhere in the city irrespective of the ward they are in. It also generates an instantaneous receipt for the tax paid and the property record is updated with details of the amount paid. The system also enables calculation of annual demand of property tax for each property.

The application developed has bilingual features in certain interfaces. A range of MIS has also been provided to the various levels of management. This module has been linked to the Water Tax module through the database. It is also linked to the Accounts module where for each receipt, an entry is posted.

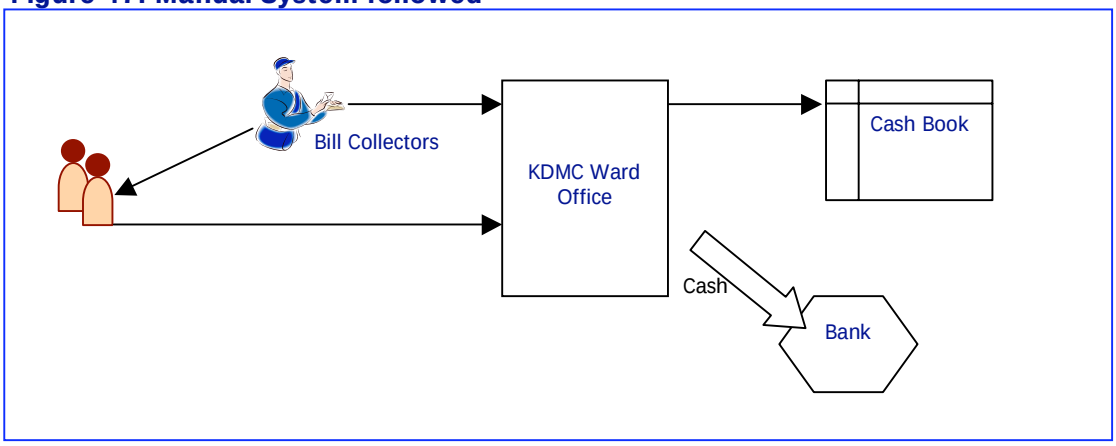
This module broadly provides the following features:

i. No Due certificate for arrears of Property Tax.
ii. Property Tax Assessment Certificate.
iii. Extract of Property.
iv. Permission for Property Transfer through heredity.
v. Permission for Property Transfer through other modes.
vi. Issuance of Duplicate Tax Bill.
vii. Payment of Property Tax Bill.

Processes and procedures followed

The processes and procedures followed are shown in **Figures 47 and 48**.

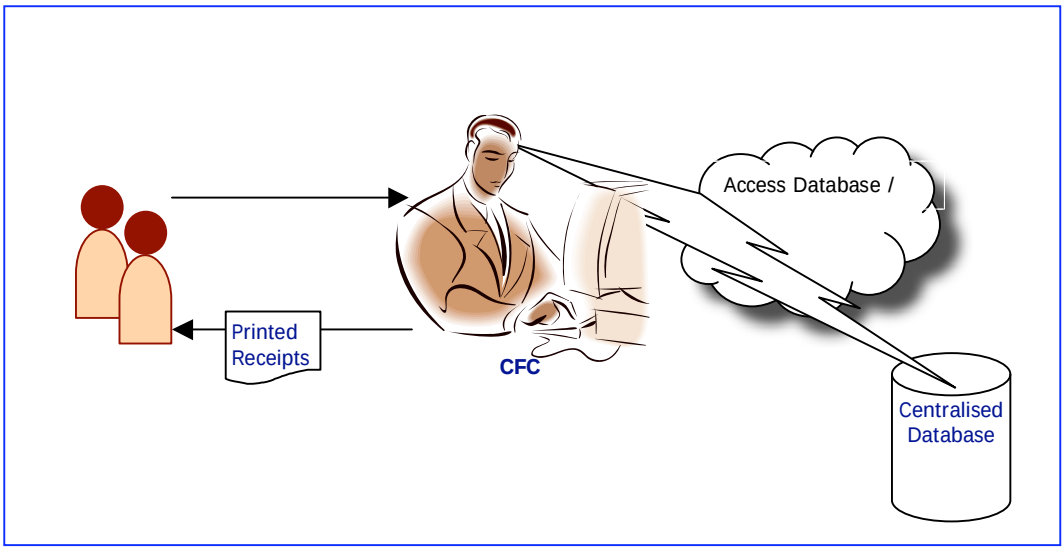
Figure 47: Manual System followed



Former process measures vs. redesigned process

Previously, assessment of properties and collection of property tax were made manually. For assessment and payment of property tax, the citizen used to approach the ward/circle office. The bill collectors also used to visit the citizens for collecting property taxes. Collection of property tax was poor due to the manual procedures and lack of proper information for follow-up. In the redesigned process, the citizen can pay property tax in the Citizen Facilitation Centres. This data is updated in the database, which is also linked to the accounts module. For assessment of properties and related matters, the module has been designed to accommodate such processes. The existing process flows for property tax assessments have been redesigned to suit the new module. Forms have been designed which are used at different stages of the process, like no due certificate, issue of assessment certificate, permission for property transfer etc.

Figure 48: Computerised property tax collections



Process outputs

i. The module prints a receipt for every tax collection.
ii. A 12-digit code is assigned for every assessment.
iii. DCB is generated from the system.
iv. Daily collection reports, with various parameters like bank-wise details, arrears-current break-up, etc., can be generated from the system.
v. List of defaulters of Property Tax payments.

Impact of laws and regulations

The re-engineering of processes to suit the new system was done by the administration itself. As the existing delegation of powers vested within the administration, such process changes were done any change in the legal framework.

Functional areas covered

The Property Tax module is in operation in the Head Quarters, and 7 Ward Offices across the Kalyan Dombivli City. Functionally, the Property Tax module covers the Assessment Department and the Accounts Department.

Strengths and weaknesses of the system

Strengths

i. Business Process re-engineering has been done to a certain extent which has streamlined the activities of the department.

ii. The module has enhanced the Citizen-centric administration, with accountability and transparency.
iii. This module has made the life of the citizens easier, as the touch points with the Corporation employees has decreased and the citizens can pay their taxes in any of the Citizen Facilitation Centres.
iv. A unique 12 character coding for each property has been developed.
v. This module is linked with accounts module and the accounting entries are passed for each receipt.
vi. Citizen can pay the Property Tax in advance for the next financial year.
vii. As the Property Tax module is linked to the Water Tax module, the citizen can know the status of both tax dues simultaneously over the internet.
viii. MIS reports at all levels of management for better decision making.

Weaknesses

i. Automatic generation of demand notices not enabled.
ii. The demand notices are served only in the month of June, and not in the month of April of the financial year.
iii. Certain features are not master driven and are programmed which does not allow the flexibility of change in future.

Table 11 shows the Comparison of the earlier and redesigned processes in KDMC.

Table 11: KDMC Property Tax: Pre and Post Implementation Scenario

Process: Assessment of Property	Pre implementation	Post implementation
1. Identification of Properties for Taxation	1 month	3 days
2. Preparation of Property Assessment	10 days	1 day
3. Calculation of Property Tax	10 days	Immediate
4. Preparation of Demand Notice	(No fixed time. But usually a month or more than that)	About 15 days
5. Hearing on Objections	1 month	2 days
6. Methodology	Focus on door-to-door collection. The collection was concentrated in Jan, Feb & March.	Focus on collections at CFC. Collection spread over all the 12 months. This helps in maintaining a proper liquidity of corporation.

b. Water charges module

KDMC has implemented a module for registration of new water connections and collection of water consumption charges. KDMC has about 70,000 water connections, of which 18,000 water connection records are available in the database. A unique number is generated for every new water connection.

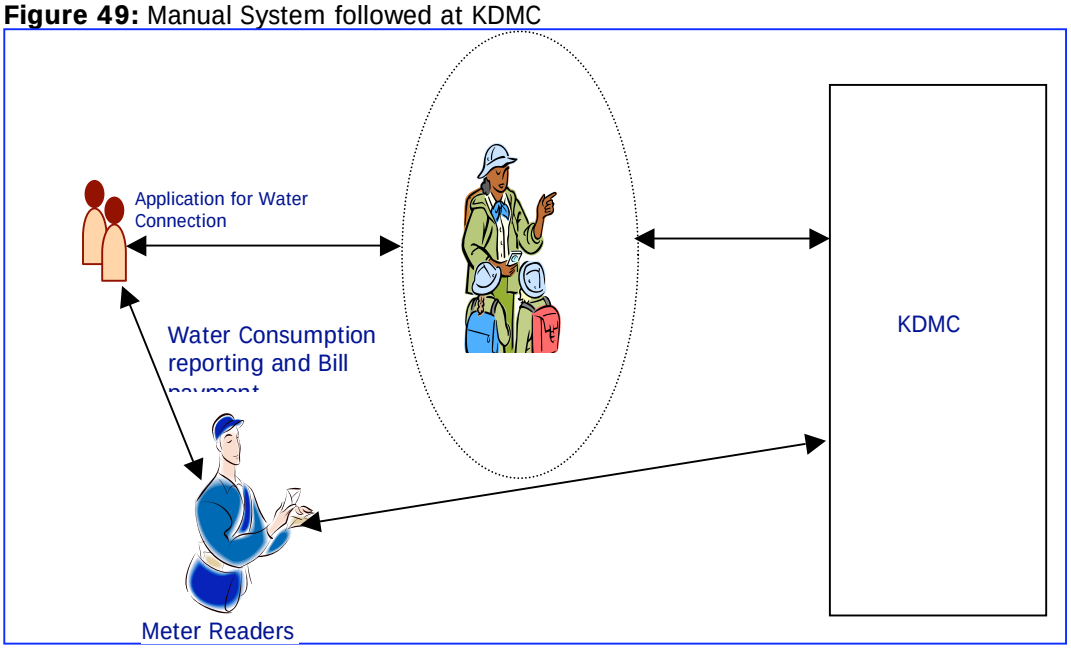
Business process re-engineering was done during software system implementation. A unique feature of this module is the recommendation for the connection size by the system. This module automatically arrives at the connection size considering inputs like pressure, source line, no. of families, etc. Hazen William's formula for calculation of water consumption charges is built in this module. This module enables the management in taking decisions for granting of new connections.

However, the process is not totally computerized. In the existing process, the meter reading procedure is contracted to a private agency. Here the control over proper and accurate meter reading is debatable. The private agency goes to individual consumers and collects the meter readings, and supplies the same to the Water supply department where periodic updating is done in the module. This module has been linked to the Property Tax Module and the Accounts module.

Processes and procedures followed

The processes and procedures followed are shown in **Figures 49 and 50.**

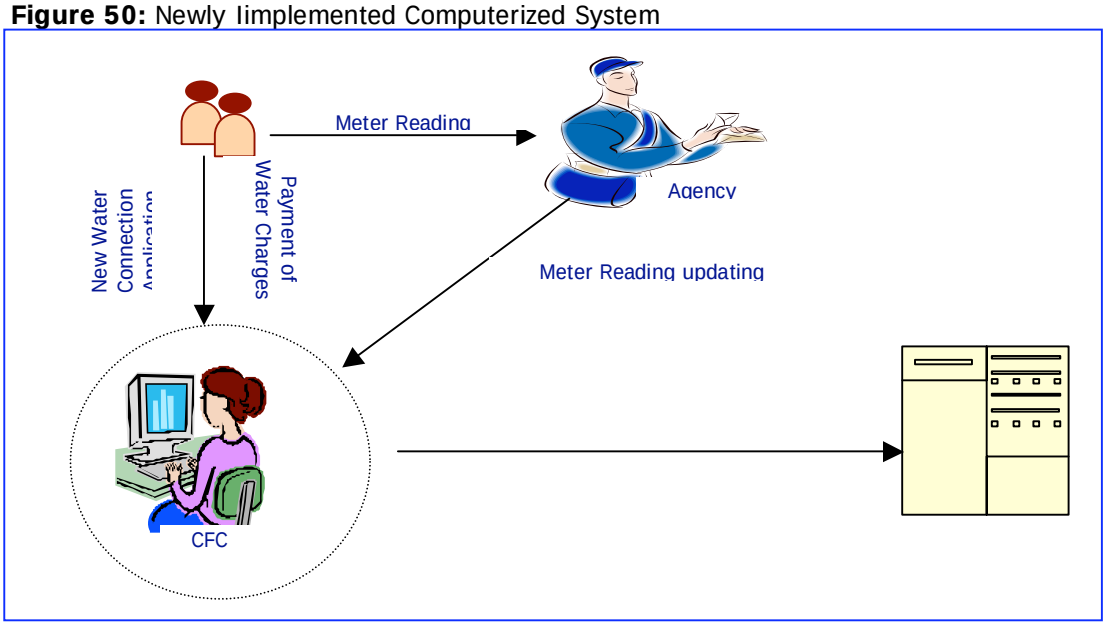
Figure 49: Manual System followed at KDMC



Former process measures vs. redesigned process

Previously, for connections and consumption/billing processes the procedures were manual. In the manual process, for a water connection, the citizen used to apply for the connection after which the officials would go and inspect the site before granting the connection. The internal process for the application used to take a long time and hence the process was delayed. In the redesigned process, the procedure for granting water connections has been simplified. The software has been linked to the workflow, which enables the concerned officials to watch the applications over the computer, for taking necessary action. The software enables the management in taking decisions for granting of new connections. The payments for water consumption are made at the CFCs. However the reading of meters for consumption has been outsourced, which was initially done by KDMC.

Figure 50: Newly Iimplemented Computerized System



Process outputs

i. The module prints a receipt for every collection.
ii. DCB (Demand Collection Balance) is generated from the system.
iii. Collection reports and MIS are also generated.

Impact of laws and regulations

The re-engineering of processes to suit the new system was done by the administration itself. As the existing delegation of powers vested within the administration, such process changes were done without requiring any change in the legal framework.

Functional areas covered

The Water Charges module is in operation at various Citizen Facilitation Centres across the city. Functionally, the Water Charges module covers the Water Supply Department and for financial transactions the Accounts department is also affected.

Strengths and weaknesses of the system

Strengths

i. This module has made the life of the citizens easier, as the touch points with the Corporation employees has decreased and the citizens can pay their taxes in any of the Citizen Facilitation Centres, collection centres and designated banks.
ii. Citizen can know his dues at the Citizen Facilitation Centres and on the website.

iii. As it is linked to the Property Tax Module, the citizen can know the status of both tax dues simultaneously.
iv. This module is linked to the accounting module, and the collections are automatically posted to the Accounts module for each receipt.

Weaknesses

i. Control over meter reading data provided by the agency is weak.
ii. The meter reading period is not fixed for the agency. As a result meter reading could be more than once in a given month.

Table 12 shows the comparison of the earlier and redesigned processes in KDMC.

Table 12: KDMC New Water Connection: Pre and Post Implementation Scenario

Process: New Water Connection Service	Prior implementation	Post implementation
1. Application for New Water Connection	About 1 week	Immediate
2. Verification at site by J.E.	About 4 days	-
3. Verification of Records for Water Dues	About 7 days	Done internally by the system
4. Verification of Records for Tax Dues	About 4 days	
5. Scrutiny by J.E.	4 days	4 days
6. Scrutiny by D.E.	4 days	3 days
7. Scrutiny by E.E.	2 days	Immediate
8. Administrative Approval from DMC	4 days	Immediate
9. Letter Of Intent	2 days	
10. Customer Satisfaction	• Citizens had to go from Pillar to Post for their sanction • Involvement of more than One Department (Water Department & Property Tax Department) means more middle men, more scope for corruption • Typical delay in granting the new connections used to result in less number of legally sanctioned connections.	• Single Touch Point Service (at CFCs) right from Application Submission, to Application Status identification, Collection of LOI, Payments, etc. • No direct interaction with the departments • Every common man has access to CFCs. Thus one can see definite increase in the sanctioned connections.

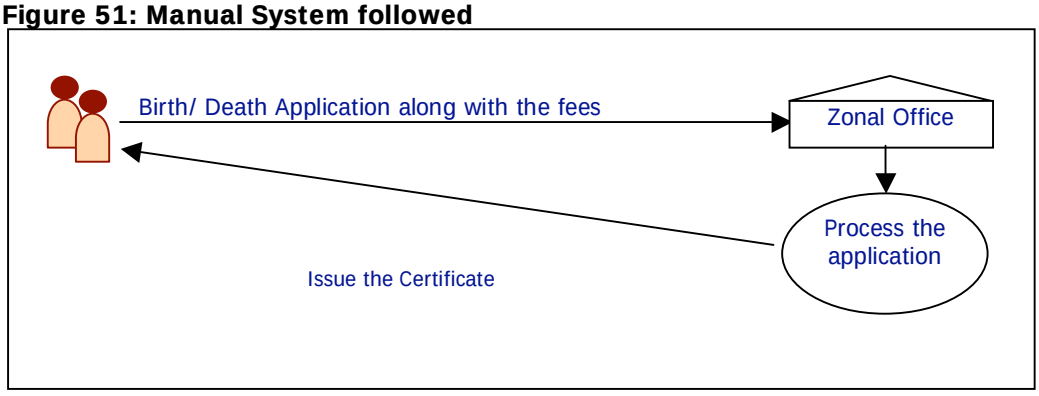
c. Birth and death module

The Birth and Death module is used to register the births and deaths, and issue the certificates. The system has recorded the Birth and Death entries since 1995 as part of the implementation process. The process of registration and issue of certificates has been simplified. Depending upon the request of the citizen, KDMC has extended this service to even Home delivery of certificates by postal services, which is very unique. Apart from the Birth and Death registration and Issue of the certificate, Corporation also has a sub-module for Child adoption.

Processes and procedures followed

The procedures that were followed earlier manually have been retained with some re-engineering. The Citizen Facilitation Centres collect the charges from the citizens and issue certificates to the citizens. **Figures 51 and 52** show the earlier process and the redesigned process followed.

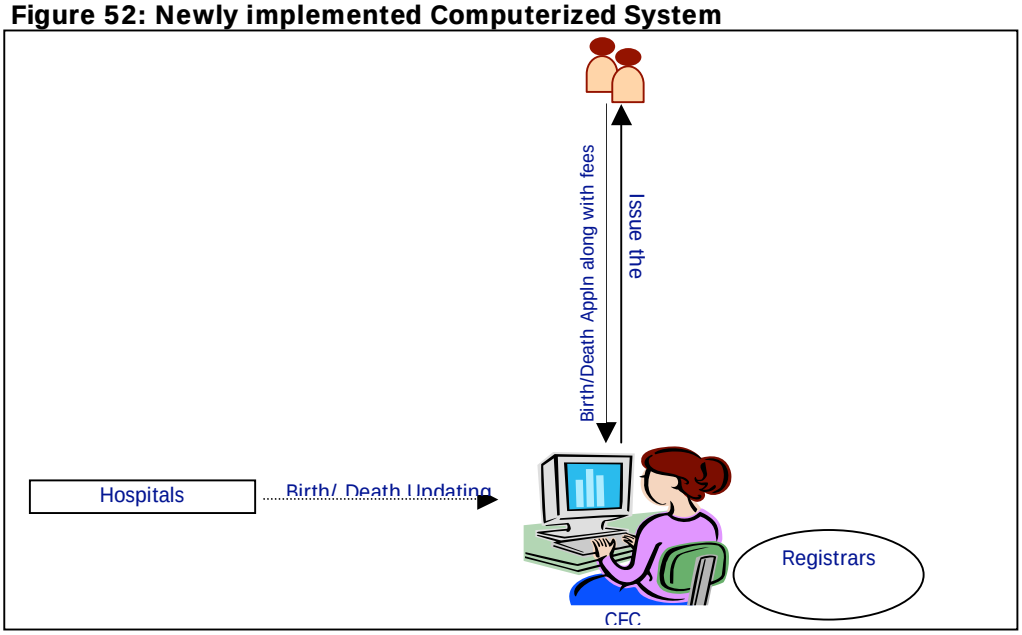
Figure 51: Manual System followed



Former process measures vs. redesigned process

In the previous process, the application was received by KDMC and sent for verification to the statistics department, which would consume more time and result in delay in issuing certificates, as these were done manually. In the redesigned process, the Statistician physically sits in the CFC, so that the applications can be processed immediately. Also the computerisation has provided interface for printing of certificates and issue of the same.

Figure 52: Newly implemented Computerized System



Process outputs
The system generates Birth and Death Certificates on payment of the required fees. The details are also available for the citizens over the internet.

Impact of laws and regulations
Operationally, there are no major changes required in the legislative framework.

Functional areas covered
The Birth and Death module covers the Statistical Department. As the collections of Birth & Death registrations are linked to the Accounts module, it partially covers the Accounts department also.

Strengths and weaknesses of the system

Strengths

i. The process has been streamlined to the convenience of the citizens.
ii. MIS related to the Birth and Death statistics is available to the management.
iii. Time delay in the scrutiny of applications and issue of certificates has drastically reduced.
iv. The home-delivery service to the citizen is an innovation.

Weaknesses

i. The module does not provide for maintaining a link between the death event and birth event of a citizen, which could be possible for those death events where the birth record is available.

Table 13 shows the comparison of the earlier and redesigned processes in KDMC.

Table 13: KDMC Birth & Death Registration: Pre and Post Implementation Scenario

Process: Birth/Death registration	Pre implementation	Post implementation
1. Registration of Birth	More than 1 day	15 minutes
2. Authorization of Record	More than 1 day	Immediate
3. Customer Satisfaction	▸ No Commitment of Timely Delivery ▸ Involvement of Corporators or Middlemen a must for speedy solution	▸ Total Satisfaction without any hassles. Average time delivery of 15 Minutes

d. Grievance Redressal System

Citizen Grievance and Redressal System is in operation at KDMC since 2003 and in this module the citizens can register their complaints either over the web or at the Citizen Facilitation Centres. The complaints are monitored by the KDMC officials. The complaints are tracked by means of a complaint number. The main features of this initiative are given below:

Processes and procedures followed
Each complaint is recorded with a unique number which is given to the citizen. These complaints are monitored by the KDMC officials, and are forwarded to other officials depending on the type and nature of the complaint. Automatic scaling/redressal is enabled in the system. Masters are built to categorise the complaints, address to whom the complaint should be escalated if not redressed, etc. Once the grievance is redressed, the

official updates the same with action taken and remarks, which the citizen can either see over the internet or enquire in the Citizen Facilitation Centres.

Process outputs

i. A grievance number is given to the citizen and this serves as a reference for future follow up. Status updating is also done based on the progress of the complaint redressal mechanism. The citizen can at any time find out the status of the complaints using the complaint number.
ii. An acknowledgement is given to the citizen for the complaint lodged in the form of a printed receipt.
iii. KDMC has formulated certain forms for capturing the complaint information, so that the data flow into the system is standardized.

Functional areas covered

The complaints received relate to all departments of KDMC. They are forwarded to the officials of the respective departments.

Strengths and weaknesses of the system

Strengths

i. The citizens can register either on the web or at the Citizen Facilitation Centres.
ii. Citizens can know the status of their complaints over the internet.
iii. The system does not demand the citizens to know the official to whom the complaint has to be addressed. In case the citizen is not aware of the department, the system provides an option for shifting the complaint to the appropriate department or specific officer.
iv. Automatic escalation of the unattended complaints to the immediate higher officer is made available in the system. This escalation continues up to the top official of any departmental, and if required the Commissioner.
v. Once the complaint is escalated to the next level officer, the official can access the virtual file in the system. While he can attend the case and resolve the issue, he should also update the issue/complaint status to his senior.

Weaknesses

i. No Call centres have been established. The citizen has to either log onto the web or visit a Facilitation Centre.

e. Food and Trade License Module

This module is used to grant License to Large/Small/Tiny scale category trades. Temporary license like Cracker license are also captured in this module. Fees for the Trade license will be collected for the defined License type, according to the 'Prevention of Food Adulteration Act, 1954'. Exhaustive data like License No. & Date (if issued), license holders name and address, Applicant type (Individual/ Organization), etc. are captured. This module is linked to the Property Tax Module, enabling cross verification of data.

An interface is provided to capture the information collected during field visits by the Food Inspector. If any flaw is encountered during the Inspection, Notice Report is sent to the License holder. Show cause Notice will be served to the License holder for some clarifications required by the food department along with the hearing dates. In case of any discrepancy found while inspection, the License can be suspended for a specific period. Suspension Notice of Food License is issued to the License Holder.

Strengths and weaknesses of the system

Strengths

i. System has link between modules like Assessment Module, which assists the Management in cross verification of certain information if required.
ii. This module enables to avoid maintenance of manual registers as the entire flow of the system is recorded in this module.

Weaknesses

i. While the system has certain basic reports, there is no prescribed MIS reports to help decision-making process.

f. Developmental Works Module

KDMC has implemented this module to track the ongoing developmental works carried out by the Engineering department of the Corporation. This module has a range of features and captures exhaustive information about the work right from the stage of proposal till the end of the work. Several forms have been provided for capturing SR details, Project based works, proposal of work, approval, tender details, billing information, etc.,

This module is still not fully implemented in the KDMC. Out of the total works, only about 450 works which are in the proposal stage, have been recorded in the database and are being updated in a phased manner.

Processes and procedures followed

When a work is proposed, the respective engineer records the work in this module along with various details of the work like (standard rates) SR, measurement, estimated cost, project details, etc. Work Flow is built in this module, by which the work is forwarded for approval to the higher authorities. After the necessary approvals, the work gets sanctioned and the tender process starts. This module enables printing of tender notices, tender form, etc. Provisions have been made in this module to capture tender details like the bids received, amounts of deposits received, etc., after which the necessary work orders are issued to the winning contractor. Bills are prepared by the system after inputs of measurements, etc. which are forwarded for payments.

Former process measures vs. redesigned process

No major redesigning of processes has been attempted. The existing manual procedures have been computerised. This module is still not implemented.

Process outputs

Certain basic reports have been developed, which gives information on measurement analysis, technical sanctions, measurement book abstract, status of works, count of works, the number of works at various stages, etc.

Functional areas covered

This module mainly covers the Engineering Department.

Strengths and weaknesses of the system

Strengths

i. Single source of information as single database is maintained for all the works.
ii. Comprehensive data is captured throughout the life cycle of the work, which could be used by the Management in decision making at various levels.
iii. Basic details of the work like SR, Measurements, Tender details, etc. are captured, exactly in line with the PWD codes.
iv. Technical evaluation of the work and its progress possible.
v. Work flow management is linked to this module, which enables all the levels of the management to monitor and review the works over the system.

Weaknesses

i. No major re-engineering has been done to improve control and efficiency.
ii. This module is not fully implemented in the KDMC.
iii. Contractor/Agency details are not captured which is data crucial to the work. As a result, control is lacking on the agency fixation.
iv. There is no system of monitoring the progress which would ensure that status updating is prompt on the part of the Engineering Department staff.
v. While the system has certain basic reports, there is no prescribed MIS structure in place to help in decision making.
vi. This module is not linked to the Accounts module.
vii. For certain processes like Tax rates, Deductions heads, billing logic, etc., the logic and formula of the process have been programmed in the code and are not flexible enough to be changed by the user. This makes the module vendor-dependent.
viii. Controls on certain processes are yet to be established. For eg., a closure certificate can be printed for any work any number of times, still providing scope for further billing.

g. Town Planning Module

This module assists in providing sanction like permission to construction of building on a Non agricultural land, Plinth Completion certificate, Layout approval, etc. This module is linked to the Property Tax Module and Trade License Module.

Processes and procedures followed

Manual procedure, followed earlier to computerization, used to lead to delay and a lot of paper work, and the most important thing, the citizen was not able to know the status of his application.

With computerization of the department, now citizens submit their applications at CFC at Kalyan. The JE from the department verifies that the application is complete in all aspects. If not, a rejection note is given to the applicant. Subsequent to the receipt of the application, it is sent to the concerned officer for scrutiny. The standardized scientific scrutiny sheet allows the Town Planning department to grant various permissions and certify completion of construction within the stipulated time period.

Former process measures vs. redesigned process

No major redesigning of processes has been attempted. The existing manual procedures have been computerised. However, as a result of computerisation, manual processing of work has reduced and is done through computers.

Strengths and weaknesses of the system

Strengths

i. Basic reports for viewing the plan applications, plan permissions etc., are provided in the module.
ii. IT is linked to the Property Tax and Trade modules for information sharing.

Weaknesses

i. This module is not linked to the Accounts module.
ii. No structured MIS built to enable decision making process.

h. Legal Module

This module acts as a Court Diary to the KDMC by providing the court schedule and hearings. All the cases since 1983 are available in the system.

The Legal department of KDMC deals with all matters related to Court Cases like filing of cases, appointment of Advocates, maintenance of hearing details, payments to the advocates, collection of para-wise comments from the related departments, etc.

All such cases are tracked in the system and this module is linked to the work flow management. Case history and periodical case statistics (such as registered cases, concluded, pending cases etc.) based on the selected departments, which has details related to cases made by corporation and cases against corporation are available in the database.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiatives at KDMC is given in **Table 14**.

Table 14: Snapshot view of the e-Governance initiatives at KDMC

Parameter	Details of Kalyan Initiatives
1. No. of Modules implemented	8
2. Platform/ Programming Language(s)/ Technology	JSP, Oracle D2K, VB
3. Software Architecture	2-tier
4. Deployment Architecture	Centralized
5. Database	Oracle
6. Connectivity	Optical Fibre, Leased Lines
7. Hardware Platform (Servers)	Sparc, Pentium
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Solaris, Windows 2000 – Server
10. Operating System (Clients)	Windows

Parameter	Details of Kalyan Initiatives
11. Software Applications	Property Tax Water Charges Birth & Death Complaints Mgmt. Trade License Works Mgmt. Town Planning Legal Module
12. Build or Buy	Contracted
13. Development Process	No recognized process
14. Backup Procedures	Backup daily to tape.
15. PPP Arrangements	-
16. Citizen Interfaces	citizen facilitation centres, website
17. Documentation	Very good documentation
18. Use of Local Language	Not used

4.1 Description of the Technical Architecture

a. Hardware

KDMC has planned for and deployed adequate infrastructure. The data centre has a centralized database server, which holds the database for all the modules. There is a separate application server for the 'CARE' module which is also the server for the Authentication module. There are two separate servers, one for anti-virus protection and the other for hosting the website. Detailed configuration of the hardware is provided in **Annex B19**.

b. Software

Kalyan has both web-based and client-server applications. The web-based applications are developed using Java Server Pages (JSP). The client server applications are developed using Developer 2000, Visual Basic. Oracle 9*i* is used as the database and Tomcat Server is used as the application server for web-based applications.

c. Operating System

Windows 2000 – Server Edition or Sun Solaris is used as the operating system for the various servers. Windows 2000 - Professional is used as the client operating system.

d. Network communication software

No evidence of usage of network communication software was found.

e. Systems management plan & network management plan

HCL Technologies Ltd. has supplied the hardware and setup the network for KDMC. They have also been contracted to provide maintenance services for the same. The systems are upgraded as and when the requirement arises with the approval from the Systems Manager. KDMC does not have any specific Network Management or Maintenance Plan.

f. Details of application and programming languages

The applications are developed using the client-server architecture model. There is an option to run the current applications through the browser using Oracle Application Server but this mode of deployment is not used at present. Module wise details are provided in **Annex B20**.

g. Details on the database system

The database software is Oracle 9i. The data from various CFCs (Citizen Facilitation Centres) are stored in the centralized server located at the head office CFC. All the modules access the common database. Detailed configuration of the database servers are provided in **Annex B21**.

h. Details on current network architecture

The Corporation has got a centralized database server located at the server room of the head office CFC. The CFC at each of the ward offices are connected to the head office through a 100 Mbps optical fibre line. The CFC of Ward-A is connected to the CFC of head office through a 11 Mbps RF connection. The CFC at Dombivli is connected through 2 Mbps leased line. More detailed information about the domain, IP addressing, etc. are provided in **Annex B22**. The network infrastructure in a graphical form is shown in **Figure 53.**

i. System interfaces with other systems

The system does not have interfaces with other software such as EDMS, GIS, etc.

j. Citizen interface

The citizen interface to the Corporation is through the Citizen Facilitation Centres (CFC) and through the website. Payments are collected only at the facilitation centres (except in one zone, where the bill-collector is used for direct collections). The website provides details about the demand of the citizens, defaulters and some reports that open to the citizens.

k. Level of computerization

The manual processes have been re-engineered and then computerised. The modules like Property Tax, Water Tax, Non-Tax, Birth and Death Certificate, Professional Tax, Payroll, etc. have been re-engineered to reduce the work load and time of the processes as discussed earlier.

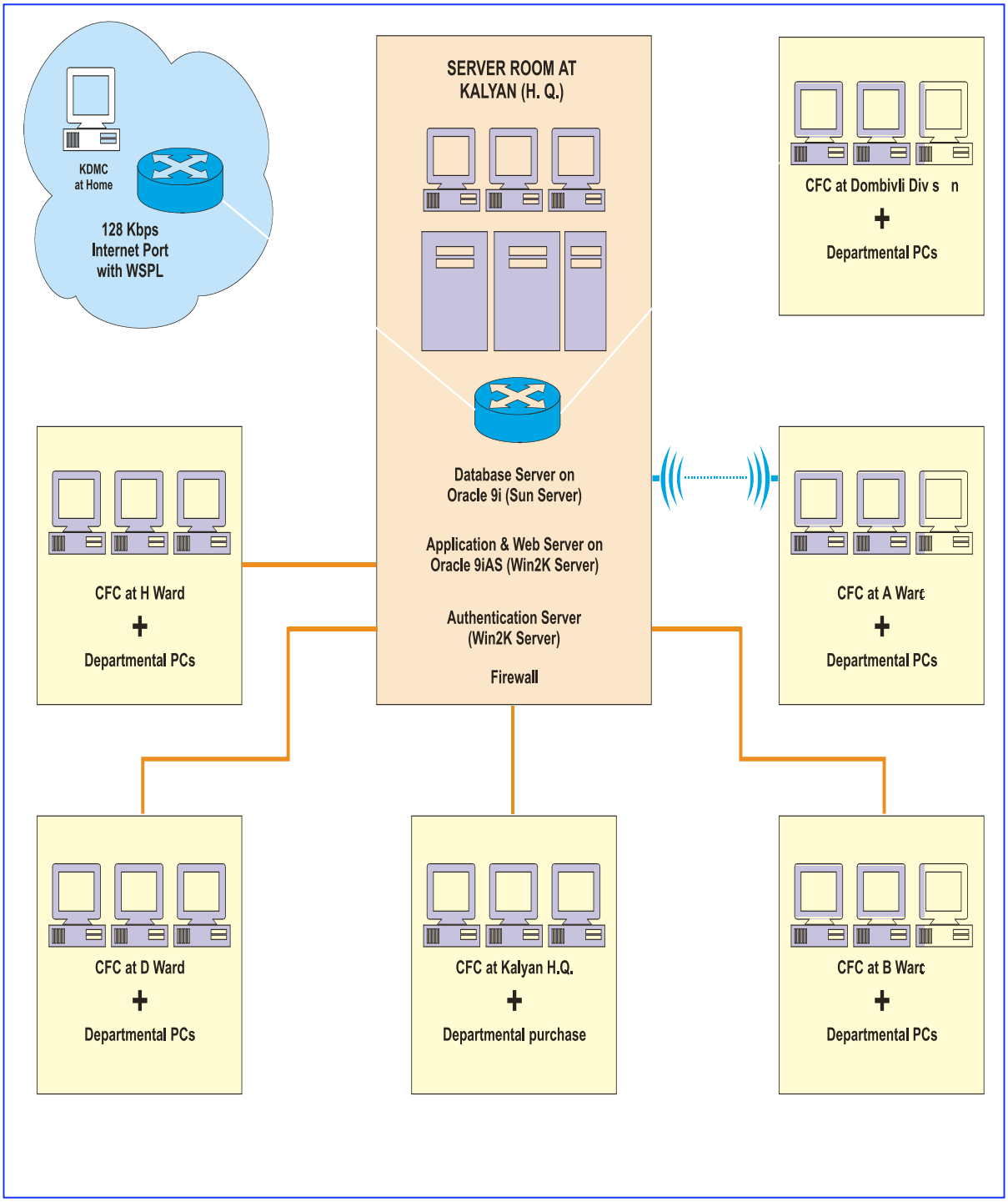
l. Quality of project documentation and user manuals

Project documentation is present for all the modules. The documentation is very descriptive and exhaustive. It addresses both the technical and functional aspects of the module. The user manuals are very descriptive and elaborate. Screen shots are provided in the documents for the user to easily understand the system. The user manual explains each and every form in the system.

m. Business continuity plan and disaster recovery plan

The database from the centralised server is backed up on a daily basis and a weekly cold backup is taken on tapes which are stored in a different location. In case of any disaster the data can be backed up from the tapes. Work is in progress to set up a mirror of the database at Dombivli which is a step in the right direction.

Figure 53: Graphical Representation of Network Infrastructure - KDMC



5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The centralized data centre is located at the head office. The hardware infrastructure in place is very good. KDMC has procured only the hardware that is needed and has not spent too much on ambitious infrastructure. KDMC has its own fibre optic network of 100 Mbps bandwidth, which is more than sufficient. KDMC has signed a Service Level Agreement (SLA) with HCL Technologies Limited for maintenance of the hardware and the network. The systems are operated on a stable network, which can be scaled at any point of time. There are SLAs which guarantee a specific response time for each complaint. There are specific time lines defined for each task, for example if there is a failure in the network then HCL has to restore the network within a specific time, based on the nature of the complaint, and if it fails to do so then KDMC is liable to collect charges from HCL on a hourly basis as penalty. If the response time overshoots KDMC collects a penalty from the service provider. The infrastructure is very reliable except for the fact that there is no hot backup or mirroring of data. Steps are taken to set up a mirror database at Dombivli. Once that is through then the KDMC infrastructure will be very dependable.

a. Potential of the current application and new application to be integrated/operated/hosted

Integration between the modules is provided to a large extent. New modules developed can be hosted and operated on the same infrastructure. Integration of the new modules with the existing modules will not be a problem if the modules are built on the same architecture as the existing modules.

b. Vendor dependence to independence

The modules for KDMC were developed by ABM and the IPR is with KDMC. Thus, KDMC is vendor independent and has full rights to change or modify or enhance the application at any point of time. KDMC has replicated the application software at Nagpur and Madgaon with some degree of customisation, which has been done by ABM. KDMC will always propose ABM for customisation of the application software, but it is left to the other party to decide whether to customise using ABM or not. While KDMC gains from the replication, ABM gains from the customisation.

c. Information security management and systems security

All the applications have been built over a base authentication module, which defines the role and privileges each employee in KDMC has, and which are the forms he/she is allowed to access. The security system is thus based on the role based access levels of the individual users accessing the system.

d. Systems auditing

There was no record of system audits having been carried out.

5.2 Systems Deployment and Training

a. Project management, monitoring and system development process

The project is totally monitored and administered by the Systems Manager of KDMC. Individual heads of the departments are given the responsibility for the requirements specification, workflow design and the access privileges of users at various levels to the application.

The typical approach to development is as follows:

- Requirements gathering based on discussions with department staff.
- Development using the appropriate technologies based on delivery.
- Initial round of testing by the developers based on requirements taken up for development.

As seen the development process follows the generic system development process. However, there is no recognized Software Development Life Cycle method that is being followed.

b. Speed in deployment/procurement - system installation time

The modules of KDMC developed by ABM were developed and rolled-out in about one year's time. The CFC at the head office was set up and the project was tested over a period of three months before it was fully operational.

c. Implementation approach and plan

The implementation approach adopted was as described below:

- Stage I
  - Gap Analysis–ABM and KDMC analyse the application software to find out whether all the requirements are addressed in the system.
- Stage II
  - Customisation –The application software after the gap analysis is customised to meet the users' requirements.
  - Parameterisation–The application software is further reviewed for both technical as well as functional aspects and if needed new parameters are introduced to make it robust.
  - Testing-After the requirements are fully addressed in the application, the software is thoroughly tested and validated to remove bugs, if any.
- Stage III
  - Implementation–The application software is handed over to the KDMC and the users are trained to use the system.

d. Manpower

The Systems Manager and his deputy are in-charge of the entire project management process and each of the HODs are given responsibilities for the proper functioning of their respective modules. An implementer is allotted for each module with extensive knowledge about both the technical aspects as well as the functionality. Users from various departments are trained in the module by the implementer who also resolves the queries posed by the users of the system.

e. User Training

The software vendor, ABM, have trained the users of the system. KDMC has appointed one person for each module, as Implementer, who is trained extensively on that particular module. The implementer of the module takes care of training requirements beyond that done by the vendor.

f. Support

KDMC have penned an SLA and AMC with the vendors of both hardware and software. The support is on-call basis. There is strict complaint response guidelines with penalty clauses included.

5.3 Details on Cost

KDMC has spent totally Rs.557.50 Lakhs for implementing the e-Governance initiative. The cost break-up is given in **Table 15**.

Table 15: Cost break-up of KDMC Initiatives

Sl	Expenditure type	Vendor	Amt. (Lakhs)
1	Computers & peripherals	HCL	122.57
2	Server(Hardware & Software)	Wipro	87.53
3	Networking	HCL	58.05
4	Anti-virus	NNM Systems	5.05
5	UPS	Enertech UPS Ltd.	8.78
6	Lease Line	BSNL + Web Surf Pvt. Ltd	29.14
7	Application Software	ABM	159.88
8	SRS	ABM	27.23
9	Project Management, Implementation, Training, Tender specs, Data Entry	ABM	55.15
10	Expert Committee Honorarium		4.13

5.4 Stakeholder Participation

a. Stakeholder usage and ease of access

All the stakeholder use the system basically due to the consultation process followed for implementation. The internal users do not have any issues with access to the system.

b. Cost of accessing

The details required for such an analysis was not available.

c. Popularity

The acceptance and usage by citizens is very good due to the very high level of convenience offered in comparison to the older system. Process re-engineering like colour coding of application forms have been widely appreciated by the citizens. The citizen response has been very positive. Furthermore, the Corporation employees have also recognized the benefits offered by the system and have been pro-active in its usage.

6. Lessons Learnt

- Leadership and commitment at highest level (Commissioner) required to ensure reforms.
- Gains from successful Property Tax initiatives can act as catalyst to push reforms forward.
- Role of service provider and clarity of ownership of software/hardware can enable smooth implementation of the initiatives.
- Ownership with employees in key position enables successful implementation and monitoring of the project.
- Freedom for champions to act enables the success of the initiative.
- Clarity in requirements and systematic approach helps the team to achieve success.
- Good System development documentation can be reused for replication.
- Process Re-engineering precedes functional requirement specifications in case of successful changes.

Coimbatore City Municipal Corporation

1. Linkages of State Level Initiatives to ULB Level Initiatives

Tamil Nadu Government, under the TNUDP II project, took up the computerization of all Urban Local Bodies. Coimbatore City Municipal Corporation (CCMC) took the TNUDP model as base, and developed modules as per its own requirements with the support of consultants. There was continued leadership within the organization throughout the implementation.

The GoTN has introduced a Urban Local Bodies Act 1998 and Urban Local Bodies Rules, 2000. This provides for uniformity in the functioning of all urban local bodies which has facilitated state-wide e-Governance initiatives. This is applicable now to CCMC also.

1.1 Objective of the e-Governance initiative

The main objective of the e-Governance initiatives in Coimbatore City Municipal Corporation (CCMC) is "Effective, Efficient and Transparent system to the Citizens and **Anything Anywhere**". CCMC wanted to achieve maximum transparency, faster service, provide process tracking and better citizen interface with the administration. CCMC adopted a phased approach for implementing the e-Governance modules aimed to markedly improve citizen welfare, operational productivity and efficiency, and revenue collection.

CCMC adopted a phased approach for the e-governance initiatives.

- Phase I Data Entry.
- Phase II Implementation of basic modules for demand generation.
- Phase III Establishment of WAN, LAN, and Internet.
- Phase IV Establishment of a centralized transaction management system.
- Phase V System Implementation.
- Phase VI Establishment of payment gateways.

2. Organization Structure

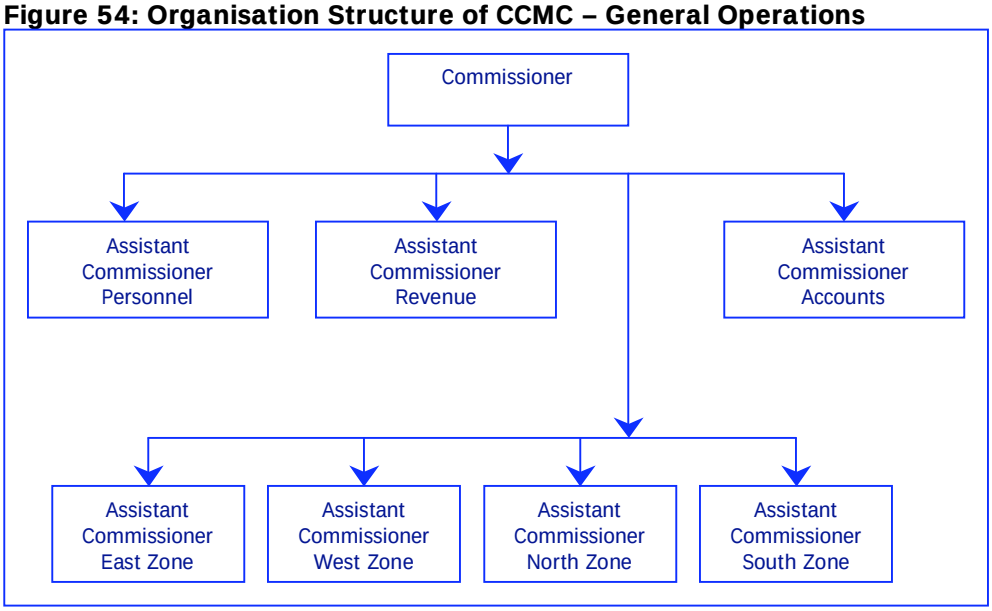
2.1 Organisation Structure

Commissioner heads the administration with the Mayor being the head of the elected representatives. Role of the elected representatives is mainly confined to the governance of the ULB and laying down of policies, guidelines, according approvals, etc., for the various developmental programs. Administration is responsible for the management, regulatory and developmental activities being carried out by the Corporation. The functions of the administration is carried out by the three the Assistant Commissioners of three functional areas with the supervision of the Commissioner.

The population of the city is about 13 lakhs covering an extent of about 105 sq. km. For administrative convenience, the Corporation jurisdiction has been divided into four zones: East, West, North and South, each headed by an Assistant Commissioner. In addition to the above, there are three Assistant Commissioners in the main office dealing with Personnel, Revenue and

Accounts. **Figure 54** shows the organisation structure of Coimbatore City Municipal Corporation.

Figure 54: Organisation Structure of CCMC – General Operations



2.2 Distribution of Roles and Responsibilities

The Commissioner does the functions of the Corporation, which can be broadly classified into two:

- Obligatory and
- Discretionary

The Obligatory duties relate to erection of substantial boundary marks defining the limits of the city, maintenance of public streets, roads, public health and other matters relating to sanitation and improvement of the city, etc. Matters which may be provided for the Corporation at its discretion relate to the general welfare of various classes of the population, transport facilities and furtherance of educational objectives, improvement of socio-economic status of the inhabitants of the city, etc. These constitute the discretionary duties.

Functions of the Municipal Commissioner

Commissioner is the head of administration and is assisted by a set of deputies as discussed. Apart from the regular obligatory and discretionary functions, the Commissioner is also responsible for good service delivery to the citizens, as a part of good governance.

2.3 New Organisation Structure

No major restructuring has been done in the existing organization structure. Though there was scope for such activity with the implementation of e-Governance initiatives, the existing staff have been doing the implementation with no changes in the structure. The data entry operations, however, are outsourced to an agency.

3. Key Municipal Functions

3.1 Modules in CCMC

a. Property tax module

The Property Tax Module is implemented by CCMC for collecting the Property Taxes of about 1.89 lakhs assessed properties. CCMC has set up facilitation counters in all its zones, to collect property tax from citizens, apart from providing other services to citizens. This software is developed by KGISL, who have been given the contract for developing various modules for computerization. Two modules have been developed for the property tax management, i.e. one module for administration/updating of data and another only for handling payments. CCMC has enabled collections at its facilitation counters as well as banks, so that citizens can pay their taxes anywhere.

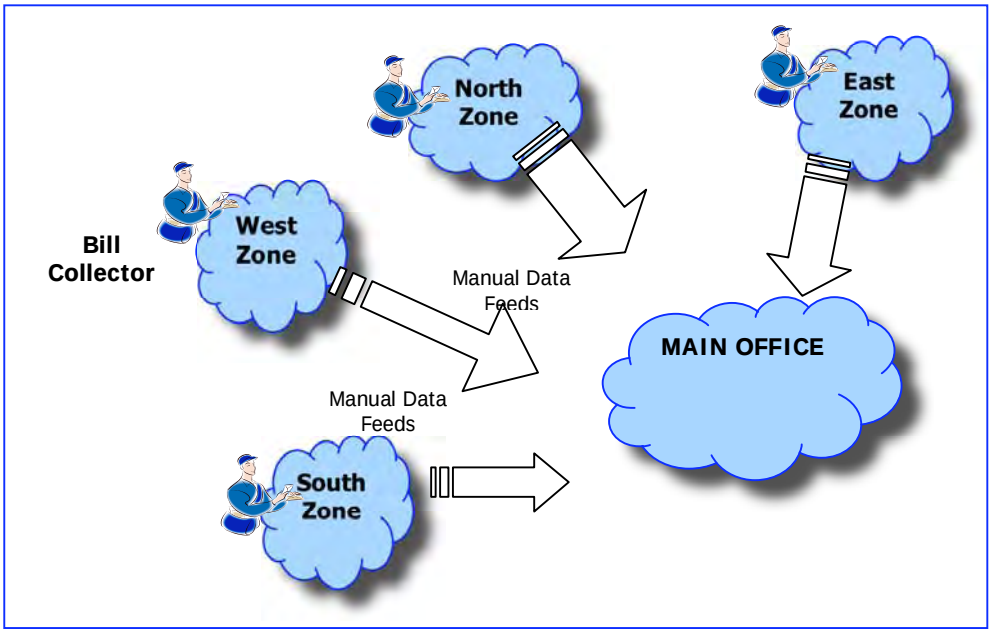
The property tax database was built by the CCMC using its existing manual records. Over a period, this database is being updated with the ongoing assessments. The Property Tax module enables generation of Demand Collection Balance (DCB) and daily collection reports. A range of MIS has also been provided addressing various levels of management. The software provides reports of various kinds with drill down facilities. Also, a standard format is maintained throughout all the modules for all the reports generated by the system. All the modules provide audit trail with date-time stamp for each transaction.

This module has been linked to the Water Tax module through the database. However, no integration is provided to the Accounts module.

Processes and procedures followed

The processes and procedures in the manual and the revised systems are shown in **Figures 55 and 56.**

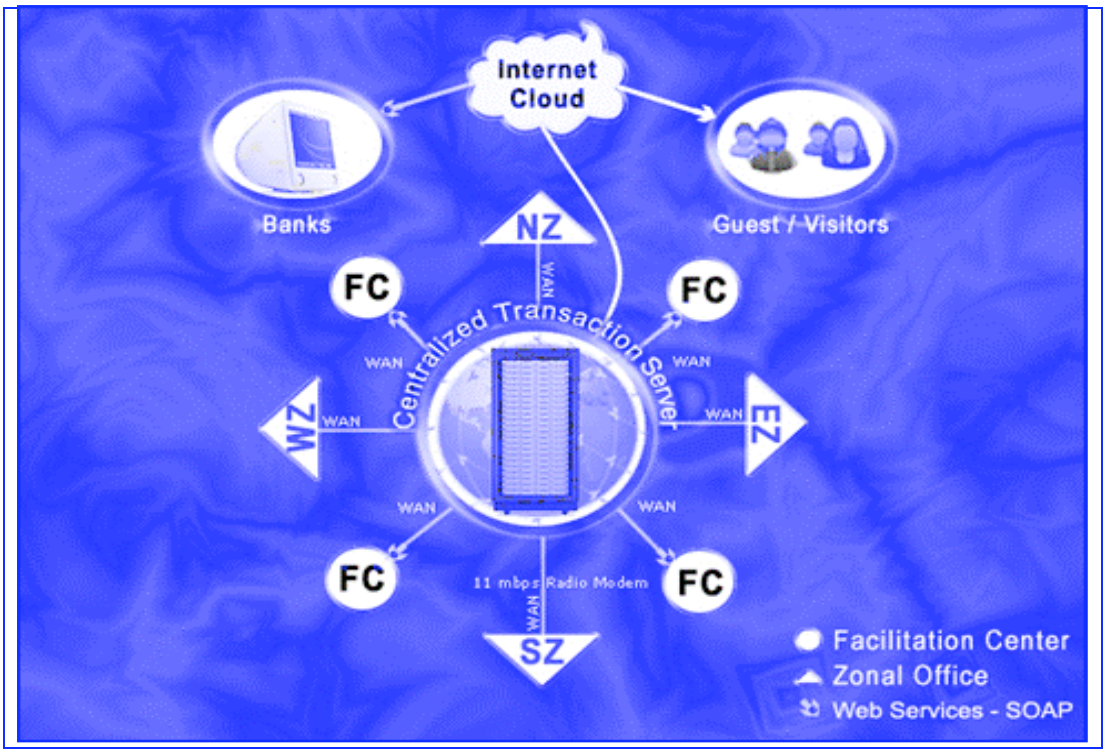
Figure 55: Manual System followed



Former process measures vs. redesigned process

Earlier, the property tax was collected by bill collectors visiting the citizens. The citizens also used to visit the corporation office to pay taxes. The entire process was done manually and all the records manually maintained. CCMC has established facilitation centres in the current system for collection of taxes and for various other services. Also, the software for collection of taxes has been installed in the designated banks, which directly talks to the central database in CCMC. This has enabled the citizens pay taxes either at banks or in the facilitation centres. The process for collections and updating of records has thus been simplified.

Figure 56: Computerised property tax collections



Process outputs:

i. The module prints a receipt for every tax collection.
ii. DCB is generated from the system.
iii. Daily collection reports, with various parameters like bank wise details, arrears-current break-up, etc., can be generated from the system.
iv. Defaulters of property tax payments.

Impact of laws and regulations

There is no major restructuring of activities as a result of introduction of the Property Tax module necessitating changes in governing rules and regulations. There is no security policy of the CCMC as of now either for Property Tax or the other modules.

Functional areas covered

The Property Tax module is in operation in the Head Office, and 4 Zonal Offices across the City. It is also in operation in facilitation centres and collection centres across the city. Functionally, the Property Tax module covers the Revenue Department. It is yet to cover the Finance Department, as accounting portion is yet to be linked.

Strengths and weaknesses of the system

Strengths

i. The database has been refined over the last two years and is relatively free of errors.

ii. This module has made the life of the citizens easier, as the touch points with the Corporation employees has decreased and the citizens can pay their taxes in any of the facilitation counters, collection centres and designated banks.
iii. Citizen can know their demand and balance over the internet.
iv. As the Property Tax module is linked to the Water Tax module, the citizen can know the status of both tax dues simultaneously over the internet.
v. MIS reports generated at all levels of management for better decision making.

Weaknesses

i. The necessary Process Reengineering that should have accompanied the implementation of such a module has not been done.
ii. The system is poor in integration aspects. Accounting entries for amounts collected have to be passed separately in the accounting system since the two modules are not yet integrated. While increasing the workload on the operational staff, this also compromises on control aspects.
iii. No specific Property identification number is assigned to each property apart from the unique default number in the database.

b. Water charges module

CCMC has implemented a module for billing and collection of water consumption charges for about 94,000+ consumers. This module enables recording of new water connections also. A unique number is generated for every new water connection.

However, the process is not totally computerized. No process reengineering was done to streamline the existing processes. In the existing process, the meter readers would go to the individual locations, read the meters and intimate the consumer of the amount payable. This process continues as it is, except that now the citizen does not pay to the Corporation officials, but pays it in the collection centres or banks.

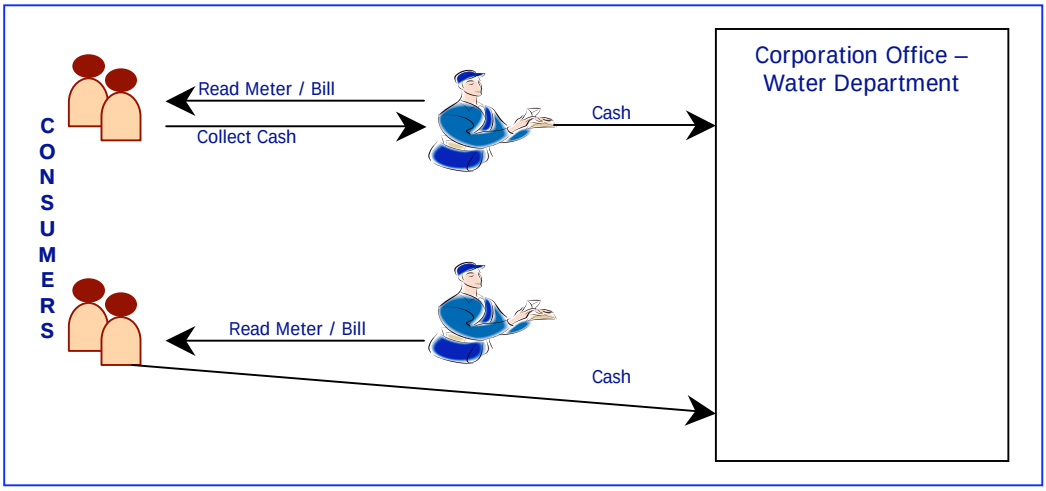
This module accepts the meter reading and the amount, and records in the database. When the consumer pays the amount, the payments are also recorded against the water connection.

This module has been virtually linked to the Property Tax Module through the database for about 25,000 connections. However no integration is provided with the Accounts module.

Processes and procedures followed

The processes and procedures followed in the manual and revised systems are shown in **Figure 57 and 58**.

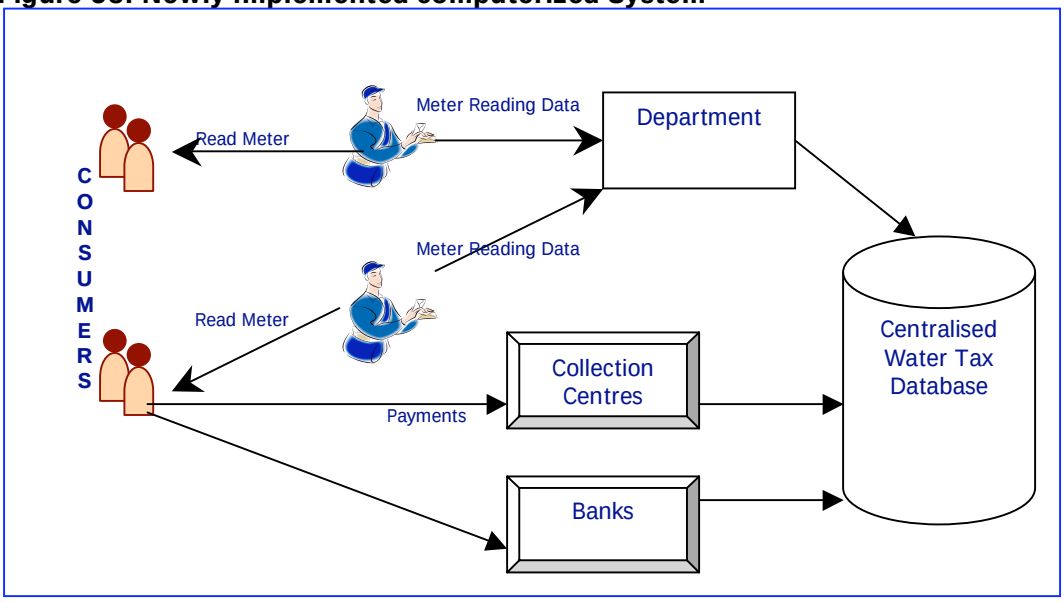
Figure 57: Manual System followed



Former process measures vs. redesigned process

The existing processes have been computerised and no redesigning or reengineering has been undertaken. The process of billing has been computerised. However, no controls have been exercised in the system to overcome the problems faced in the manual system. The manual work of recording payments has been reduced.

Figure 58: Newly implemented computerized System



Process outputs:

i. The module prints a receipt for every collection.
ii. DCB is generated from the system.
iii. Daily collection reports, with various parameters like bank wise details, arrears-current break-up, etc., can be generated from the system.

Impact of laws and regulations

There is no restructuring or process-reengineering done.

Functional areas covered

The Water Charges module is in operation in the Head Office, and 4 Zonal Offices across the City. It is also in operation in facilitation centres and collection centres across the city. Functionally, the Water Charges module covers the Revenue Department. It is yet to cover the Finance Department.

Strengths and weaknesses of the system

Strengths

i. This module has made the life of the citizens easier, as the touch points with the Corporation employees has decreased and the citizens can pay their taxes in any of the facilitation counters, collection centres and designated banks.
ii. Citizen can know his dues over the internet.
iii. As it is linked to the Property Tax module, the citizen can know the status of both tax dues simultaneously over the internet.

Weaknesses

i. Existing manual system is computerized. The necessary Process Reengineering that should have accompanied the implementation of such a module has not been done.
ii. The system is poor in integration aspects. Accounting entries for amounts collected have to be passed separately in the accounting system since the two modules are not yet integrated.
iii. Though about 25,000 connections have been linked to the Property Tax module, still 2/3rd of the volume is not linked.
iv. Though this module is linked to the Property Tax module, the name transfer in the Property Tax module does not automatically hit this module. This process is still done manually only after intimation by the consumer, which results in undue delays and hassles.
v. The computerized system does not overcome the problems faced in the earlier manual system of billing, i.e., no slab/rates master has been built in the system which requires manual calculation of charges, and could lead to lack of control over revenues.
vi. No bill or demand notice is served to the consumers.

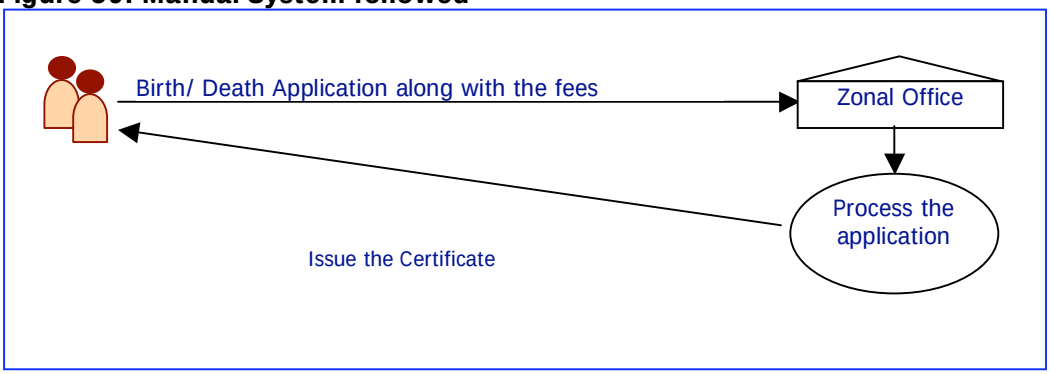
c. Birth and death module

The Birth and Death Module is used to record births and deaths and issue certificates. The database of records was built up for the last few years for births/deaths as part of the implementation process. The process of registration and issue of certificates has been simplified.

Processes and procedures followed

The procedures that were followed earlier manually have been retained. The facilitation centres collect the charges from the citizens and after co-ordination with the department and zones for the process, issue certificates to the citizens. **Figures 59 and 60** show the former process and the redesigned process.

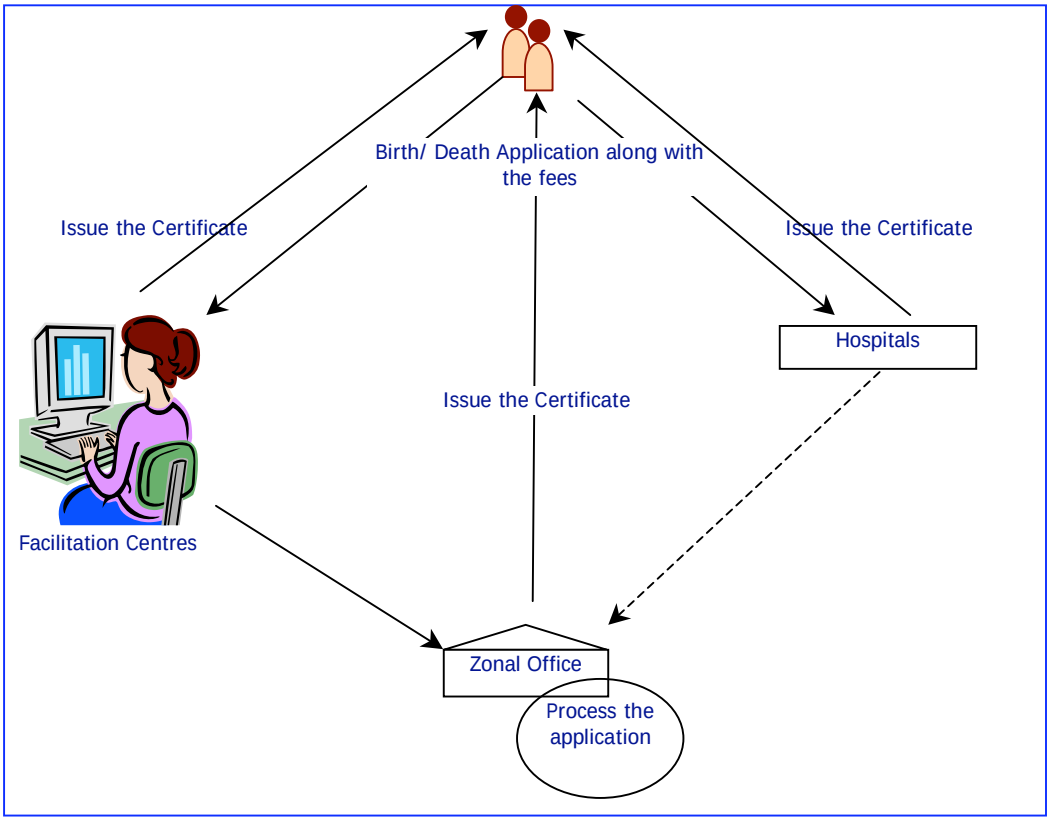
Figure 59: Manual System followed



Former process measures vs. redesigned process

The existing processes have been computerised and no redesigning or reengineering has been undertaken. Citizens now apply for the certificates in the facilitation centres instead of approaching the corporation offices. Also there is coordination between the hospitals and the CCMC for data related to the birth and death events. In this regard database is being built and slowly connections with various hospitals are being established.

Figure 60: Newly implemented Computerized System



Process outputs

The system generates Birth and Death Certificates on payment of the requisite fees. The details are available for the citizens over the internet.

Impact of laws and regulations

Operationally, it is stated that there are no major changes required in the legislative framework. Once CCMC decides to go in for online payments, online downloading of forms, etc., certain changes may be required to facilitate the same.

Functional areas covered

The Birth and Death Module covers the Statistical Department only, covering the function of issue of birth & death certificates. There are no direct links with the Finance and Accounts Department.

Strengths and weaknesses of the system

Strengths

i. The process has been streamlined to the convenience of the citizens.
ii. MIS related to the birth and death statistics is available to the management.
iii. Information of birth and death and the status of registration etc., are displayed over the internet for the citizens.

Weaknesses

i. There is no link between death and birth event of a citizen.
ii. Process for actual verification of births and deaths is weak.
iii. Not linked to Accounts module.

d. Grievance Redressal System

The Citizens' Grievance and Redressal System is operational in CCMC, wherein citizens can register their complaints over the web. The citizens can also manually submit their grievance at the facilitation counters, wherein the CCMC staff will record it in the system.

Processes and procedures followed

The citizens need to address the grievance to the particular official for redressal. Each complaint is recorded with a unique 11 digit code which is given to the citizen. These complaints are monitored by the CCMC officials, and forwarded to other officials depending on the type and nature of the complaint. Automatic scaling/redressal has not been enabled in the system. Once the grievance is redressed, the official updates the same with action taken and remarks, which the citizen can either see over the internet or enquire in the facilitation counters.

Process outputs

i. Eleven digit grievance number is given to the citizen which serves as the reference for future follow up. Status updating is also done based on the progress of the complaint. The citizen can at any time find out the status of the complaints using the complaint number.
ii. There are no printed forms or documents involved in this module apart from reports indicating the status of the complaints received.

Functional areas covered

The complaints received relate to all departments of CCMC. They are forwarded accordingly to officials of various departments. Geographically, the system covers all areas coming under the jurisdiction of CCMC.

Strengths and weaknesses of the system

Strengths

i. The citizens can register either on the web or in the facilitation counters.
ii. Citizens can know the status of their complaints over the internet.

Weaknesses

i. The system requires the citizens to know the official to whom the complaint has to be addressed. But in many cases, the citizens may not have this knowledge.
ii. There is no system of automatic escalation of unattended complaints.
iii. There is no system of internal performance monitoring accompanying the Complaint Redressal System to ensure that the problems are promptly attended to and after attending are promptly updated in the database.
iv. There is a lot of scope for building in analytical reports to support performance evaluation.

e. Non-Tax module

Basically, this module is about collection of rent from leased properties. This module captures details of leased properties like shops, markets, commercial complexes, etc. About 2,266 leased properties are covered under this module. The rent receipts are collected in the facilitation centres/collection centres/banks and are updated in the database.

This module also enables to capture the basic details of the property like measurement details, lessee, etc. But some vital data like location etc. are not captured. This module is stand-alone

and is not integrated to any other module. There is scope for enhancing controls, if this module can be linked up to the Assets module and Accounts module. The module provides for interest calculation on delayed payments, but the interest rates and timing are not driven by any master and instead are hard coded in the program. Collection reports, defaulters list, etc. are generated from the system.

Processes and procedures followed

The procedures followed in this module have not changed much after computerisation. The module provides generation of demand for collection of rents from various properties. The procedures followed are similar to those of the property tax module and the rent payments are collected at facilitation counters and banks.

Process outputs

Basic reports on the demand and collection are available. Since all the master information is available in the database necessary reports as required can be generated.

Functional areas covered

This module mainly covers the Revenue and Estate Departments only.

Strengths and weaknesses of the system

Strengths

i. The database of all the properties belonging to CCMC is available.
ii. The leakage of revenue due to non-collection of rents under control.
iii. Provides scope for revision of rents.

Weaknesses

i. Interest calculation is hard coded.
ii. Not integrated to Accounts module.
iii. Not integrated to Assets module.

f. Developmental Works Module

CCMC has implemented this module to track the ongoing developmental works carried out by the Engineering department of the Corporation. This captures basic details of works and displays them over the internet. This serves as a comprehensive record of the non–financial aspects of works.

Processes and procedures followed

As and when an engineering work gets administrative approval, it is recorded in this module by the respective Assistant Engineers of the wards. Then the physical progress of the work is tracked and updated in the system, by the respective engineers. This information is also displayed on the web. This module does not capture the financial details of the work, and stops at capturing the physical progress of the work. It is not linked to the Accounts module.

Process outputs

Certain basic MIS reports have been developed, which gives information on status of works, count of works, the number of works at various stages, etc.

Impact of laws and regulations

No major restructuring of activities has been done to necessitate the smooth functioning of this module. Further no financial information is involved in this module.

Functional areas covered

This module mainly covers the Engineering Department only. Geographically, even though it is available in the Head Office and the Zonal and ward offices, it is being used only in the Head Office. It covers the Accounts department.

Strengths and Weaknesses of the System

Strengths

i. Single source of information as single database is maintained for all the works.
ii. Physical progress of works can be seen over the internet.
iii. MIS related to progress of the works are made available to the management.

Weaknesses

i. The system captures only the physical progress of the works. No financial information is captured and is not linked to the Accounts module.
ii. Existing system is computerized and no reengineering has been done to improve control and efficiency.
iii. This module is not fully implemented in the CCMC.
iv. There is no system of monitoring the progress which would ensure that status updating is prompt on the part of the Engineering Department staff.
v. While the system has certain basic reports, there is no prescribed MIS structure in place to help in decision making.

3.2 Agencies involved in providing solutions to CCMC

The following agencies are involved in providing various solutions related to software and hardware, to CCMC:

i. KGISL
ii. Helix Automations
iii. STPI

KGISL

The role of KGISL has mainly been in providing software related solutions to CCMC. KGISL has designed and developed all the modules explained in the above processes, for CCMC. KGISL has implemented these modules and has also provided training to the staff of CCMC. However, currently KGISL has provided manpower for running of certain modules and administration of software and hardware. There is no clear agreement between CCMC and KGISL for the software solutions.

Apart from software solutions, KGISL has also played a major role in providing network solutions to CCMC. There is an agreement between CCMC and KGISL for WAN connectivity in CCMC.

Helix Automation

Helix Automation is appointed by CCMC for maintenance of systems. There is an agreement between CCMC and Helix Automation for AMC of the systems at CCMC.

STPI

CCMC has also signed an agreement with STPI for availing softnet services. The agreement by CCMC is for the use of STPI's High Speed Value Added Datacom Network in Coimbatore at the rate of Rs.4.50 Crores per annum. In other words, STPI provides the 'Radio Frequency' Network in Coimbatore for connectivity between zones. STPI ensures reliable and error free Datacom services to CCMC and also endeavours to provide fault response time of two hours.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiatives in Coimbatore is given in **Table 16**.

Table 16: Snapshot view of the e-Governance initiatives in Coimbatore

Parameter	Details of Coimbatore Initiatives
1.No. of Modules implemented	6
2. Platform/ Programming Language(s)/ Technology	VB, ASP
3. Software Architecture	2-tier
4. Deployment Architecture	Centralized
5. Database	Oracle
6. Connectivity	RF, ISDN
7. Hardware Platform (Servers)	Xeon
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Windows 2000 – Server
10. Operating System (Clients)	Windows
11. Software Applications	Property Tax Water Charges Birth & Death Complaints Mgmt. Collections Works Mgmt.
12. Build or Buy	Contracted out
13. Development Process	No recognized process
14. Backup Procedures	Backup daily to tape.
15. PPP Arrangements	KGISL
16. Citizen Interfaces	City civic centres, banks, website
17. Documentation	No documentation
18. Use of Local Language	Not used

4.1 Description of the Technical Architecture

a. Hardware

Coimbatore Corporation has very limited hardware infrastructure. It has a single centralized server which holds the database as well as the server application. The client systems are typical PCs, running on Windows XP operating system. Detailed configuration of the hardware is provided in **Annex B23**.

b. Software

Web-based applications are developed using Active Server Pages (ASP) and Internet Information Server is used as the web server for web-based applications. The client-server

applications are developed using Visual Basic 6.0. Oracle 9*i* is used as the database for all modules.

c. Operating System

Windows 2000-Server is used as the server operating system. Windows XP is used as the client operating system.

d. Network communication software

No evidence of usage of network communication software found.

e. Systems management plan & network management plan

Systems are under Annual Maintenance Contract with a local vendor. There is no evidence of a periodical upgrade of the systems. The systems are upgraded as and when the requirement arises with approval from the Commissioner. Coimbatore Corporation does not have any specific Network Management or Maintenance Plan.

f. Details of application and programming languages

The Corporation has adopted the client-server architecture for all the modules. One point of note is the use of Simple Object Access Protocol (SOAP) for a more secure means of operation of the application. However, such a claimed benefit has to be explored further before adoption. Module-wise details are provided in **Annex B24.**

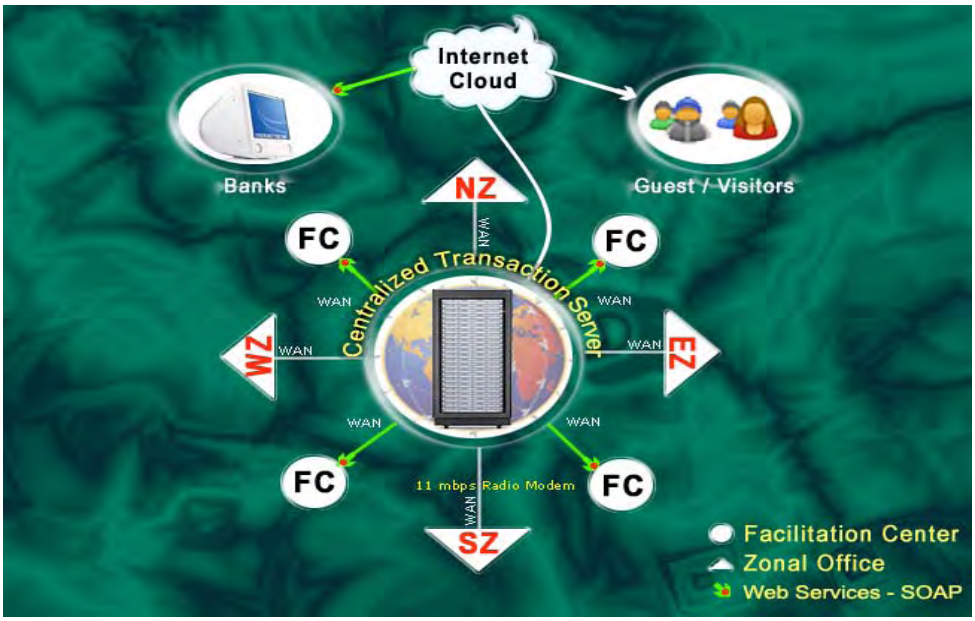
g. Details on the database system

The database is an Oracle 9*i* database. The data from various zones are stored in the centralized server located at the head office. All the modules access the common database. Detailed configuration of the database servers are provided in **Annex B25**.

h. Details on current network architecture

The Corporation has a centralized server which acts as the database server as well as the application server. All zone offices and the head office are connected to the RF station located at the K.G. hospital through an 11 Mbps RF connectivity facility. The terminals within the zone offices are connected through the Intranet. The banks are connected through the ISDN leased line. RF connectivity is provided by STPI. More detailed information about the domain, IP addressing, etc. is provided in **Annex B26.** The network infrastructure in a graphical form is shown in **Figure 61.**

Figure 61: Graphical Representation of Network Infrastructure



i. Internet/Intranet components

Almost all the transactional modules have been developed on a client-server mode and are served over the intranet. However, some of the reports from the modules are published over the web with varying levels of access to data for citizens and Corporation staff.

j. System interfaces with other systems

The current system does not have interfaces with other systems such as EDMS, GIS, etc.

k. Citizen interface

The citizen interface with the Corporation is through the facilitation centres, banks and the website. Payments are made at the facilitation centres located at the zone offices and at various banks. The facilitation centres located at places other than the zone offices collect applications from the citizens for various services. The website provides details about the tax demand for the citizens, defaulters and also provides access to some reports.

l. Level of computerization

The computerization of the existing manual process has been done. The modules like Property tax, Water tax, Non-tax, Birth and Death Certificate, Professional tax, Payroll, etc. are computerized. There is very little reengineering done on the existing process.

m. Quality of project documentation and user manuals

There is no documentation provided for the modules except for a few. The knowledge of the system is restricted to a few individuals which is not healthy in the long-term. There are no standard user manuals for any of the modules. The Study team was also given only limited access to the user manuals that were present.

n. Business continuity plan and disaster recovery plan

The Corporation has no disaster recovery mechanism in place. The recovery of lost data is done by restoring the data from the daily cold backup. Since the daily data backup is stored in the same location as the server there are no chances of recovery from major disasters.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The hardware infrastructure currently in place is very limited but the infrastructure is able to handle the current load. The network available is suitable and satisfies their current requirements. The infrastructure in place has only one server that acts as the centralized database server, server for the applications and the firewall server. Even though it is able to handle the current load it is neither a reliable nor a stable solution.

a. Potential of the current application and new application to be integrated/operated/hosted

Integration between the modules is provided to a limited extent. New modules developed can be hosted and operated in the same infrastructure. However, to develop an effective integration to the core modules, such as accounting, it might be necessary to re-develop bulk of the software.

b. Vendor dependence to independence

The basic modules have been provided by TNUDP over which base the current e-Governance modules have been built by KGISL. The IPR for the software rests with the vendor and only a usage license has been provided to the Corporation. Since the IPR is not with the Corporation there is a certain degree of dependence with the vendor for further enhancements and modifications. There are no replication agreements with the vendor.

c. Information security management and systems security

A SOAP based payment gateway has been designed for secure transactions. The software is locked to the machine to provide additional security along with role-based security for all transactions. Online payment facilities have not been provided at present.

d. Systems auditing

There is no evidence of system audits having been conducted for the various processes.

5.2 Systems Deployment and Training

a. Project management, monitoring and system development process

There is no clearly documented/recognizable approach to the project management process.

The typical approach to development is as follows:

- Requirements gathering based on discussions with department staff.
- Development using the appropriate technologies based on delivery.
- Initial round of testing by the developers based on requirements taken up for development.

As seen the development process follows the generic system development process. However, there is no recognized Software Development Life Cycle method that is being followed.

b. Speed in deployment/procurement - system installation time

The modules that were developed by KGISL were developed and rolled-out in moderately quick time. The time span for the development of the system, from the initial base provided by the TNUDP software, was around 5 months with an installation time of around 2 days on all server and client machines.

c. Implementation approach and plan

The implementation approach adopted is described below:

i. Data Entry.
ii. Implementation of basic modules for demand generation.
iii. Establishment of WAN, LAN, and Internet.
iv. Establishment of a centralized Transaction Management System.
v. System Implementation.
vi. Establishment of payment gateways.

d. Manpower required to operate the system

An Assistant Programmer had been recruited by the Corporation as part of the initial TNUDP initiative. Presently, the assistant programmer along with a team from KGISL is involved with day-to-day maintenance of the system. The software is under an Annual Maintenance Contract with KGISL at present.

e. Amenability of Service Delivery through PPP mode

The system has no limitations to delivery via PPP(Public Private Partnership) mode. The Corporation has tied up with various banks to provide collection facilities and the banks also use the same system as part of these operations.

f. User Training

The user training is taken care of by KGISL and is covered under the annual maintenance contract (AMC). There is no documentation available on the methodology.

g. Support

The Corporation has signed an AMC with the vendor for support for the software. The contract is for the duration of one year. A member from the project development team is deployed full time in the Corporation site for support.

5.3 Details on Cost

The costs of the various components of the system as mentioned by the Corporation are as follows:

- Rs. 46.00 Lakhs for their hardware procurement.
- Rs 2.50 Lakhs for the application software provided by KGISL.

This is apart from the inputs CCMC obtained from TNUDP.

5.4 Functionality

The modules developed currently serve the specific purpose of computerization of existing processes and cover the necessary functionality. The local language (Tamil) has not been used either for the data or for the user interface. However, some Tamil is used for static text in places such as birth certificates. The software is user-friendly and several usability factors such as common shortcuts across all the modules have been considered during the design.

5.5 Stakeholder Participation

a. Stakeholder usage and ease of access

Stakeholder usage is very high because of the absence of a manual system fro many of the modules. The internal users do not have any issues with access to the system.

b. Cost of accessing

The details in this regard could not be obtained during the study.

c. Popularity

The acceptance and usage by citizens is very good due to the very high level of convenience offered in comparison to the earlier system. The citizen response has been very positive. Furthermore, the Corporation employees have also recognized the benefits offered by the system and have been pro-active in its usage.

6. Lessons Learnt

- Phased approach to design and implementation of the system helps in fostering success.
- Creating databases for various modules is the key issue and needs to be addressed at the beginning of the project.
- Employees of the Corporation need to be used for data compilation and for implementation.
- Though outside service providers could be used, the data maintenance and management need to be done by the employees.
- In specialized areas like accounting, support of specialists (Chartered Accountants) is required; handholding and training are required in such areas.
- Common databases not only help in increasing efficiency but also provide increased controls.
- Integration to accounting of various modules is required to have credible MIS.
- Exclusively identified staff (accountable) required for handling specific functionalities.

Tiruchirappalli City Municipal Corporation

1. Linkages of State Level Initiatives to ULB Level Initiatives

The e-Governance initiatives in the Tiruchirappalli City Municipal Corporation (TCMC) have been a part of the overall State level e-Governance initiatives in Tamil Nadu. The Corporation has had total support from the State Government in all regards such as hardware, communication infrastructure, software, etc. for implementation of the initiatives. Thus this has been one instance of a successful State level initiative proving to be a driver for the implementation of reforms in the ULBs.

1.1 Objective of the e-Governance initiative

The e-Governance at Tiruchirapalli is aimed at providing on-line citizen services, furnishing information to all levels of the hierarchy within the Corporation and monitoring its performance. "The commissioning of the system is expected to provide a push towards bringing about transparency in the civic services besides contributing to better administrative efficiency and accessibility to information" summarises the intentions of the TCMC in the introduction of various e-Governance initiatives.

The salient features of e-Governance initiatives in Tiruchirapalli include:

- On-line dues payment.
- Property Tax.
- Water Charges.
- Non-Tax.
- Professional Taxes.
- Issue of various certificates:
- Birth Certificate.
- Death Certificate.
- Building Plan Approval.
- Trade License.
- Registration of On-line Grievances/Complaints.
- Provision of downloadable applications.

2. Organization Structure

2.1 Organisation Structure

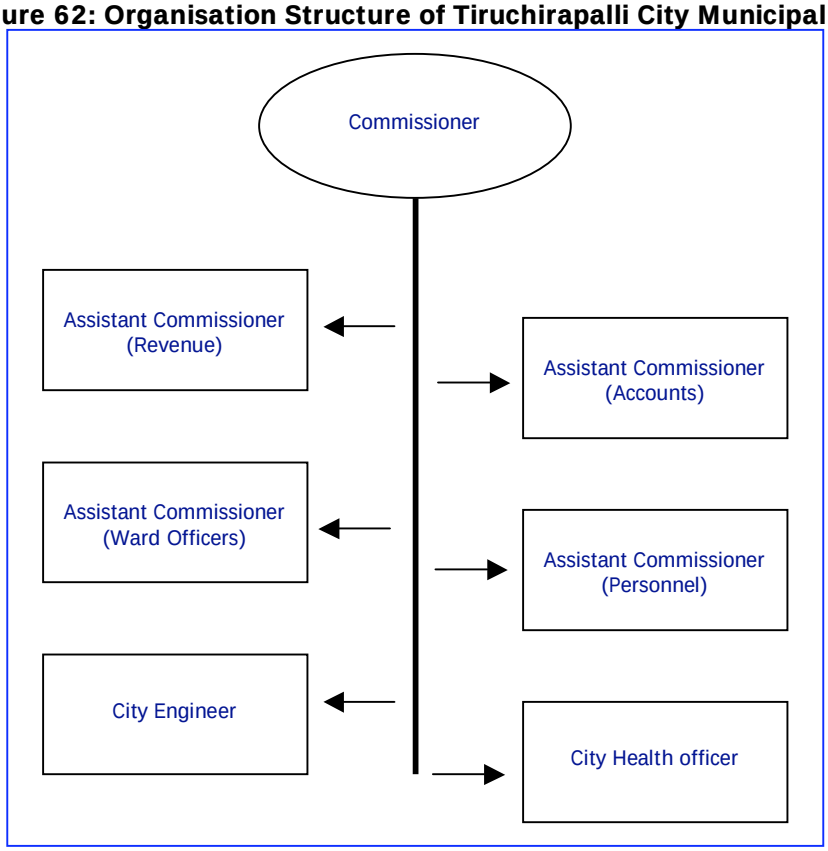
Tiruchirappalli Municipality was constituted on 08.07.1866. The Municipality was upgraded as Corporation with effect from 01.06.1994. The administration of the Corporation is carried out according to the Tiruchirappalli City Municipal Corporation Act 1994. The GoTN has introduced a Urban Local Bodies Act 1998 and Urban Local Bodies Rules, 2000. This provides for uniformity in the functioning of all urban local bodies which has facilitated state-wide e-Governance initiatives. This is applicable now to TCMC also.

The Tiruchirappalli City Municipal Corporation was constituted with a directly elected Mayor and 60 wards and elected Councillors who represent these wards. Commissioner is the administrative head of the Corporation with support team.

The Commissioner is supported by four Assistant Commissioners for Revenue, Accounts, Personnel and Ward offices. Other key departments of Engineering and Health are respectively held by City Engineer and City Health Officer. These heads of the departments are supported by a complete technical and administrative team reporting to them.

The organisation structure of the Tiruchirapalli City Municipal Corporation is given in **Figure 62**.

Figure 62: Organisation Structure of Tiruchirapalli City Municipal Corporation



2.2 New Organisation Structure

The organisation structure has not undergone any effective change due to the e-Governance initiatives. A separate IT department does not exist in this Corporation. But as a result of a state wide initiative, an Assistant Programmer post has been created, and various data entry operators have been appointed and are being paid on a daily wages scheme.

Hence there are no major changes in the organization structure except for:

- Creation of Assistant Programmer post.
- Contract staff working as data entry operators.
- Creation of a computer centre.

2.3 Decision making process within the ULB

Commissioner

- Can call for any information needed to take a decision at the Corporation.
- Has the power to decide on the role played by the Assistant Commissioners, higher officials and clubbing of responsibilities for officials.

Assistant Commissioners

- Disconnect water supply due to default.
- Inspection of various places and properties of the Corporation.
- Correspond with the government departments such as call for reference, acknowledgement, etc.
- To sign as "for Commissioner" in all fair copies of the draft approved by the Commissioner.
- Refuse license for dangerous and offensive trades.
- Pass orders on vacancy remission permission.
- Issue Annual Rental value certificates.
- Call for any information from other heads of departments and ward offices.

Assistant Commissioners (Accounts)

- Control over staff in the department.
- Power to prepare the Corporation Budget.
- Signing of cheques in banks and bills to be presented at the Treasury for adjustment and enhancement.
- Curtail and control expenditure within the budget allotment.
- Implement the system of accrual base accounting and arrange to feed all account figures in computer in new procedure.
- Settlement of PF Account payment in routine cases.
- Make payment of annuities on government and other loans.
- Sanction refund of deposits other than security deposit of employees.
- Surprise check of cash in treasury of the Corporation.
- Scrutinize all subsidy accounts and registers of the expenditure side.
- Attend to all matters affecting the finance and accounts of the Corporation below submitted to the Commissioner regarding all estimate files, tender and quotation papers, proposal for write-off of taxes and fee.
- Scrutinize all papers relating to grants, loans and investment, etc.
- Sanction all payments vouchers such as Establishment bills, P.A. recoupment vouchers and other vouchers delegated in payment order issued by the Commissioner.

City Engineer

- Granting of domestic water supply connection.
- Prohibit construction of building over drains.
- Initiate disciplinary action on technical staff for lapses and send file to commissioner for final orders, through AC/P.
- Report on progress of works and other functioning in the respective ward offices and apprise Commissioner weekly or as and when directed.
- Enter into agreement on behalf of the Commissioner for estimates within the technical sanction powers given to him.
- Monitor various projects, budget works, central schemes innovating projects, water body cleaning, solid waste management, water supply, pumping stations, etc.
- Be responsible and accountable for all the decisions taken by him.

City Health Officer

- Overall in-charge of all matters concerning health and sanitation.
- Control rubbish and filth by arranging for the periodic removal of the same.
- Control of epidemics and endemics through proper management.
- Maintenance of proper sanitation and hygiene of the City area.

3. Key Municipal Functions

3.1 Key Municipal Functions

The TCMC performs various functions as listed out in the Constitution's 74th Amendment, which aims at making the Urban Local Bodies (ULBs) as vibrant Local Self Government Institutions. Some of the major functions performed by TCMC are:

- Regulation of land-use and construction of buildings.
- Roads and bridges.
- Water supply for domestic, industrial and commercial purpose.
- Public health, sanitation facility and solid waste management.
- Provision of urban amenities and facilities such as parks.
- Promotion of cultural, educational and aesthetic aspects.
- Burials and burial grounds; cremations, cremation grounds and electric crematoriums.
- Cattle ponds; prevention of cruelty to animals.
- Vital statistics including registration of births and deaths.
- Public amenities including street lighting, parking lots, bus stops and public conveniences.

3.2 Modules in Tiruchirapalli City Municipal Corporation

All the ULBs in Tamil Nadu adopt similar modules due to the state-wide initiative. The key modules implemented in TCMC are:

a. Property tax module

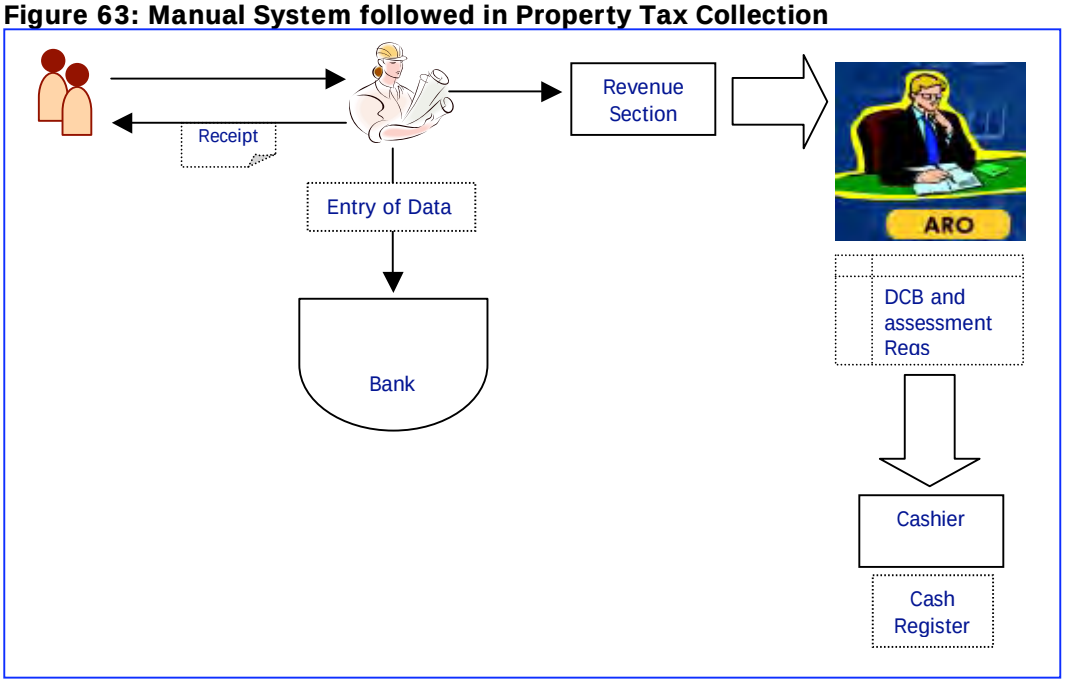
The Property Tax Module has been in use in Tiruchirapalli for the last two years, since 2003. In TCMC still the manual collection through bill collectors exists. This new computerised system enables the citizens to pay their property taxes anywhere in the city irrespective of the ward they are in. It also generates an instantaneous receipt for the tax paid and the property record is updated with details of the amount paid. The arrears have to be cleared off before payment for the current demand. One time updating of the database was taken up which was done over a period of six months; still complete database is yet to get ready. The system also enables calculation of annual demand of property tax for each property. The software for the Property Tax module was provided by Tamil Nadu Urban Development Project II (TNUDP II).

The main features of this initiative are given below:

Processes and procedures followed

Figures 63 and 64 explain the erstwhile and redesigned processes.

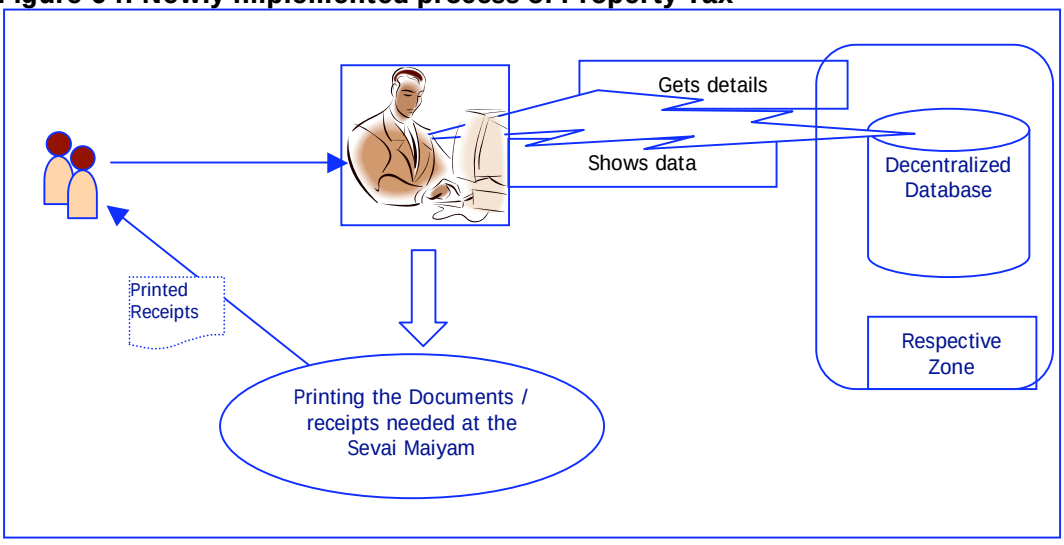
Figure 63: Manual System followed in Property Tax Collection



Former process measures vs. redesigned process

Earlier, the payments of property tax was made by way of bill collectors going to the citizens or either the citizens coming to the corporation office for paying tax. With the establishment of collection centres and designating banks, the citizens are allowed to pay their taxes anywhere. But apart from this, the existing manual procedures have not been redesigned. Even the process of Bill collectors going to citizens to collect tax, still exists. Computerisation has not resulted in stopping manual collections.

Figure 64: Newly implemented process of Property Tax



Process outputs

i. The module prints out a receipt for amounts received.
ii. A daily transaction report is also printed and used by the operational staff.
iii. No other MIS reports can be generated out of the module.

Impact of laws and regulations

There is no major restructuring of activities as a result of introduction of the Property Tax module necessitating changes in governing rules and regulations. Online payments are not being done presently. However there is no security policy of the Thiruchirapalli Corporation as of now either for the Property Tax or the other modules.

Functional areas covered

The Property Tax module is in operation in the Head Office and in 4 zones across the City. It is also in operation in 6 Citizen Sevai Maiyams and 8 banks across the City. Functionally, the Property Tax module covers the Revenue Department. It is yet to cover the Finance Department functions.

Strengths and weaknesses of the system

Strengths

i. This module has made the life of the citizens easier since it is user-friendly.
ii. Payment can be made in any of the Citizen Sevai Maiyams (service centre), banks across the city.

Weaknesses

i. Manual Collections are still being followed.
ii. The necessary Process Reengineering which should have accompanied the implementation of such a module has not been done.
iii. While the system is citizen-friendly, it has resulted in avoidable duplication of work to the internal staff like filling up of challans to deposit money collected even though a system generated challan is available.
iv. There is no established MIS reporting system.

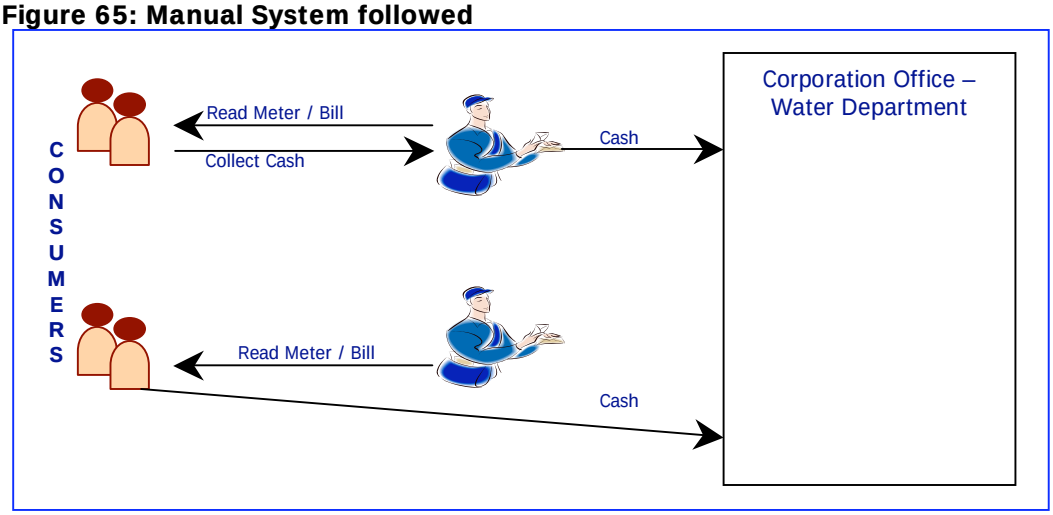
b. Water charges module

The implementation of this module in TCMC is similar to CCMC, as both were done as a part of state level initiatives. The water charges module has been implemented but has not been totally computerised. No process reengineering has been done to streamline the existing processes. In the existing process, the meter readers would go to the individual locations, read the meters and intimate the consumer of the amount payable. This process continues as it is, except that now the citizen does not pay to the Corporation officials, but pays it in the Sevai Maiyams. This module accepts the meter reading and the amount, and records in the database. When the consumer pays the amount, the payments are also recorded against the water connection.

Processes and procedures followed

The processes and procedures followed earlier and now are shown **in Figures 65 and 66**.

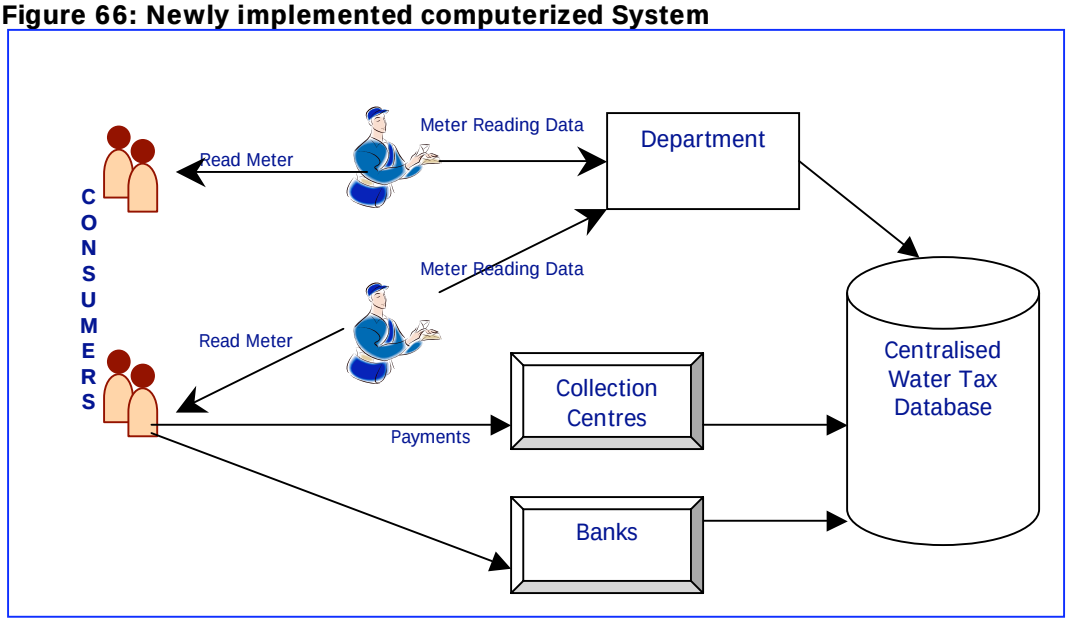
Figure 65: Manual System followed



Former process measures vs. redesigned process

The existing processes have been computerised and no redesigning or reengineering has been undertaken. The process of billing has been computerised. However, no controls have been exercised in the system to overcome the problems faced in the manual system. The manual work of recording payments has been reduced.

Figure 66: Newly implemented computerized System



Process outputs:

i. The module prints a receipt for every collection.
ii. DCB is generated from the system.
iii. Daily collection reports, with various parameters like bank wise details, arrears-current break-up, etc., can be generated from the system.

Impact of laws and regulations
There is no restructuring or process-reengineering done.

Functional areas covered
The Water Charges module is in operation in the Head Office, and across the City in the Sevai Maiyams and banks Functionally, the Water Charges module covers the Revenue Department. It is yet to cover the Finance Department.

Strengths and weaknesses of the system

Strengths

i. This module has made the life of the citizens easier, as the touch points with the Corporation employees has decreased and the citizens can pay their taxes in any of the facilitation counters, collection centres and designated banks.
ii. Citizen can know his dues over the internet.
iii. As it is linked to the Property Tax module, the citizen can know the status of both tax dues simultaneously over the internet.

Weaknesses

i. Existing manual system is computerized. The necessary Process Reengineering that should have accompanied the implementation of such a module has not been done.
ii. The system is poor in integration aspects. Accounting entries for amounts collected have to be passed separately in the accounting system since the two modules are not yet integrated.
iii. Not linked to Property Tax module.
iv. The computerized system does not overcome the problems faced in the earlier manual system of billing, i.e., no slab/rates master has been built in the system which requires manual calculation of charges, and could lead to lack of control over revenues.
v. No bill or demand notice is served to the consumers.

c. Birth and death module

The Birth and Death Module which was developed by TNUDP II is being used to record births and deaths and issue certificates. The database of records was built up based on manual records from 1997 onwards. External agencies were given the task of updating the records.

The main features of this module are given below:

Processes and procedures followed
The process followed earlier and the redesigned process followed presently is explained in **Figures 67 and 68**.

Figure 67: Manual Process in Birth and Death Module

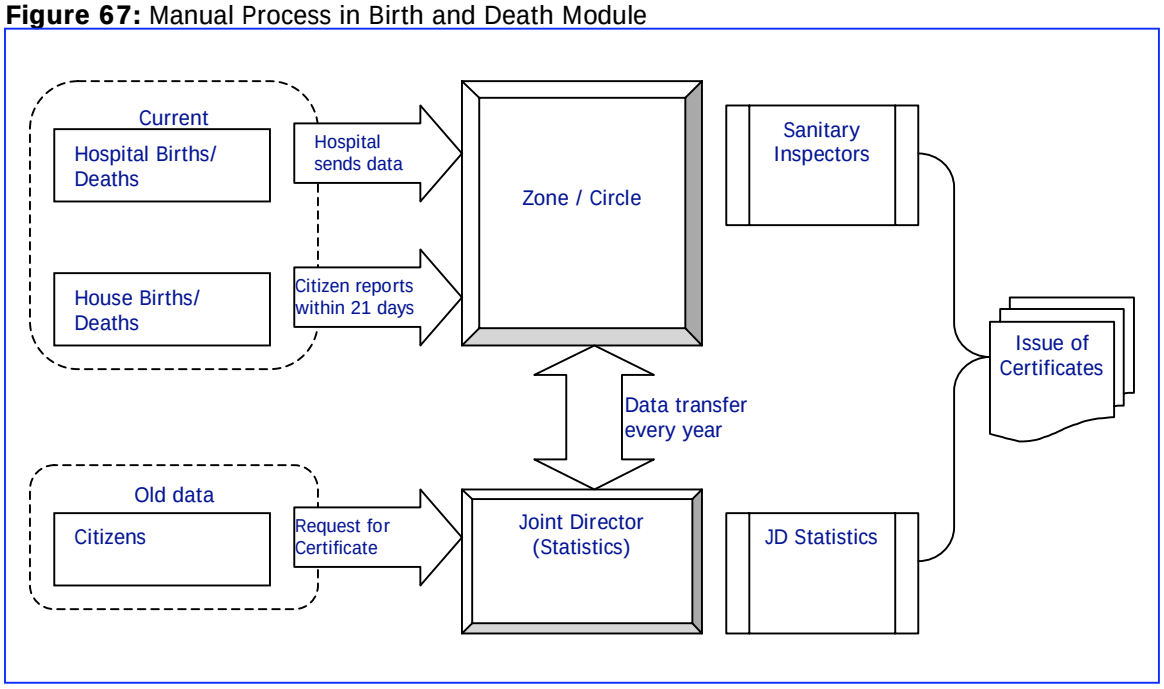
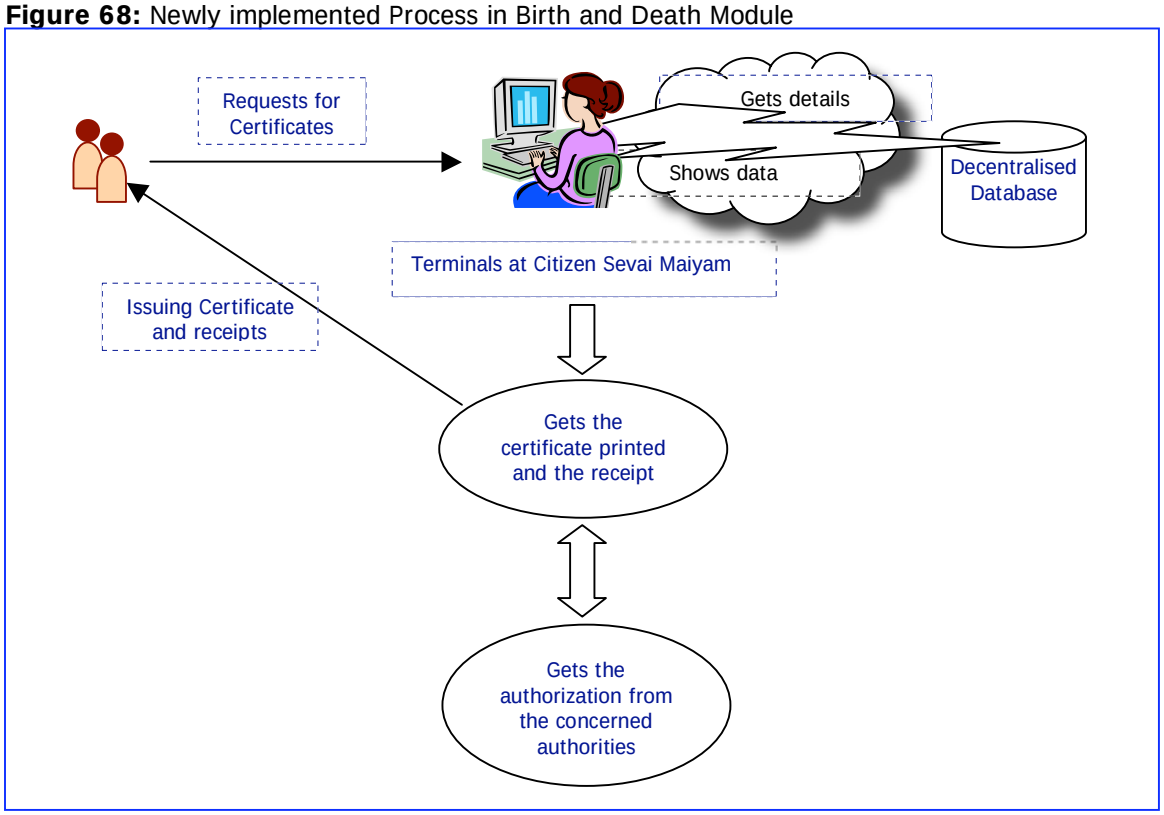


Figure 68: Newly implemented Process in Birth and Death Module



Former process measures vs. redesigned process

Previously, birth and death certificates were issued manually. When the citizen used to apply for certificate, the process of verification with records, verification with the Office of Registrar would take time. In the redesigned system, the citizens apply for a certificate at the Citizens Service Counters. This application is verified by the Central database. After verification, the certificate is sent for authorization from the concerned officials and given to the citizens.

Process outputs

i. The module prints a receipt for amounts received.
ii. A citizen can obtain a birth or a death certificate by paying the applicable charges. Such certificates are printed on pre-printed stationery.
iii. Customized forms have been provided to the citizens to apply for such certificates. A few MIS reports are also built into the module.

Impact of laws and regulations

No major changes were necessary in the existing rules and regulations. Online payments are not yet planned for the Births and Deaths module. A formal security policy is to be drafted.

Functional areas covered

The Birth and Death module is operational in the 6 Citizen Service Centres in the city and also it affects the Statistics Department.

Strengths and weaknesses of the system

Strengths

i. Has reduced time delay in the generation of certificates.
ii. Provides a one stop source of information for past births and deaths.
iii. Reduces harassment of the citizens at the Corporation.

Weaknesses

i. Very little process reengineering has been done to streamline the processes. A major portion of the activities are still dependent on human intervention which could have been automated.
ii. The reporting module is very weak in terms of the number, coverage and utility of the MIS reports.
iii. Data available for four years and still correction of data is continuing.
iv. The entire process of implementation is not being supported by sufficient documentation.

d. Non Tax Module

The implementation of this module is similar to CCMC, as this was done as a part of state level initiative. Though there are slight variations in implementation, the observations from an assessment perspective are same. This module deals with the lease of the properties of the Corporation. The demand generation is yearly. The Corporation maintains a database of the people who have taken shops and other properties for lease. The lease demand can be paid in any of the service centres across the city.

This module also enables to capture the basic details of the property like measurement details, lessee, etc. But some vital data like location etc. are not captured. This module is stand-alone and is not integrated to any other module. There is scope for enhancing controls, if this module can

be linked up to the Assets module and Accounts module. The module provides for interest calculation on delayed payments, but the interest rates and timing are not driven by any master and instead are hard coded in the program. Collection reports, defaulters list, etc. are generated from the system.

Processes and procedures followed

The procedures followed in this module have not changed much after computerisation. The module provides generation of demand for collection of rents from various properties. The procedures followed are similar to those of the property tax module and the rent payments are collected at facilitation counters and banks.

Process outputs

Basic reports on the demand and collection are available. Since all the master information is available in the database necessary reports as required can be generated.

Functional areas covered

This module mainly covers the Revenue and Estate Departments only.

Strengths and weaknesses of the system

Strengths

i. The database of all the properties belonging to TCMC is available.
ii. The leakage of revenue due to non-collection of rents under control.
iii. Provides scope for revision of rents.

Weaknesses

i. Interest calculation is hard coded.
ii. Not integrated to Accounts module.
iii. Not integrated to Assets module.

4. e-Governance Infrastructure

A snapshot view of the e-Governance initiative in Tiruchirappalli is given below in **Table 17**.

Table 17: Snapshot view of the e-Governance initiative in Tiruchirappalli

Parameter	Details of Trichy Initiatives
1.No. of Modules implemented	3
2. Platform/ Programming Language(s)/ Technology	VB, ASP
3. Software Architecture	2-tier
4. Deployment Architecture	De-centralized
5. Database	Oracle
6. Connectivity	Leased Line
7. Hardware Platform (Servers)	Xeon
8. Hardware Platform (Clients)	Pentium
9. Operating System (Servers)	Windows 2003 – Server
10. Operating System (Clients)	Windows
11. Software Applications	Property Tax Birth & Death Collections
12. Build or Buy	Provided by TNUDP
13. Development Process	No recognized process

Parameter	Details of Trichy Initiatives
14. Backup Procedures	Backup daily. Every week to CD.
15. PPP Arrangements	Incom Solutions, HCL
16. Citizen Interfaces	City civic centres, banks, website
17. Documentation	Limited documentation
18. Use of Local Language	Not used

4.1 Description of the Technical Architecture

a. Hardware

Tiruchirappalli City Corporation has adequate hardware infrastructure considering current utilization factors. The interesting thing in Tiruchirappalli is the adoption of distributed servers for each of the zones along with the central server in the head office. The zone offices have Intel Xeon based processors with hot swappable hard disks and the local client systems generally use Pentium IV processors. Detailed configuration of the hardware is provided in **Annex B27**.

b. Software

All the modules of Tiruchirappalli City Corporation have been developed with a client-server model using Visual Basic (VB) 6.0. The web-based (typically reporting and informational) applications have been developed using Active Server Pages (ASP). Oracle 9*i* has been used as the database software for all the modules and Internet Information Server (IIS) has been used as the application server for the web-based applications.

c. Operating System

Tiruchirappalli City Corporation uses Windows NT 4.0 Server operating system for the web server and proxy server. Other servers use Windows 2003 – Server Edition as the operating system. Windows 98SE or Windows XP is typically used on the client systems.

d. Network communication software

There was no evidence of usage of any Network Communication Software.

e. Systems management plan and network management plan

Tiruchirappalli City Corporation has contracted outside vendors for management of most of their IT infrastructure. For instance, M/S. HCL Technologies have been contracted for system integration and maintenance. The contract includes management of network equipment, servers, and end-user systems. Other contracts include one with M/S. AARGEE Equipments P Ltd., for UPS maintenance, one with M/S. ITI Ltd., for Engineering Software, and one with M/S. INCOM Solutions Ltd., for Website Development and BSNL for WAN and ISDN connectivity.

f. Details of applications and programming languages

All the modules use Visual Basic (VB) as the programming language with the usage of ASP for dynamic pages. The striking feature of the deployment model is that all data is zone specific and the applications are programmed in such a way that they fetch data from the appropriate zone as determined by the area of the transaction. For instance, if there are property tax collections of an assessment in a particular zone then the Collections Application directly connects to the database server of that particular zone and completes the transaction. Furthermore, all transactions are duplicated i.e. once on the zone server and once on the copy of data present in the central server. This serves to suitably replicate data and allow for some amount of recoverability from certain situations such as hardware failure. The various modules developed in Tiruchirappalli and their front-end and back-end details are provided in **Annex B28**.

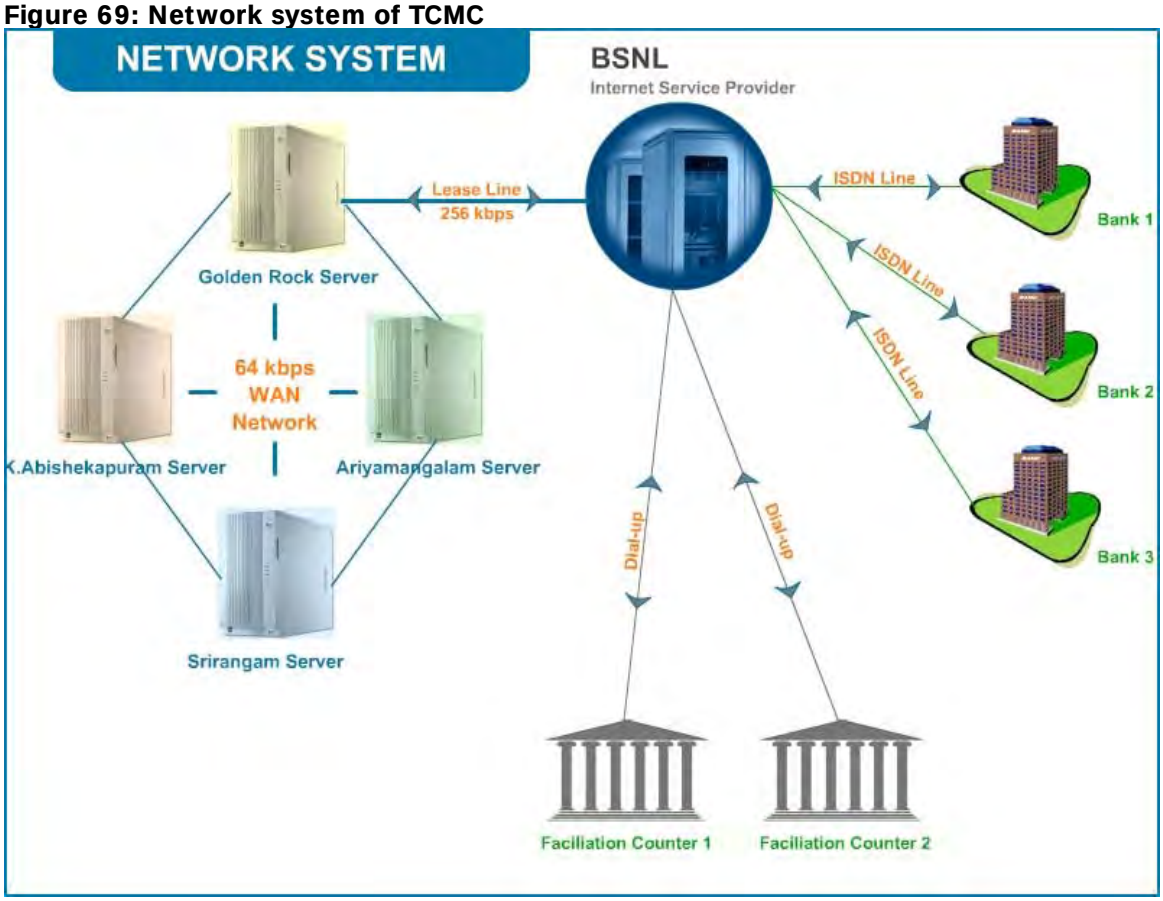
g. Details on database system

The database software used is Oracle 9*i*. Detailed configuration of the database servers are provided in **Annex B29.**

h. Details on current network architecture

The Tiruchirappalli e-Governance model follows a distributed architecture. All the zones are connected by WAN technology (leased/ISDN lines). The network infrastructure in a graphical form is shown in **Figure 69.**

Figure 69: Network system of TCMC



Details of network configuration are given in **Annex B30**.

i. Internet/Intranet components

All the modules have been developed on a client-server mode and are served over the intranet. Further, most of the modules have a web-based informational and reporting system with varying levels of access to data for citizens and Corporation staff.

j. System interfaces with other systems

The current system does not have interfaces with other software such as EDMS, GIS, etc.

k. Citizen interface

The primary citizen interface in the Tiruchirappalli Corporation is the various collection centres (including collection centres on the Corporation premises and on bank premises). The

Tiruchirappalli Corporation website also provides detailed information to the citizen on various aspects.

l. Level of computerization

At present the core operational transactions are carried out electronically at all the zone offices.

m. Quality of project documentation & user manuals

Project documentation was found to be very scarce and minimal at best. No broad standard for project documentation was observed. A good effort has been made to provide end-user and administrator level documentation for all the modules. While the documentation is precise, it is limited in coverage.

n. Business continuity plan and disaster recovery plan

Data is backed up twice daily (one online backup during the afternoon and one offline backup in the evening) into the hard disks of the database itself. This backup is burnt to CDs once a week and stored in the zones. Furthermore, another CD is also kept in the Commissioner's residence. Thus there is sufficient redundancy and planning in backup procedures and policies to safeguard the data against loss. Apart from this practice there was no sufficient documentation or methodology on Business Continuity Planning and Disaster Recovery.

5. System Suitability and Deployment

5.1 Suitability, Reliability, Stability and Scalability of Existing Infrastructure

The hardware infrastructure currently in place is inadequate and does not provide sufficient performance and reliability. The server configuration could be upgraded in order to offset against increasing usage. In the zone offices the network speed needs to be increased for better connectivity. The infrastructure in place currently faces minor issues regarding leased line connection, which is being managed temporarily by a backup ISDN line; otherwise the infrastructure is quite stable. The use of client-server architecture limits the scalability of the system to an extent.

a. Potential of the current application and new application to be integrated/operated/hosted

There is partial integration between the modules. An integrated Accounting module is under development. New modules developed can be hosted and operated in the same infrastructure since all the modules currently are in the client-server model and there are no limitations evident at this point.

b. Vendor dependence to independence

All the modules have been developed under the efforts of the TNUDP initiative and therefore the Corporation has complete independence from vendors.

c. Information security management and systems security

On-line payments are not envisaged at this point of time.

d. Systems auditing

There was no evidence of a system audit process.

5.2 Systems Deployment and Training

a. Project management, monitoring and system development process

The modules implemented in Tiruchirappalli are part of the TNUDP development initiative and as such there have been no further developments on the modules provided.

b. Speed in deployment / procurement - system installation time

Due to the clear direction and project monitoring done by the TNUDP working committee across all the ULBs in Tamil Nadu (including Tiruchirappalli) all systems were implemented in very good time.

c. Implementation approach and plan

The typical implementation approach adopted was the straightforward method described below:

i. Data entry using contracted console operators.
ii. Training to staff.
iii. Data check and verification by staff.
iv. Final rollout.

d. Manpower required to operate the system

The Tiruchirappalli City Corporation has only one dedicated IT person (Assistant Programmer) who maintains the system. However, due to the modules having been supplied as part of the TNUDP initiative there seems to be a good network of support amongst the programmers of various ULBs. As such all modifications or improvements are being managed at the central level by the TNUDP coordinator.

e. Amenability of service sdlivery through PPP mode

A separate Collection module has been designed which has been installed at various banks and Collection Centres. Thus the system has been amenable to service delivery through PPP mode.

f. User Training

The user training is taken care of by the IT department (under the aegis of TNUDP). Evidence of documentation on the methodology was not observed.

g. Support

Due to the presence of local expertise, the applications are well supported and are maintained up-to-date. All support requests are handled by the IT department and are only escalated to the regional (district coordinator) level, when there are major changes required in the software.

5.3 Functionality

The modules developed currently serve their specific purpose of computerization of existing processes and cover the necessary functionality. Facility for local language has been provided right up to even the data level in the software. However, it is not being put to complete usage and the data is currently restricted to the English form. The clear benefits of the system are transparency in collections (an increase in collections is being cited which is being partly attributed to the e-Governance initiatives), easy manageability and faster response.

5.4 Stakeholder Participation

a. Stakeholder usage and ease of access

Stakeholder usage is very high because of the absence of a manual system. The internal users do not have any issues with access to the system. Furthermore, the citizens have very good

access to relevant and detailed information via the Corporation website which is very user-friendly and easy to use.

b. Cost of accessing

This cost could not be estimated during the study as study could not cover all aspects of cost at this level of detail.

c. Popularity

The acceptance and usage by citizens is very high due to the benefits of the system. The citizen satisfaction is very high and the efforts have been lauded. Further, the Corporation staff have also recognized the benefits of the system and have been pro-active in its usage.

6. Lessons Learnt

- State level initiatives when planned well can be implemented smoothly.
- Successful arrangements with service providers ensure greater liquidity.
- Leadership and continuity in ULB are key to successful implementation.
- Role of state government in human resource decisions ensures adequate professional manpower for IT.

Annexes

Annex B 1 Technical Architecture – Hardware – SUVIDHA

a. Database Server :

Sl.No	Particulars	Details
1	Processor	64-bit Symmetric Multi-Processing RISC processors with minimum of 750 Mhz
2	RAM	10GB main memory
3	HDD	2 Nos. of 36GB HDD's ideally with 10,000 rpm
4	OS	UNIX
5	Database	DB 2

b. Application Server :

Sl.No	Particulars	Details
1	**Processor**	64-bit Symmetric Multi-Processing RISC processors with minimum of 750 Mhz
2	RAM	8GB of main memory
3	HDD	2 Nos. of 36GB HDD's Disks ideally with 10,000 rpm
4	OS	UNIX
5	Database	Oracle 8.1.6
6	Application	IBM Web sphere

c. Backup Server:

Sl.No	Particulars	Details
1	Processor	Intel Pentium IV @ 1.8 GHz
2	RAM	256 MB DDRAM, 133 MHz ECC
3	HDD	36 GB x 2 HDD's (10k rpm)
4	OS	UNIX/ NT

d. Servers for District Data Centres :

Sl.No	Particulars	Details
1	Processor	Intel Xeon based 2 GHz
2	RAM	2GB DDRAM, 133 MHz ECC
3	HDD	6 GB x 3 Ultra 160 SCI Hot swap HDDs (10k rpm)
4	OS	LINUX

e. End User Systems - Type - I

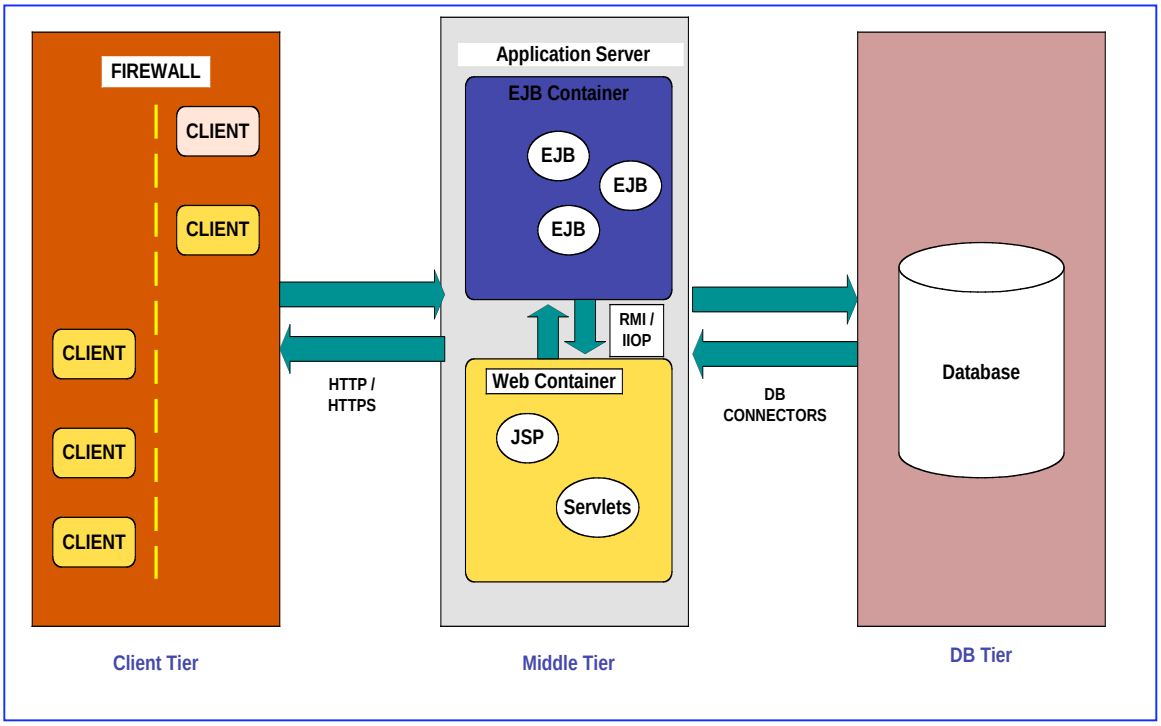
Sl.No	Particulars	Details
1	Processor	Intel Pentium IV @ 1.8 GHz
2	RAM	128 MB DDRAM
3	HDD	40 GB
4	OS	WIN 2000 PRO

f. End User Systems - Type - II

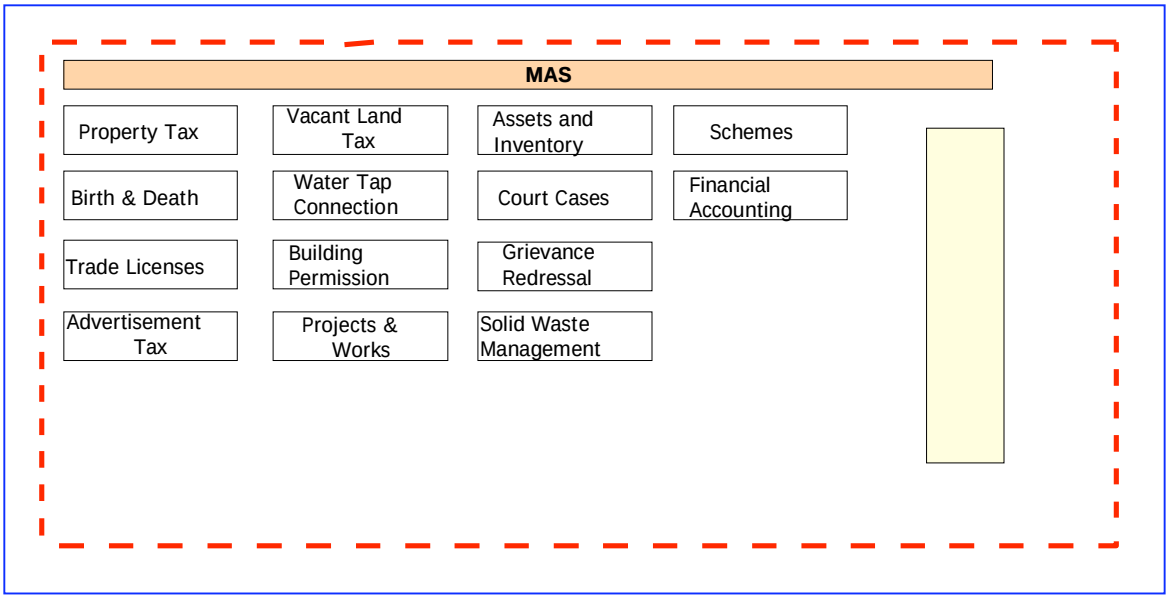
Sl.No	Particulars	Details
1	Processor	Intel Pentium IV @ 1.8 GHz
2	RAM	512 MB DDRAM
3	HDD	40 GB
4	OS	WIN 2000 PRO

Annex B 2: Programming Languages & Architecture - SUVIDHA

All the modules of the 'SUVIDHA' project are built with a common J2EE framework. Java Server Pages (JSP) and Servelets are used in the presentation layer. IBM DB2 UDB is used as the backend Database. The graphical representation of the three-tier architecture of 'SUVIDHA' is shown below.



Individual Modules of 'SUVIDHA' are shown in the figure below. Each of the modules follow the three-tier architecture as depicted above.



Annex B 3: Details of Database – SUVIDHA

Sl.No	Particulars	Details
1	Database Server	DB2
2	Application	Oracle 8.1.6

Annex B 4: Detailed Network configuration – SUVIDHA

Communication Hardware:

Routers & switches:

a. 48 PORT SWITCHES – 10/100 MBPS – 5 NOS
b. 24 PORT SWITCHES – 10/100 MBPS – 28 NOS
c. 16 PORT SWITCHES – 10/100 MBPS – 82 NOS
d. 8 PORT SWITCHES – 10/100 MBPS – 6 NOS

i. ROUTER SPECIFICATION (CAT A, TYPE-I) :

Interface/Ports	Bandwidth Support	Number
Serial Ports	2 Mbps	2
Serial Ports	64/128 Kbps	8
ISDN BRI		4
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes

Interface/Ports	Bandwidth Support	Number
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

ii. ROUTER SPECIFICATION (CAT A, TYPE-I) :- 2 NOS

Interface/Ports	Bandwidth Support	Number
Serial Ports	2 Mbps	2
Channelised E1		1
ISDN BRI		4
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

iii. ROUTER SPECIFICATION (CAT B):- 8 NOS

Interface/Ports	Bandwidth Support	Number
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	6
ISDN BRI		2
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

iv. ROUTER SPECIFICATION (CAT C):- 5 NOS

Category – C Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	4
ISDN BRI		2
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes

Category – C Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

v. ROUTER SPECIFICATION (CAT D, TYPE I):- 2 NOS

Category – D Type – I Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	12
ISDN BRI		4
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		5
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

vi. ROUTER SPECIFICATION (CAT D ,TYPE II):- 1 NOS

Category – D – Type II Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	6
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

vii. ROUTER SPECIFICATION (CAT E):- 4 NOS

Category – E Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	8
ISDN BRI		2
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4

Category – E Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

viii. ROUTER SPECIFICATION (CAT F):- 1 NOS

Category – F Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	2 Mbps	1
Serial Ports	64/128 Kbps	16
ISDN BRI		4
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		4
Support for Hot swap of modules		Yes
Redundant power supplies		Yes
SDRAM		64 MB expandable up to 128 MB
Flash Memory		32 MB upgradeable to 64 MB

ix. ROUTER SPECIFICATION (CAT G):- 59 NOS

Category – G Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	64/128 Kbps	1
ISDN BRI		1
Fast Ethernet		1
Support for Voice Modules		Yes
Minimum number of slots		2
Support for Hot swap of modules		No
Redundant power supplies		No
SDRAM		32 MB expandable up to 64 MB
Flash Memory		16 MS expandable up to 32 MB

x. ROUTER SPECIFICATION (CAT H):- 61 NOS

Category – H Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Serial Ports	64/128 Kbps	2
Fast Ethernet		1
Support for Voice Modules		Yes

Category – H Required Features		
Interface/Ports	**Bandwidth Support**	**Number**
Minimum number of slots		2
Support for Hot swap of modules		No
Redundant power supplies		No
SDRAM		32 MB expandable up to 64 MB
Flash Memory		16 MS expandable up to 32 MB

xi. ROUTER SPECIFICATION

RAS Router	
8 – Port RAS Router for providing the dial in facility for the department users into DMA Network.	
SDRAM	32 MB expandable up to 64 MB
Flash Memory	16 MS expandable up to 32 MB

Connectivity:-

i. All the Urban Local Bodies are connected to the respective District Data Center (DDC) of the department using a 64 Kbps leased line with ISDN or dial-up as backup option.

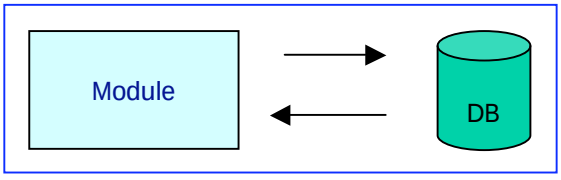
ii. DDC's are connected to the respective District Network Centres of APSWAN using a 64 Kbps leased line with ISDN as backup.

iii. APSWAN provides the connectivity from District Network Centres to the Secretariat Network Center in Hyderabad.

Annex B 5: Programming Languages & Architecture – TN

The following generic architecture (2-tier model) has been followed for all the modules:

Sl.No	Particulars	Details
1	Front End	VB
2	Back End	Oracle 9i



Annex B 6: Technical Architecture – Hardware – MCH

a. **Database Server 1**

Sl.No	Particulars	Details

1	System	RS6000 IBM F-80 Server
2	Processor	Intel 933MHZ Processor
3	RAM	1 GB RAM
4	HDD	15 GB * 7 SCSI Hard Disk (Hot Swappable)
5	OS	AIX 4.3 Server
6	No of Partitions	6 Partition for normal use & 1 Partition for Database
7	Database	Oracle 8.1.6

b. **Database Server 2**

Sl.No	Particulars	Details
1	System	IBM-230 Server
2	Processor	1.2 MHZ
3	HDD	17.3 GB * 5
4	OS	Red Hat Linux 7.1
5	Database	Oracle 8.1.6
6	No of Partitions	5 Partitions

c. **Database Server 3 & Development Server**

Sl.No	Particulars	Details
1	System	IBM-220 Server
2	Processor	1.2 MHZ
3	RAM	512 MB RAM
4	HDD	36.4 GB * 2 Partitions
5	OS	Red Hat Linux 7.1
6	Database	Oracle 8.1.6
7	No of Partitions	2 Partitions

d. **Web Server 1 & 2**

Sl.No	Particulars	Details
1	System	IBM-232 Server
2	Processor	1.2 MHZ
3	RAM	1 GB RAM
4	HDD	36.4 GB * 2 Partitions
5	OS	Windows 2000 Server
6	No of Partitions	2 Partitions
7	Application Server	Internet Information Server

e. **Other Servers**

1. **Proxy Server 1 & 2**

Sl.No	Particulars	Details
1	Processor	Inter Pentium IV 2.4 GHZ Processor
2	RAM	512 MB RAM
3	Operating System	Windows 2000 Server/Squid – Linux
4	Hard Disk	40 GB

2. **Authentication Server**

Sl.No	Particulars	Details
1	System	IBM-232 Server 1.2 GHZ
2	RAM	1 GB RAM
3	Hard disk	40 GB

3. **Content Inspection Server**

Sl.No	Particulars	Details
1	System	Compaq Presario
2	Processor	Pentium IV
3	Ram	1 GB RAM
4	Hard disk	40 GB
5	Operating System	Windows 2000 Server.
6	Firewall	CA (E-Trust)
7	Anti Virus	Bid Defender

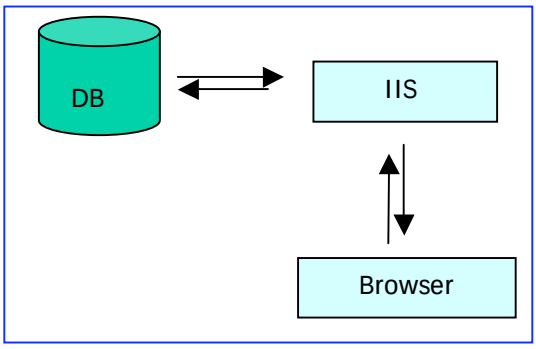
4. **Mail Server**

Sl.No	Particulars	Details
1	System	Wipro
2	Processor	Intel Pentium IV 1.8 GHZ Processor
3	Ram	512 MB
4	Hard disk	30 GB
5	Operating System	Red Hat Linux 7.1

Annex B 7: Programming Languages & Architecture of MCH

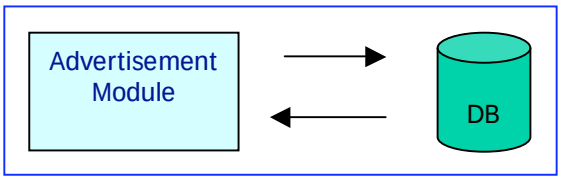
1. **Property Tax Module**

Sl.No	Particulars	Details
1	Front-end	ASP
2	Back-end	Oracle 8.1.6



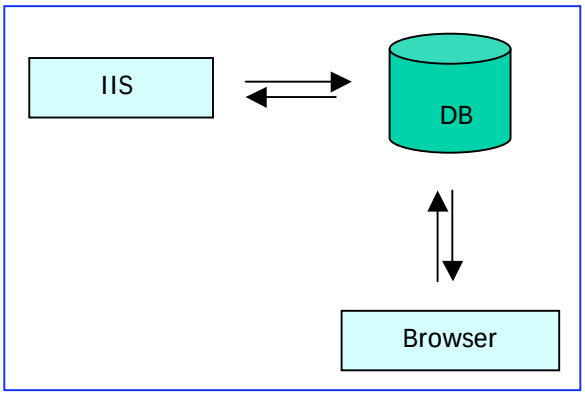
2. **Advertisement Tax Module**

Sl.No	Particulars	Details
1	Front-end	D2K
2	Back-end	Oracle 8.1.6



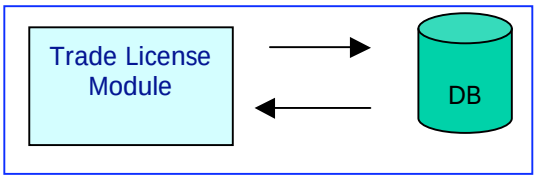
3. **Birth and Death Module**

Sl.No	Particulars	Details
1	Front-end	ASP
2	Back-end	Oracle 8.1.6



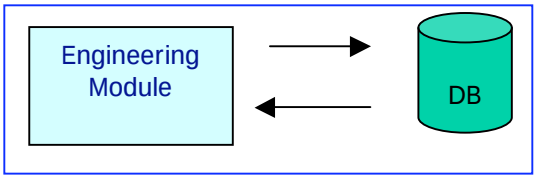
4. **Trade License Module**

Sl.No	Particulars	Details
1	Front-end	D2K
2	Back-end	Oracle 8.1.6



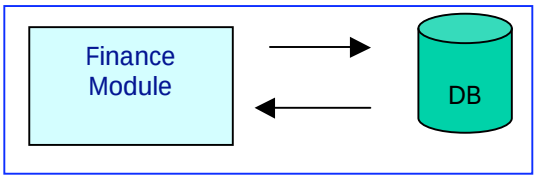
5. **Engineering Module**

Sl.No	Particulars	Details
1	Front-end	D2K
2	Back-end	Oracle 8.1.6



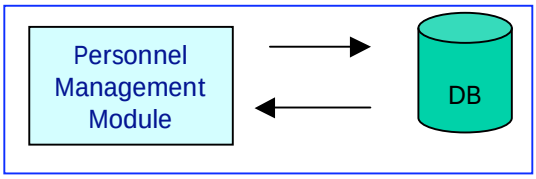
6. **Finance Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 8.1.6



7. **Personnel Management Module**

Sl.No	Particulars	Details
1	Front-end	D2K
2	Back-end	Oracle 8.1.6



Annex B 8: Details of Database System of MCH

Sl.No	Particulars	Details
1	All modules	Oracle 8.1.6

Annex B 9: Details of Network Configuration of MCH

Communication Hardware

1. **Routers & switches**

MCH Server Room

a. **Routers**

Sl.No	Particulars	Details
1	Cisco 3600 Series Router	1 No
2	Cisco 1700 Series Router	1 No (BSNL)
3	Cisco 1800 Series Router	4 No

b. **Switches**

Sl.No	Particulars	Details
1	Layer 3 switches 10/100	24 Port
2	Layer 2 switches	24 Port (Manageable)
3	Layer 2 switches	24 Port(Un-manageable)

c. **Connectivity**

1. 64 Kbps Leased Line from Zonal Office to Head Office
2. 128 Kbps ISDN Backup Line from Zonal to Head office

d. **Internet Domains**

Sl.No	Particulars	Details
1	Domain Name	www.ourmch.com
2	IP Address	210.212.212.114
3	Domain Name	www.mch.gov.in
4	IP Address	210.212.212.115

Annex B 10: Typical Desktop Configuration - MCH

Sl.No	Particulars	Details
1	Processor	Intel Pentium IV 2.4 GHZ Processor
2	RAM	256 MB DDR RAM
3	Hard disk	40 GB
4	OS	WINDOWS XP & WINDOWS 2000 PRO

Annex B 11: Technical Architecture- Hardware- MCV

a. **Database Server 1**

Sl.No	Particulars	Details
1	System	Compaq ML-530 Server
2	Processor	Pentium–III Xeon Dual Processor 1 GHz
3	RAM	512 MB RAM
4	HDD	18.2 GB * 5 Hot Swappable Hard Disk Drive
5	OS	Windows NT
6	Database	SQL Server 7.3

b. **Web Server**

Sl.No	Particulars	Details
1	System	Compaq ML 530
2	Processor	Pentium III xeon dual Processor 1 GHz
3	RAM	512 MB RAM

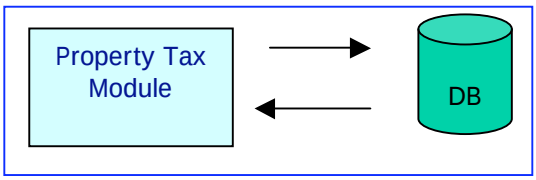
4	HDD	18.2 GB * 5 Hot swappable Hard Disk Drive
5	OS	Windows NT

c. **Local Desktop Machines – 70 Nos**
Celeron Based Systems with windows 98se and Windows 95 Operating System.

Annex B 12: Programming Languages & Architecture – MCV

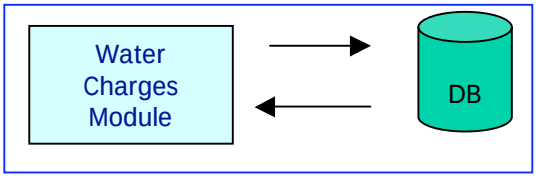
1. **Property Tax Module**

Sl.No	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



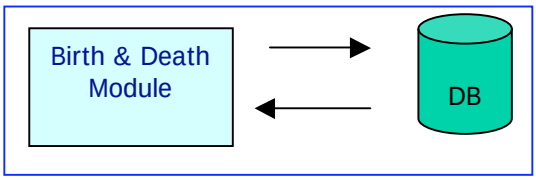
2. **Water Charges Module**

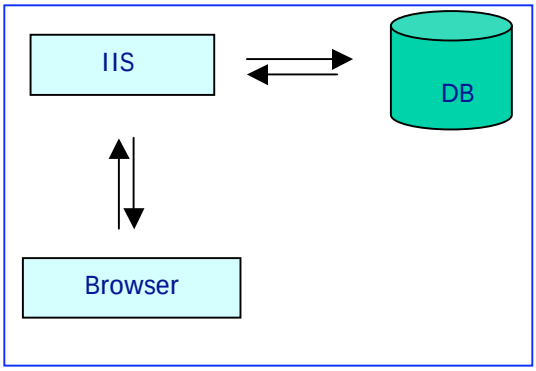
Sl. No.	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



3. **Birth and Death Module**

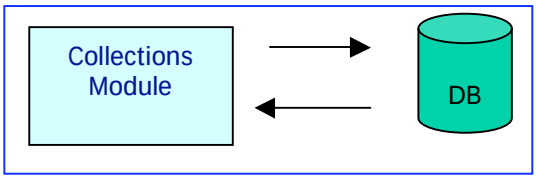
Sl.No	Particulars	Details
1	Front End	VB and ASP
2	Back End	SQL Server 7.3





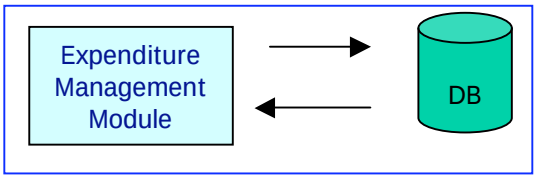
4. **Collections Module**

Sl.No	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



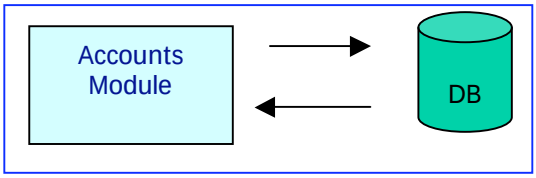
5. **Expenditure Management System (Works Management)**

Sl. No.	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



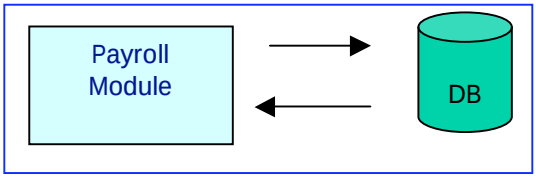
6. **Accounts Module**

Sl. No.	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



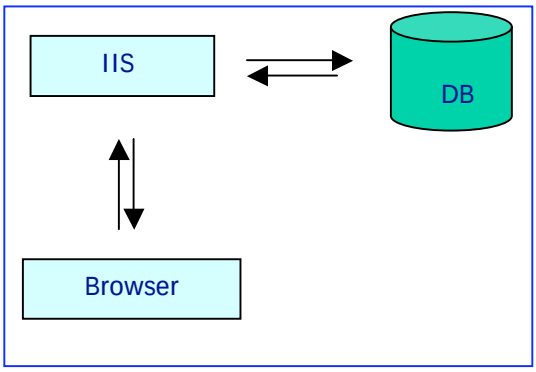
7. **Payroll Software**

Sl. No.	Particulars	Details
1	Front End	VB
2	Back End	SQL Server 7.3



8. **Complaints Management System**

Sl. No.	Particulars	Details
1	Front End	ASP
2	Back End	SQL Server 7.3



Annex B 13: Details of Database System of MCV

Sl.No	Particulars	Details
1	All modules	SQL Server 7.3

Annex B 14: Technical Architecture - BMP

Servers

1. **Application Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Xeon Dual Processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Application Server	JBoss Application Server

2. **Database Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Pentium IV Processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Database	Oracle 8*i*

A. **Birth and Death Module**

1. **Application Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Pentium IV Processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Application Server	Internet Information Server

2. **Database Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Pentium III Processor Dual processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Database	Oracle 8*i*

B. **PGR Module**

1. **Application Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Pentium III Processor Dual processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)

2. **Database Server**

Sl.No	Particulars	Details
1	System	IBM Server
2	Processor	Intel Pentium III Dual processor
3	RAM	1 GB EDO RAM
4	HDD	80 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Database	Oracle 8*i*

Other Servers

1. **Backup Database Server**

Sl.No	Particulars	Details
1	System	Compaq Server
2	RAM	1 GB EDO RAM
3	HDD	32 GB SCSI Hard Disk (Hot Swappable)
4	OS	WIN 2000 (Server)
5	Database	Oracle 8*i*

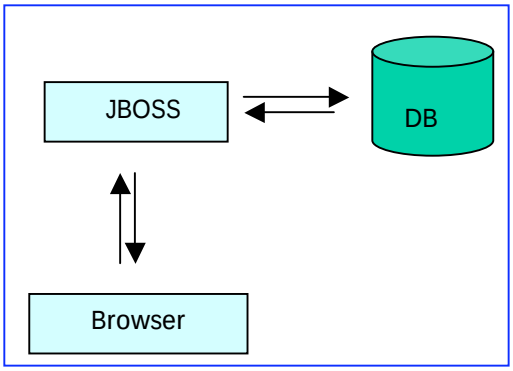
2. **Anti Virus Server**

Sl.No	Particulars	Details
1	System	Compaq Server
2	Processor	Intel Pentium III Processor
3	RAM	1 GB EDO RAM
4	HDD	32 GB SCSI Hard Disk (Hot Swappable)
5	OS	WIN 2000 (Server)
6	Anti Virus	McAfee version 8.0

Annex B 15: Details of Programming Languages – BMP

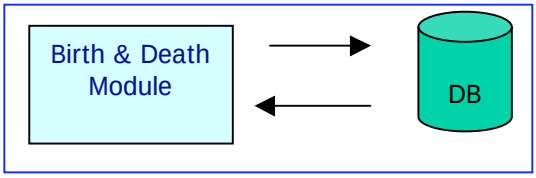
a. **Property Tax Module**

Sl.No	Particulars	Details
1	Application Server	JBoss
2	Font end	JSP
3	Language	Java, j2ee Architecture



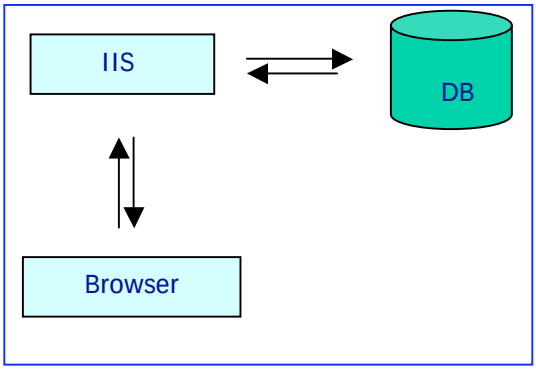
b. **Birth & Death Module**

Sl.No	Particulars	Details
1	Language	Visual basic 6.0



c. **Customer Grievance Module**

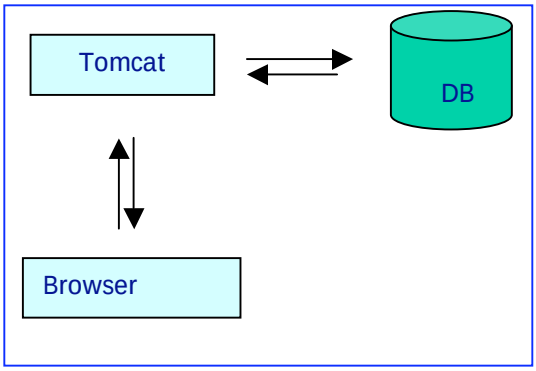
Sl.No	Particulars	Details
1	Application Server	IIS
2	Front end	ASP



d. **FBAS**

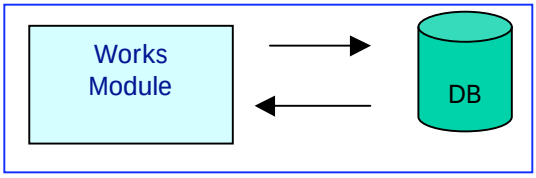
1. **Expenditure Module**

Sl.No	Particulars	Details
1	Application Server	Apache Tomcat
2	Front end	JSP



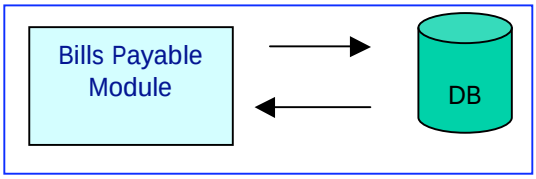
2. **Works Module**

Particulars	Details
Front end	VB 6.0



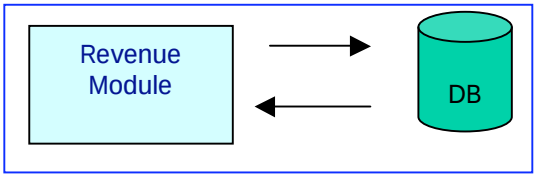
3. **Bills Payable Module**

Particulars	Details
Front end	VB 6.0



4. **Revenue Module**

Particulars	Details
Front end	VB 6.0



5. **Data Capture Screens and MIS**

Sl.No	Particulars	Details
1	Front end	Delphi
2	Report Tool	Crystal Reports

Annex B 16: Details of Database - BMP

Sl.No	Particulars	Details
1	All modules	Oracle 8*i*

Annex B 17: Details of Network Configuration – BMP

Communication Hardware

a. **Routers & Switches in BMP Server Room**

Cisco 3600 series Router
Cisco 24 port switch

b. **Routers & Switches in Citizen Service Center**

Cisco 1700 series Router
D-Link 24 port switch

Annex B 18: Typical Desktop configuration - BMP

Typical Desktop Configuration

Sl.No	Particulars	Details
1	Processor	Intel Pentium IV Processor
2	RAM	128 MB RAM
3	OS	Windows XP

Annex B 19: Technical architecture- Hardware- KDMC

At Server Room

a. **Database Server**

Sl. No	Particulars	Details
1	System	Sun E 450
2	Processor	Dual Processor

3	RAM	1 GB
4	HDD	6 *18 GB SCSI
5	OS	Solaris
6	Database	Oracle 9*i*

b. **Application Server & Authentication Module Server**

Sl. No.	Particulars	Details
1	System	HCL 2310
2	Processor	Pentium III 1 GHZ
3	RAM	512 GB
4	HDD	20 GB
5	OS	Windows 2000 server
6	Application Server	Tomcat

c. **Development Server**

Sl. No.	Particulars	Details
1	System	Sun E 250
2	Processor	Dual Processor
3	RAM	1 GB
4	HDD	2 * 18 GB SCSI
5	OS	Solaris
6	Database	Oracle 9*i*
7	Application Server	Tomcat

d. **Web Server**

Sl. No.	Particulars	Details
1	System	HCL 2310
2	Processor	Pentium III 1 GHZ
3	RAM	512 GB
4	HDD	20 GB
5	OS	Windows 2000 server
6	Application Server	Oracle 9ias

e. **Anti-Virus Server**

Sl. No.	Particulars	Details
1	System	HCL 2000
2	Processor	Pentium III 1 GHZ
3	RAM	128 MB
4	HDD	20 GB
5	OS	Windows 2000 server
6	Anti-Virus	Symantec Anti-Virus

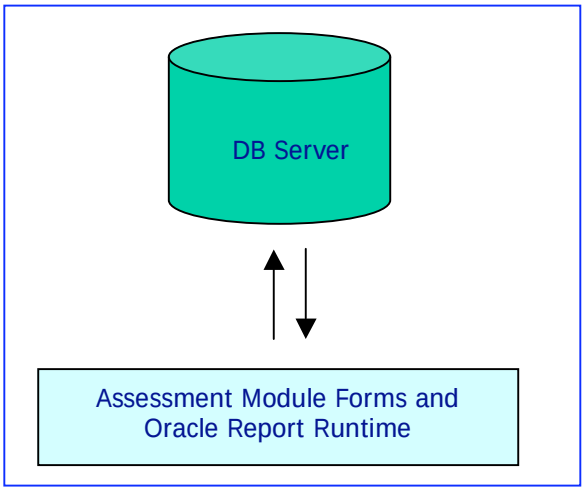
f. **Backup Server [To be Placed as Dombivli as backup for any disaster Recovery]**

Sl. No.	Particulars	Details
1	System	Sun E 250
2	Processor	Dual Processor
3	RAM	1 GB
4	HDD	3 * 18 GB SCSI
5	OS	Solaris
6	Database	Oracle 9*i*

Annex B 20: Programming Languages & Architecture of KDMC

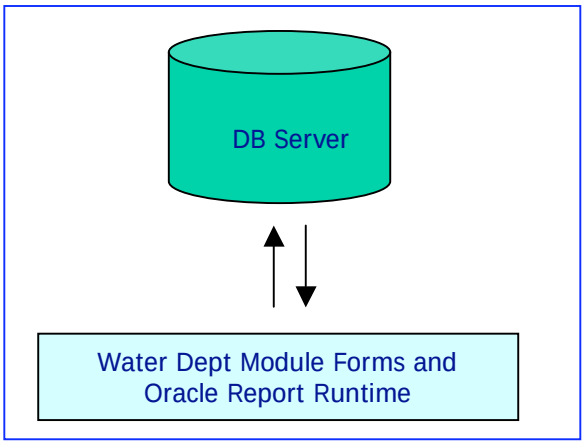
1. **Assessment Module**

Sl. No.	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



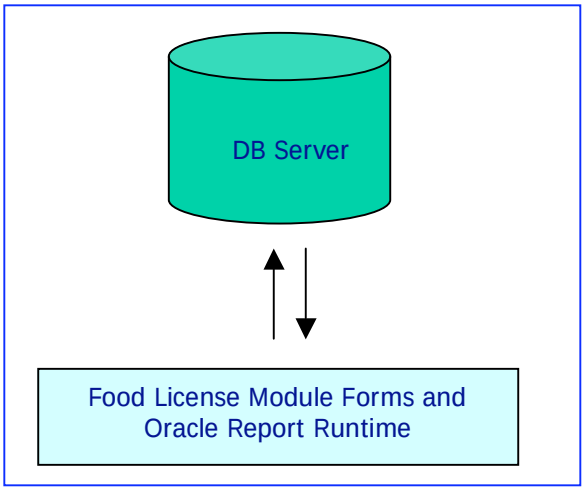
2. **Water Dept Module**

Sl. No.	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



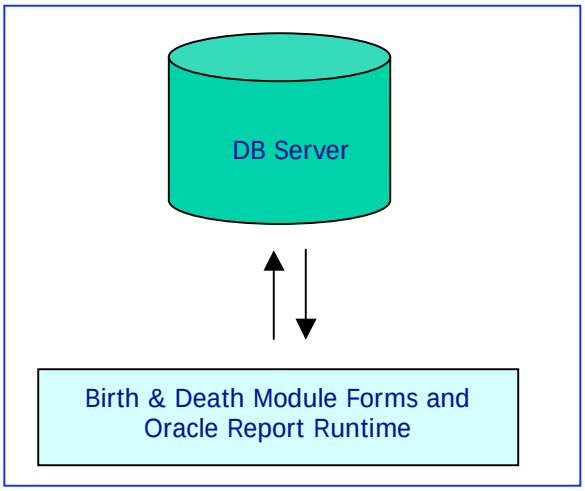
3. **Food License**

Sl. No	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



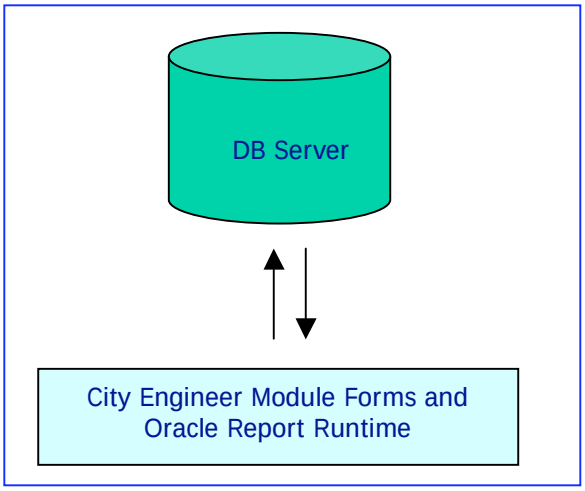
4. **Birth and Death Module**

Sl. No	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



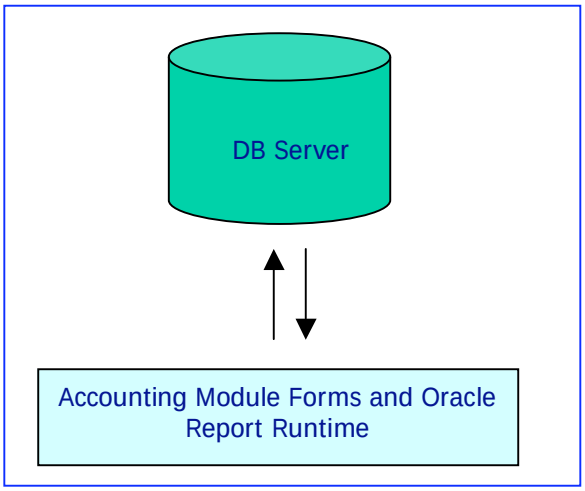
5. **City Engineer Module**

Sl. No	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



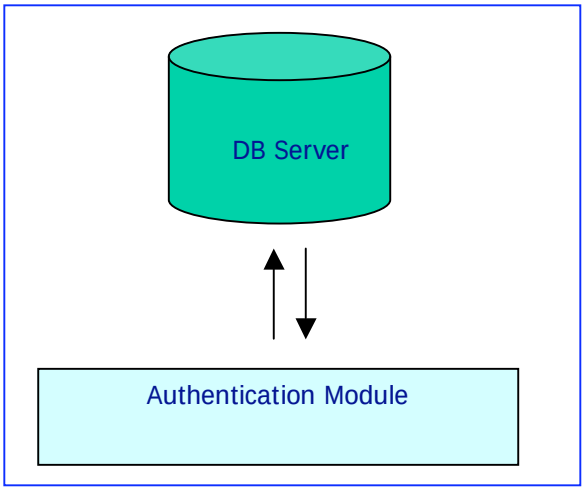
6. **Accounting Module**

Sl. No	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



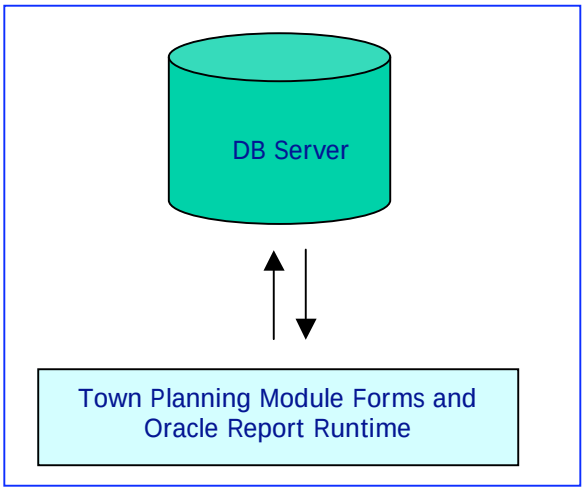
7. **Authentication Module**

Sl. No.	Particulars	Details
1	Front End	VB
2	Back End	Oracle 9*i*



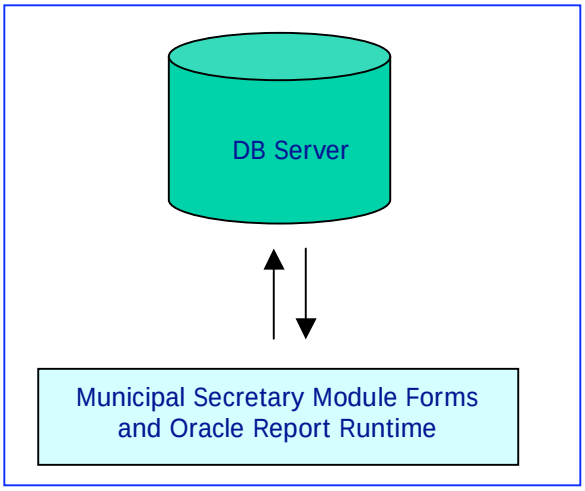
8. **Town Planning Module**

Sl. No.	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



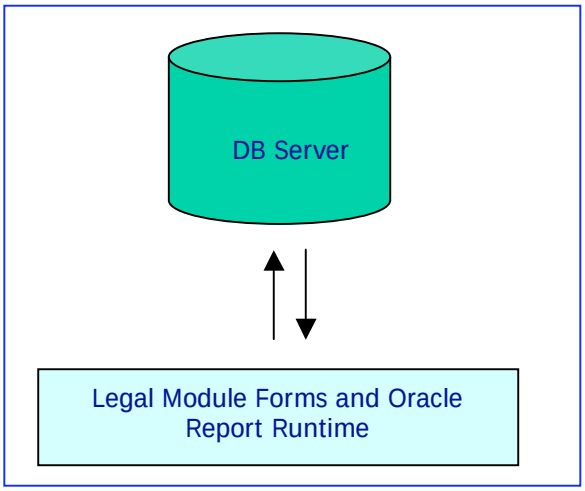
9. **Municipal Secretary Module**

Sl. No	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



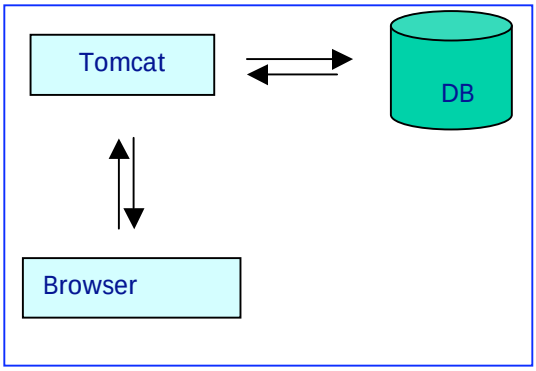
10. **Legal Module**

Sl. No.	Particulars	Details
1	Front End	Developer 2000
2	Back End	Oracle 9*i*



11. **Complaint Redressal Module (CARE)**

Sl. No	Particulars	Details
1	Front End	JSP
2	Back End	Oracle 9*i*



Annex B 21: Details of Database Servers of KDMC

Sl. No.	Particulars	Details
1	All modules	Oracle 9*i*

Annex B 22: Details of Network Configuration of KDMC

Communication Hardware

a. **Router [Not Used]**

Sl. No.	Particulars	Details
1	Cisco 3600	Router

b**. Connectivity**

1. All CFC at the Wards except CFC of Ward-A is linked to the Head office through 100 MBPS Optical fibre.
2. CFC of Ward-A is linked to the head office through 11 MBPS RF Connectivity
3. CFC at Dombivli is linked to head office by 2 mbps leased line.

c. **Internet Domain**

Sl. No.	Particulars	Details
1	Domain Name	www.kdmc.gov.in
2	IP Address	172.16.6.7

d. **Firewall**

Sl. No.	Particulars	Details
1	3 Com 4950 centre core switch	Hardware Firewall

Annex B 23: Technical architecture- Hardware- CCMC

a. **Centralized Server**

	Particulars	Details
1	System	HCL Infiniti 2775 XD

2	Processor	Intel Xeon Processor
3	RAM	2 GB
4	HDD	80 GB
5	OS	Windows 2000 Server SP4
6	Database	Oracle 9*i*
7	Application Server	Internet Information Server
8	Antivirus and Firewall	Panda Antivirus

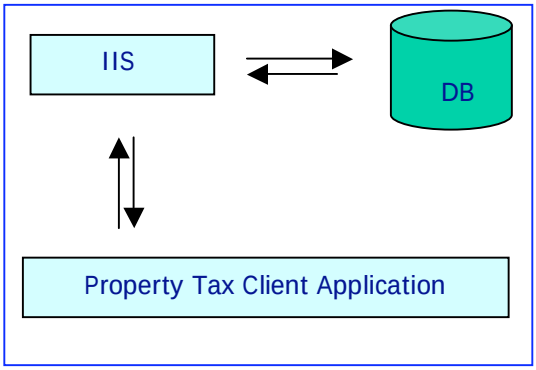
b. **Typical Desktop Configuration**

Sl.No	Particulars	Details
1	System	HCL
2	Processor	Pentium IV
3	RAM	256 MB
4	HDD	40 GB
5	OS	Windows XP

Annex B 24: Programming Languages & Architecture of CCMC

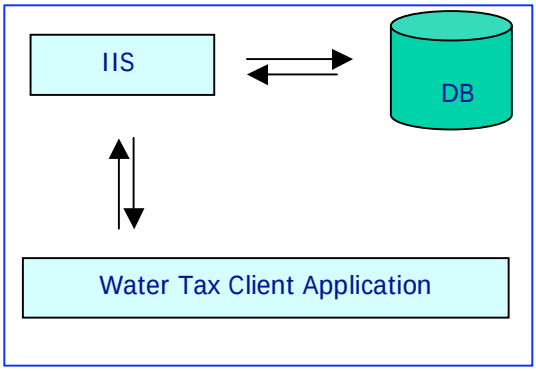
1. **Property Tax Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 9*i*



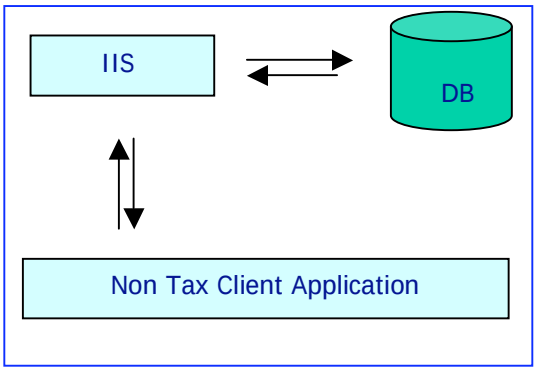
2. **Water Tax Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 9*i*



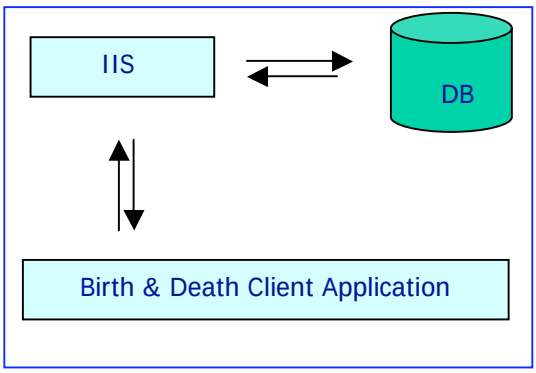
3. **Non Tax Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 9*i*



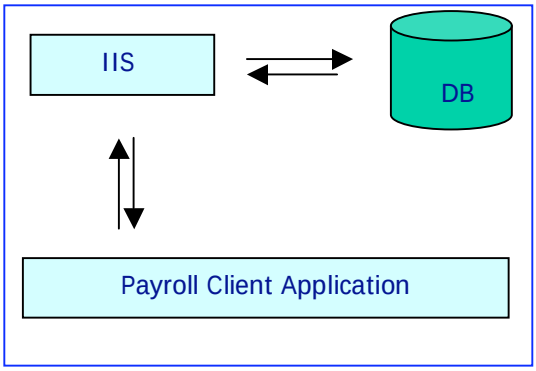
4. **Birth and Death Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 9*i*



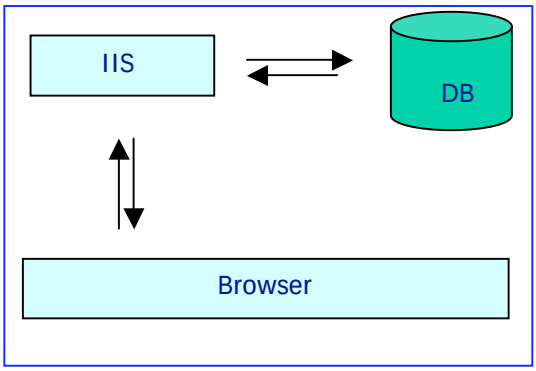
5. **Payroll Module**

Sl.No	Particulars	Details
1	Front-end	VB
2	Back-end	Oracle 9*i*



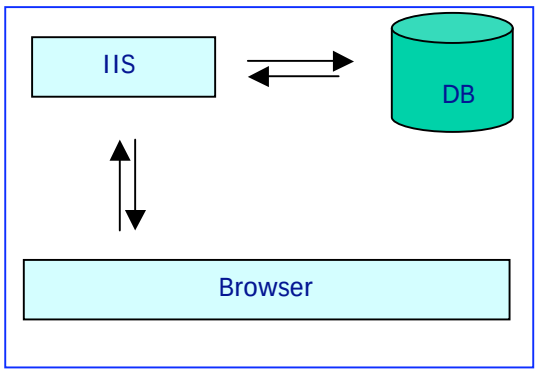
6. **Grievance Module**

Sl.No	Particulars	Details
1	Front-end	ASP
2	Back-end	Oracle 9*i*



7. **Development Works Module**

Sl.No	Particulars	Details
1	Front-end	ASP
2	Back-end	Oracle 9*i*



Annex B 25: Details of Database System of CCMC

Sl.No	Particulars	Details
1	All modules	Oracle 9*i*

Annex B 26: Details of Network Configuration of CCMC

Communication Hardware

Centralized Server Room

a. **Modem**

Sl.No	Particulars	Details
1	11 mbps Radio Modem	RF Communication

b. **Connectivity**

1. ISDN Line from the banks to the head office
2. RF base connectivity between Zone Office and Head Office

c. **Internet Domains**

Sl.No	Particulars	Details
1	Domain Name	www.coimbatore-corporation.com
2	IP Address	203.129.254.157

Annex B 27: Technical architecture- Hardware- TCMC

a. **Database Server / Application Server / Backup Server – 5 Nos**

Sl.No	Particulars	Details
1	System	Hcl Infiniti Global Line (277xD)
2	Processor	Intel Pentium xeon processor 1.80 GHZ
3	RAM	1 GB DDR SDRAM With ECC
4	HDD	3 Nos x 36 GB SCSI Hard Disk 10,000 rpm with Hot Swayable
5	OS	Windows NT 4.0 Server Operating System
6	Database	Oracle 9i
7	RAID	PCI Ultra 160 SCSI Based RAID Controller card with 64 MB RAM

b. **Proxy Server / Firewall / Antivirus Server – 1 No**

Sl.No	Particulars	Details
1	System	HCL Infiniti
2	Processor	Pentium III 1 GHZ Processor
3	RAM	512 MB RAM
4	HDD	16 GB SCSI Hard Disk

5	OS	Windows 2003 Server Software
6	Proxy	NATI Proxy
7	Firewall	Watch Guard Firewall
8	Anti Virus	Symantec 8i 2004 Corporate Edition

c. **Local Desktop Machines – 20 Nos**

Sl.No	Particulars	Details
1	System	Hcl Infiniti
2	Processor	Pentium III 800MHZ
3	RAM	64 MB RAM
4	HDD	20 GB Hard Disk
5	OS	Windows 98 SE/Windows XP

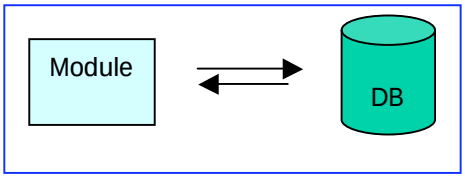
d. **Local Desktop Machines – 27 Nos**

Sl.No	Particulars	Details
1	System	Hcl Infiniti
2	Processor	Pentium IV 3GHZ
3	RAM	256 MB DDR RAM
4	HDD	40 GB Hard Disk
5	OS	Windows 98 SE / Windows XP

Annex B 28: Details of Programming Language of TCMC

The same client-server (2-tier) model has been followed across all the modules

Sl.No	Particulars	Details
1	Front end	VB
2	Database	Oracle



Annex B 29: Details of Database System of TCMC

Sl.No	Particulars	Details
1	All modules	Oracle 9i

Annex B 30: Details of Network Configuration of TCMC

Communication Hardware

1. **Routers & switches**

a. **Routers**

Sl.No	Particulars	Details
1	Cisco 1700 Series Router	6 Nos

b. **Switches**

Sl.No	Particulars	Details
1	10/100 24 Port Layer 3 switches (D-Link)	6 Nos

c. **Modems**

Sl.No	Particulars	Details
1	56 Kbps (Leased Line) (D-Link)	7 Nos

d. **Connectivity**

1. Main office connected with 256 Kbps lease line & Internet Band Width by BSNL (WAN)
2. Zonal offices are connected with Main Office through WAN (Wide Area Network)
3. 64Kbps lease line provided by BSNL for each zonal offices.
4. Facilitation Counters are provided with Dial up Connection.
5. Local Area Networking is provided in Main office and all Zonal offices.

e. **Internet Domains**

Sl.No	Particulars	Details
1	Domain Name	http://www.Thiruchirapallicorporation.com
2	IP Address	202.71.144.158