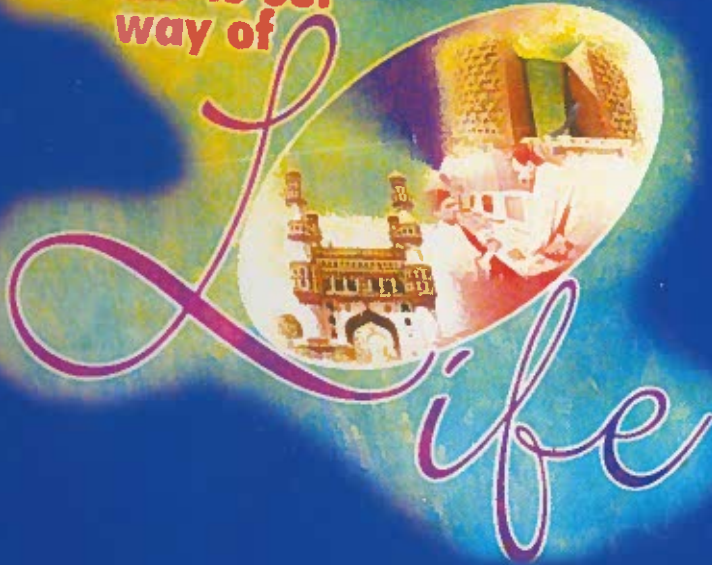# E-Governance In Andhra Pradesh

IT is our way of *Life*

*Documented
By*

E.D. SETTY, Ph.D.

*Foreword
By*

P.V.R.K. PRASAD, IAS

**Dr. MCR Human Resource Development
Institute of Andhra Pradesh : Hyderabad**

E-GOVERNANCE IN ANDHRA PRADESH

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FOREWORD

BY

P.V.R.K. PRASAD, IAS

FOREWORD

Homo sapiens, our scientific name, indicates that human beings are thinkers. Anthropologists point out that the name Homo faber (human beings as makers) is equally applicable to man. Humans, from the very beginning, were thinkers and makers at the same time and the making of the chipped stone, the crude tool of our earliest ancestors, represents the beginning of technology.

Not surprisingly, the march of civilization has been measured by the technological advances-from the Stone Age to steel age, from the muscle power of animals to rocket and nuclear power and from hand tools to mass production lines, computer controlled factories and the use of robots in surgery. And the pace of progress of technology has been breath-taking.

The twenty-first century, by all indications, would be a different world. Rocket-powered aeroplanes, auto-piloted vehicles and pollution-free hydrogen fuel would change the transport system we know. Communications will be developed so well that the world would shrink to a global village. Global position system will aid navigation for all vehicles from automobiles to rockets. Even manned missions to Mars are on the cards. Genetic engineering promises to create another green revolution. The new technology may even repair the age-old destruction of natural vegetation by bringing biodiversity to forms. The scenario appears to from a science fiction but many of the predictions may turn to realities.

Usage of the term e-government is of recent origin and there is no commonly accepted definition. E-Government is understood as the use of emerging ICTs like Internet, World Wide Web and mobile phones to deliver information and services to citizens and businesses. The term e-government is sometimes confused with e-governance and the two terms are often used interchangeably. However, e-governance is a broader concept, which includes the use of ICT by government and civil society to promote greater participation of citizens in the governance of political institutions. For example, it covers the use of the Internet by politicians and political parties to elicit views from their constituencies in an efficient manner, or the publicizing of views by civil society organizations which are in conflict with the ruling powers. E-government, by contrast, is concerned specifically with improving access to government functions, whether information or services. It can include publication of information about government services on a website, for example so that citizens can download application forms for a variety of services. It can also involve the actual

delivery of services, such as filing a tax return, renewing a license, etc. More sophisticated applications include processing on-line payments.

We may liken the advancement in several fields of technology as a race amongst them. This race was started from the origin of mankind and we have progressed with new discoveries and inventions in all fields of man's advancement but one area of technology relating to information has surpassed far beyond the other fields of technology, quite unthinkable and unimaginable a few decades ago. It is not the question of inventions and upgrading of technology but it is up to the administrative system to make use of it. It is really appreciable and commendable that the State of Andhra Pradesh has the vision in making attempts in streamlining the total administrative system in terms of IT paving the way in rendering services to the public.

E-Governance has a twin policy followed by action. The main focus is on facilitating diverse services to the public reducing the waiting time increasing the fastness of service and eliminating corruption on the part of the render of the service to the public and further impersonalising the whole operation of service and delivery of goods. E-Governance, primarily, tries to streamline the entire administrative system right from the state level down to the village level i.e., making the administrative system in IT terms, a sophisticated instrument in rendering services to the public:

The benefits to citizens and businesses from on-line delivery of services include convenience (location and time) and shorter waiting periods. In addition, E-Government systems may lead to greater transparency, resulting in reduced administrative corruption.

E-Government can only lead to transparency if there is a legal framework that supports free access to information. E-government reduces corruption in several ways. It takes away discretion, thereby curbing opportunities for arbitrary action. It increases chances for exposure by maintaining detailed data on transactions, making it possible to track and link the corrupt with their wrongful acts. By making rules simple and more transparent, E-Government emboldens citizens and businesses to question unreasonable rules and procedures and their arbitrary application.

Combating corruption can be targeted as a specific objective of e-government. E-Government can become one of the key components of a broader anti-corruption strategy enabling effective communication in addition to the increased transparency. Second, service delivery improvement initiatives can be implemented in corrupt departments.

As one could see, the State Government of Andhra Pradesh under the administrative guidance of Hon'ble Chief Minister of Andhra

Pradesh, Nara Chandrababu Naidu, has made headway in keeping up and adopting the latest technology in the field of information streamlining and educating the personnel in administration preparing them to render services to the entire public making things easy and convenient for them in meeting their multifarious needs in terms of production, transport and communication.

It may be mentioned here that the Government of Andhra Pradesh has sponsored the documentation of "E-Governance in Andhra Pradesh" and the Department of Administrative Reforms, Pensions & Public Grievances, Govt. of India was kind enough to provide financial assistance for documentation of the project.

I appreciate the efforts made by Dr. E.D. Setty, Consultant of this Institute, in documenting the material in respect to e-Governance. I believe that the documented material would serve as a source of information, knowledge and guidance to the reader.

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DIRECTOR GENERAL,
Dr. MCR HRD INSTITUTE OF AP &
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TO GOVT. OF ANDHRA PRADESH

3rd January, 2004,

Hyderabad.

PREFACE

We may consider electricity or any other alternative source of power as the parent of the phenomenal and unimaginable revolution hat has taken place in electronics and information technology. It has made most of the traditional ways of commercial interaction and communication obsolete and Information Technology (IT) has gained momentum, which is really difficult to describe. The present documented volume deals with the efforts made and initiatives taken by the State Government of Andhra Pradesh in introducing IT and making use of IT in sophisticating and simplifying all the services and transactions between the government administration and the public. It deals with details of the software and hardware infrastructure that has been established in the State.

The introductory part speaks of the concept of good governance and how it has augmented by Electronic Governance (E-Governance). It spells out the advantages of e-governance avoiding delays, uncertainty and eradicating corruption, making every interaction and communication transparent to the public.

E-governance covers all the principal administrative services and it serves as an effective instrument bringing the people and the government very close to each other.

Chapter 2, briefly details the vision of e-governance in Andhra Pradesh spelling out the benefits to the citizens and the government. This chapter also details the how GOAP has designed suitable frameworks to meet the egovernance challenges. Further, this chapter provides details of core applications of e-governance initiatives.

Chapter 3 briefly describes electronic hardware policy of AP Government and details the various products covered under the definition of Electronic Hardware.

Chapter 4 in continuation of IT policy of 2000 deals with ICT policy covering the period 2002-2005. Keeping VISION 2020 in view, the policy stipulates the kind of action to be pursued and accomplished to realize the VISION.

The Government of AP has initiated several measures facilitating e-Governance in several sectors of administration and development comprising Computer Aided Administration of Registration Department (CARD),

Citizen Friendly Services of Transport Department and further covering land records management and several online transactions. Chapter 5 briefly mentions the sectors and areas wherein hi-tech approaches have been initiated which are all citizen friendly.

Chapter 6 provides the details of AP Technology Services Limited, a government of Andhra Pradesh enterprise. This chapter deals with various functions, IT Services, Technology lead taken by APTS in egovernance in Andhra Pradesh.

Chapter 7 in detail provides the entire IT Architecture. This may be taken as the long-term policy of Government of AP and this chapter details the twelve components of the architecture i.e. Application Architecture, Information Architecture, Groupware Architecture, Data Architecture etc. This chapter stipulates various principles, standards, recommended best practices in each component of Architecture.

Chapter 8 as the title stands provides details in respect of the following infrastructure projects: Hi-Tec City, APSWAN, Tele medicine and computer literacy.

Chapters 9 speak of the profiles and presents the status of IT projects in AP mainly CARD, CFST, e-cops, e-procurement, e-seva, MPHS, Saukaryam, SMBS, OLTP, APPortal, SmartGov, IFIS & HRMS

Centre for Good Governance (CGG) is one of the newly added wings especially streamlining and systematizing every field of activity of administration and services to the citizens of the State. Chapter 10 details the measures initiated, projects accomplished and continuously followed on several aspects and needs of the citizens in the State. This chapter points out the significant and highly useful software tools that are being developed by CGG.

Chapter 11 speaks of the application of information system facilitated by software in respect to drought mitigation aiding integrated water management system and also planting of trees and safeguarding of seedlings towards increasing area under the forest coverage.

Chapter 12 highlights redressal of grievances of the citizens, monitoring of agriculture through call centres, which make life easy and convenient for the people.

Human Resource Development in Information Technology is key for successful implementation of various e-governance initiatives taken up

by AP. Chapter 13 provides details of role of Dr.MCRHRD Institute of AP in imparting IT training in various software packages. This chapter also speaks of the unique initiative taken by GOAP to develop the IT Managers within government by conducting Training program for Chief Informational Officers in coordination with IIM Ahmedabad & DR.MCRHRD IAP.

E-Governance is becoming so pervasive, embracing all essential walks of life of human beings. The documented material briefly speaks of the IT policy initiatives, IT Architecture and the services/facilities that are provided to the public. In one sense, we may say that the Govt. of Andhra Pradesh took off in the field of e-governance and is marching fast providing and facilitating easy accessibility to all kinds of services required by the public. In brief, the document tells the story the way the Govt. of Andhra Pradesh has visualized, planned, organized and accomplished appreciable milestones in the field of E-Governance.

DOCUMENTALIST

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1. www.ap-it.com
2. T.H. Chowdary, Info-Tech Advisor to the Government of Andhra Pradesh, Hyderabad, PRAJNA JOURNAL
3. www.gipi.org.in/state_policy/andhra.pdf
4. www.apfirst.com/ictpolicy.pdf
5. www.esevaonline.com
6. www.apts.gov.in
7. upgov.up.nic.in/infotech/VISIT_REPORT.pdf

E.D. SETTY, Ph.D.
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3rd February, 2004

Dr. MCR HRD Institute of AP, Hyderabad.

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1
INTRODUCTION

Information Technology is changing the way the society functions. Internet is the biggest revolution in human history. The impact of IT can be felt in all economic and social activities in every conceivable manner. The convergence of all forms of communications on the digital playfield is opening up immense new possibilities of achieving speed, versatility and space-time independence. Governments are no exception to this phenomenon. In the post liberalization era governments across the country have been engaged in improving internal efficiencies, responsiveness, coordination and integration between various government departments and external agencies, citizens and businesses. The global trends also point out to the emergence of e-Government revolution after the Internet and e-commerce revolutions.

We often hear a number of words coined to describe this newly founded love between the Governments and the computers- " Good Governance", "SMART Government" and "e-Government". It is pertinent to state clearly what they mean.

'Good Governance' connotes the widest meaning of the three phrases. It encompasses the entire process of public administration, the processes underlying the formulation of public policies; the HRD efforts required for re-skilling the government machinery, prioritization, efficient management of public resources and above all re-designing the various instruments used to realize the concept of a welfare state.

'SMART Government' is an acronym for Simple, Moral, Accountable, Responsive and Transparent Government. It is the image of an ideal government through the eyes of its constituents.

e-Governanace: Usage of the term e-governance is of recent origin and there is no commonly accepted definition. E-Governance is understood as the use of emerging ICTs like Internet, World Wide Web (WWW) and mobile phones to deliver information and services to citizens and businesses.

A number of arguments are adduced against the concept of e-Government. Some of the popular arguments, especially in the Indian context, are mentioned below.

"It helps only the rich" - "It can't be done in India" - "Who needs e-Government when labour is so cheap in India?" - "The laws are hurdle" - "The existing infrastructure can't support e-Government efforts" - "It won't be allowed to happen by the vested interests" - "It is too expensive for

India"

Real cost of government services: The justification for stems from an analysis of the real cost of obtaining Government services. It is well borne out by experience that in addition to the prescribed statutory levy and the prescribed transaction cost, securing service from a government agency, more often than not, entails any or all of the following indirect costs:

- Delay and uncertainty
- Lack of transparency
- Corruption
- Mistrust / ill-treatment at the offices
- Loss of wages / productivity of the citizen / business
- Cost of travel & stay at the place of service

If the government could provide its services, such that the above indirect costs are avoided, then the citizen would be prepared to avail the same even at an additional charge. Tools of Information Technology certainly have the potential of meeting the challenge. The option, clearly, is e-Governance. It has the portents of providing high quality government services to citizens and businesses, of providing equal access and equal treatment to the rich and the poor, of bringing in enhanced transparency, speed, reliability and consistency in handling transactions, of opening up immense scope for offering new services, for instance **'any-time, any where services'** to the clientele, of making the concept of **Citizens Charters** a reality and, above all, of reducing the real cost of transacting with the Government.

Need to embrace emerging technologies: While the reduction of real costs and enhancement of convenience are arguments for e-Governance from the citizen's perspective, there is another set of reasons purely from the organization's position. Several sectors of the economy are embracing the emerging technologies so rapidly that the public agencies that do not choose to fall in line would soon become 'out of place' in the global scenario. In other words, the sheer pressure exerted by the technology-savvy entities in the private sector is enough to compel the public sector to clutch at the modern tools.

Implications of e-Governance: Given that e-Government is a highly desirable objective, the immediate questions are – 'Is e-Government easy enough to implement in a reasonable time-frame? What are the different dimensions and issues one has to be wary of in this context? Here are some answers.

Size, Cost and Complexity: An estimate of the effort of com-

puterizing the processes in all the departments and agencies of the Central and State Governments in India, puts it at over 130,000 person-years, costing about Rs.35,000 crores. Besides these seemingly impossible figures, the sheer spread of the implementation is daunting and beset with problems relating to logistics of installation, training, maintenance and supervision. Given the existing low levels of computer competency there is a great risk of underutilization and non-utilization of IT assets in a widespread programme implemented by the Government. The variety of applications to be implemented is unnerving. We have simple MIS applications, data processing applications of medium complexity and extremely complicated applications like OLTP (Online Transaction Processing), GIS etc., Needless to say, we do not have, within any Government, the variety of skills required to develop and implement applications with such a wide spectrum of complexities.

Speed of implementation: Implementation of e-Governance applications across hundreds of departments and thousands of offices, could take endless years in the normal circumstances. Given the rapid advancements in the convergence technologies, adopting a normal public sector approach to implementation of e-Governance is fraught with the following risks:

· The technologies originally used in the design of a major project get outdated by the time the project is completed.

· Projects implemented at different periods are out of tune with each other.

· The benefit of end-to-end and integrated solutions, especially those involving inter-departmental approach, would be a mirage. This would necessarily mean that a *'carpet bombing'* approach would be required to be adopted if e-Government has to make any meaningful impact on the users.

Integration: Given the objective of providing integrated services to the citizens on the lines of one-stop shop, it becomes imperative to adopt an overall architecture for e-Governance that facilitates such a seamless integration of applications implemented by various departments and agencies of the Governance.

HRD for EG: One of the handicaps is the low computer literacy in most of the Government departments. Given the size of the employee population in public sector and also the fact that the employees who are in the age group of above 45, it is somewhat difficult to impart a reasonable degree of IT skills, which is a prerequisite for successful implementation of E-Governance projects.

Organizational buy-in: Change Management by far is the most difficult task -more complex than the technology issues. The employees of each department have to be involved and associated with the efforts at each stage starting with system study, design and development of software so as to ensure a buy-in. Extensive training and conducting of workshops at state, regional and district levels are some of the other change management techniques.

Additional cost of services due to EG: The additional investments to be made in government departments to provide electronic services to the clientele, would entail not only a capital cost but also recurring costs. The governments are hard pressed financially and cannot perhaps provide for these costs through a budgetary support. This brings us to the inevitable conclusion that the brunt of the operational costs will have to fall on the citizens or the other end-users in the form of user charges.

Key areas of using IT in Governance:

The word e-Governance is too general. Specifically, it means using the tools of IT for enhancing the productivity, efficiency of government organizations and providing quality services to citizens in many areas like Citizen Services, Law, Judiciary, Education, Promotion and outreach activities of government etc.,

Just as e-business is transforming the private sector, e-government will transform the governance. However, the e-government transformation is costly and fraught with political, operational and technology risks. Governement should have clear vision and strategy to implement the e-governmet projects.

Now let us have a look at Andhra Pradesh Vision and strategy of e-Governance.

ANDHRA PRADESH VISION & STRATEGY OF E-GOV-ERNANCE
GoAP's Vision of e-Governance

Internet technology is empowering consumers to make personal choices on how they access and receive goods and services. This is leading to an increasing dependence on electronic business resulting in a realignment of virtually every sector and a variety of customer-centred relationships between service providers and customers. Government is no exception to these phenomena.

As public awareness and Internet usage increase, the demand for online Government interaction and simplified, standardized ways to access Government information and services become increasingly important. At the same time, the public must have confidence that their online communications with the Government are secure and their privacy protected. Therefore, to help its citizens gain one-stop access to Government information and services in a secure way, and to provide better, more efficient, transparent and responsive services, Government of Andhra Pradesh (GoAP) has embarked on a scheme of e-Government to leverage the tools of ICT (Information & Communication Technology) in serving its citizens.

e-Governance is one of the vehicles that can be gainfully used in reaching the goal of SMART governance. GoAP's IT vision to leverage Information Technology (IT) is amply reflected in its IT vision statement. **The Government of Andhra Pradesh cherishes the vision of establishing a Simple, Moral, Accountable, Responsive and Transparent Government–<SMART> Government.**

Objectives of e-Governance Initiatives

Recognizing the need for technology-enabled service delivery and, as a part of its e-Government strategy, GoAP has initiated an innovative broad based, enterprise-wide approach to service delivery.
The targeted benefits of GoAP's e-Government program include the following:

Benefits to Citizen & Business

·   Streamlined, standardized electronic information gathering and access
·   Electronic delivery of services to meet citizen expectations and requirements

- Convenient, anytime, anywhere citizen services
- Support for e-commerce initiatives (e.g., online filing, payments etc.)
- Significant improvement in Government to Citizen (G2C), and Government to Business (G2B) interface

Benefits to Government

- Increased employee productivity
- Facilitation of information reuse across and within the departments of GoAP
- Reduced system maintenance and training requirements by adopting standard systems and processes for GoAP
- Cost-effectiveness in the operations of Government agencies
- Improvement in Government-to-Government (G2G) interface.

Approach to e-Government

GoAP's strategy for implementing e-Government has been unfolding over the last few years. It has implemented e-Government projects in a few key departments, which yielded encouraging results. The following are some examples of these early initiatives:

- **CARD** – Computer-aided Administration of Registration Department
  - Demystification of procedures for registration of legal documents like sale deeds, mortgage deeds, gift deeds etc
  - Automation of processes at 239 sub-registrar offices
  - 2.8 million deeds registered digitally in 3 years after launch
  - 1.4 million title searches & 2.1 million property valuations done
- **MPHS – Multi-Purpose Household Survey Project**
  - 1125 field offices of revenue departments computerized
  - Database of 75 million citizens & 25 million land records created
- **C-TAS-Computerized Treasury Accounting System**
  - 233 district treasuries & 300 sub-treasuries computerized
- **COMPACT – COMPuterized Administration of Commercial Taxes**
  - Computer-based system of registration of dealers & processing of their sales tax returns.

Based on these initial successes, various other government departments have embarked on developing departmental applications.

The Essential Framework for e-Government

GoAP recognized the state's potential for employing Internet communications and Web technologies to improve government services and

promote economic development. The desire to translate this potential into a reality, soon brought to fore a number of challenges, like the ones mentioned below:

•Fast-changing horizon of **technology**, making it difficult to evaluate options and arrive at appropriate cost-effective, scalable and inter-operable solutions.

•The need for huge **resources** to be invested at a fast pace to implement a large number of inter-related projects in a synchronized mode, to create the required impact.

•The compelling need to **prioritize** the e-Government applications, given that there are about 1500 services that can be improved through the use of ICT.

•The need to ensure that the e-Government projects are **implemented** in a way that the benefits to the citizens are provided in a cost-effective and sustained way. GOAP has designed suitable frameworks to meet the above challenges. They are depicted below (figure 1)

Technology Framework	>	ICT Architecture
Resource Framework	>	PPP Model
Prioritization Framework	>	Big Picture
Implementation Framework	>	6C Model
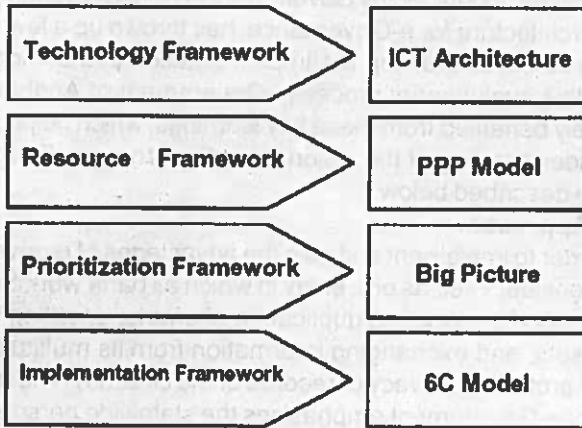
Figure-1

In this chapter an attempt has been made to briefly describe frameworks. The **Technology Framework**, also called as the **ICT Architecture, Resource Framework,** also called **PPP Model,** the **Prioritization Framework,** also called as the **Big Picture and Implementation Framework** also called **6C Model.** More details about four-layer strategy can be found at the www.ap-it-com.

I.The ICT Architecture for e-government

From its experience in implementing a few e-Government projects at the

department/agency level, the GOAP realized that such individual projects implemented by the departments on a *stand-alone* basis would result in duplication of work, besides creating islands of excellence, which are not interoperable. Integration of these disparate systems at a later time would involve tedious *plumbing*. A standards-based approach was felt to be the need of the hour. In January 2001, GoAP developed a statewide IT architecture & technology standards, Security Policy and PKI Strategy with the consultancy services provided by **PricewaterhouseCoopers**, over the preceding 5 months. Common business models/processes and shared technology infrastructure services were identified as key success areas during the exercise. Standards for various technology components were identified to enable re-usability and ensure inter operability and integration. These standards have been mandated, through a policy document (G O Ms 40 of IT&C Department dated. 14.08.2001), for compliance by all departments and developers implementing e-Governance projects.

Key learnings from the study on ICT Architecture

The study conducted by Government of Andhra Pradesh for building the ICT Architecture for e-Governance, has thrown up a few key learnings that are useful to draw up the implementation plans – logically the next step in this evolutionary process. Government of Andhra Pradesh has immensely benefited from these key learnings, which helped in sharpening the understanding of the vision for e-Government. Four such key learnings are described below:

Enterprise Approach:

In order to implement and gain the advantages of e-governance, a state must consider itself as one entity in which all parts work together for the common good by avoiding duplication of efforts, enabling sharing of technical assets, and exchanging information from its multitude of databases (while protecting privacy of records of the citizens). The **enterprise approach** for e-Government emphasizes the statewide perspective (versus an agency view). The state must view itself differently from a technology perspective. It can no longer afford to be an agglomeration of separate and disjointed organizations, programs, and assets.

This enterprise approach strategically plans and implements the synchronization of multiple applications that run on a number of infrastructure components, necessary to deliver digital government services to the citizen.

Departments would need to work cooperatively, yet independently, to realize the vision of digital government. No department can successfully deliver digital government services alone. Mutual, interdependent ap-

plication development and service delivery among state departments is necessary for citizens to experience online services through a single window.

In order to identify the core initiatives for e-Government, GoAP used this approach that treats the state as a single enterprise. The single enterprise concept includes development of a set of **core policies, core applications and core ICT infrastructure** that span across departments. Given the characteristics of the fastpaced Internet application development process and rapid changes in technology, these three areas need to be developed in parallel. This concept of core initiatives developed more fully in a later exercise, has been described in latter sections.

Develop and follow Internet standards and guidelines. Standards and guidelines are fundamental to the development of a single, secure, enterprise-wide infrastructure to support the State's development of products and services for the web. They serve as a common framework and rule-set for the application development lifecycle. One of the strong recommendations that has been thrown up is the compelling need to develop all future applications, especially the citizen-facing applications, adopting Internet technology standards. Though obvious, prescription of this standard has made a fundamental difference in several projects.

Build once, use many times. Developing a single architecture and enterprise commerce infrastructure will allow the State to build the infrastructure once and leverage it across multiple new applications. The infrastructure must be able to support current applications, and be the foundation for future initiatives. In a like manner, the core applications should be designed generically, on the lines of a product, such that they can be used across all the departments or large groups of departments. This approach results in considerable saving in cost and effort in design, development, implementation, training and maintenance of applications. Typical examples are the core applications relating to Financial Information System, Human Resource Management System, e-Procurement etc.

Leverage new models for enterprise integration. As in the case of an enterprise infrastructure, whenever possible, the State should seek to employ the concept of leverage. An excellent example is the use of standard Middleware commercial off-the-shelf (COTS) packages for the integration of legacy applications within the Finance department and its associated departments such as Treasuries, Accountant General's (AG's) office, etc, rather than developing applications from scratch. The use of COTS applications offers the opportunity to dramatically reducing development time and costs as well as reducing maintenance costs associ-

ated with upgrades over time.

II. PPP Model

Concept of PPP for e-Government

A variety of solutions in the generic name of Public Private Partnerships are being employed today to bridge the gap between the expected levels of speed, efficiency and spread of public projects especially in the areas of creation of infrastructure and provision of services. The concept of Public Private Partnership (PPP) essentially arises out of considerations like, the imperative to provide infrastructure of high quality, shortage of public funds and above all, the profit motive driving high efficiencies and quality in the privately managed areas. The Public Private Partnership can assume a wide spectrum of shapes like, BOO, BOOT (Build-Own-Operate-Transfer), BOT for specified periods -otherwise called concession contracts, Joint Ventures, private finance initiative (PFI), partial privatization through partnering with strategic investor etc. The idea is to arrive at the right combination of public sector accountability with private sector efficiencies and also to share the risk correspondingly.

Experiences across the globe show that IT is one of the areas which is eminently suited for PPP – especially, in areas such as driving licenses, utility bill collections, management of land records etc. Investments in information technology by governments have an opportunity cost since there are limited resources of money, time and attention. Investing these in IT would explicitly deny such investments in other development areas like provision of water, sanitation, health, shelter, production technology and skills development. Investments in information technology have therefore to be made very strategically by governments. The Government of Andhra Pradesh has focused its energies on creation of content and digitization of databases so that transaction based services become attractive for private sector players. For example, in the case of the TWINS project after a successful demonstration of the pilot, private sector partners have been involved to provide services to citizens. In the case of infrastructure creation, government has leveraged assets like land for attracting private sector investments to set up facilities like Hitec City. Similarly, government has used the provision of a royalty free right of way for attracting investments into setting up high-speed optical fibre networks. The possible usage of such networks for e-governance applications in the future has in turn enhanced their commercial viability.

User charges

The implementation of IT projects results in delivery of better quality services to the citizen. Citizens derive the extra convenience by making

the services speedier, more transparent and easily accessible. For this extra convenience the citizen could be prepared to pay an additional cost over and above the normal statutory fee or charge. The government of Andhra Pradesh has been contemplating the issue of suitable guidelines to the departments in the matter of fixing user charges for providing IT enabled services to the citizens. The implementation of the concept of collection of user charges for providing IT enabled services opens up an immense possibility for taking up a large number of the citizen services projects, aimed at smoothening the government citizen interface. It is assessed that the user charges will be quite nominal when compared to the direct and indirect costs to be incurred by the citizen in availing the services from government departments and agencies. This model would result in creating IT systems that are in equilibrium by themselves without the government having to invest in the capital costs or in the recurring costs.

Benefits of PPP for EG: Three sets of stakeholders benefit from the Public Private Partnership model applied to e-Government.

Benefits to Government:
- Minimizing financial outgo
- Better liquidity
- Protection against technology obsolescence
- Speedier implementation of e-Government projects
- Efficiencies in management
- Better image

Benefits to Citizen/Business:
- Easy access to services
- Single window/one-stop shop
- 24x7 convenience
- Flexibility in the choice of access methods and devices
- Saving of indirect cost and hardship

Benefits to private sector partners:
- Reliable streams of revenue
- Low risk
- Creation of employment in the development, implementation and delivery
- Capturing business from related sectors (wider market initiatives)

III. Prioritization Framework
The Rationale
　　　　Having developed the ICT Architecture and having realized the importance of the key learning that followed from it, the Government of

Andhra Pradesh seemed to be technologically equipped to build large applications that would enable it to realize its grand vision of e-Governance. Very soon it was realized that the task of identifying the various applications and prioritizing them for implementation was formidable. In particular, the following challenges were confronted:

(a) Which are the applications that need to be taken up first, and which later?

(b) How to identify the applications & projects, which, when implemented would ensure that the global best practices in e-Government permeate the related government departments and agencies?

(c) What are the linkages, explicit & implicit, between the various applications?

(d) What are the supporting policies and components of infrastructure that need to be put in place?

(e) At what pace should the whole implementation proceed?

The Government of Andhra Pradesh felt that the answers to the above questions can be found only through an exhaustive ground level survey of the governance practices within its major departments and agencies on one hand and of the global best practices in those sectors on the other. This has led to engaging the consultancy services of PWC for a survey of 50 government departments with the development of an 'e-Government blue print' as a key deliverable.

The survey of the government departments proceeded along the following steps:

· Logical grouping of secretariat departments, based on comparable objectives / functions

· High level assessment of key processes / support processes/ services for each of the logically grouped departments

· Mapping of Core Processes across the departments

· Prioritization of services based on a criticality and feasibility matrix for each group.

· Categorization of the services as those that need to be 'Targeted', Pursued, 'Permitted' and 'Kept On Hold' during the implementation of GoAP's e- Government Program.

Objectives of the e-Government Roadmap Survey of 50 departments

Typically, e-Government initiatives are implemented with a view to achieve the end objectives in view. The 50 departments survey was taken up to achieve the following objectives:

· Identification of services / applications that have e-Government

opportunities within / across departments

· Assessment of the opportunities to apply Public Private Partnership (PPP) Model which implementing the identified services/applications.

· Preparation of high-level e-Government Roadmap/blue print for GoAP covering aspects such as IT policies, Technology model and the interdependencies of applications identified in different departments.

Definition of Core E-Government Initiatives

Moving forward GoAP has attempted to identify core initiatives, which provide maximum benefits to its stakeholders (citizens, businesses, employees) and also form the backbone for future e-government initiatives. An initiative could be a policy, an infrastructure or an application.

Some of the key characteristics that have been considered by GoAP in the identification of Core Initiatives are as follows:

> Usability by large no. of departments
· Statewide geographical coverage
· Impacts key stakeholders

    1. Citizens (Urban and rural locations)
    2. Business (Organizations/ institutions/ vendors who deal with government)
    3. Employees (serving and retired)

· Any other key variable that is critical for the realization of State's vision

Framework for Prioritization of Core E-Government Initiatives

· The framework used for prioritization of Core Initiatives is shown below:
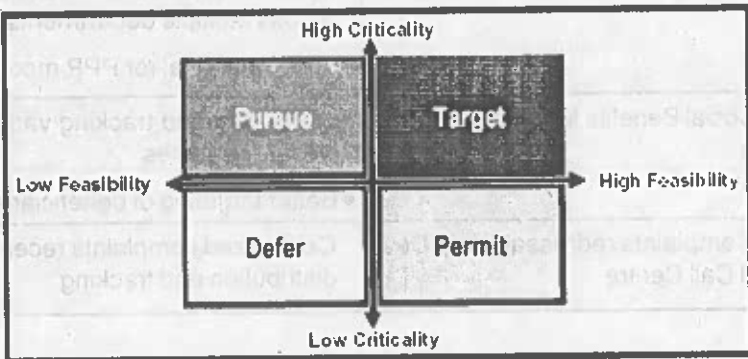

Figure 4 : Core Initiatives Prioritization Framework

Core E-Government Initiatives of GoAP

Based on the application of the above framework and criteria, GoAP has identified the Core Initiatives, and classified them according to interdependent components. These initiatives provide GoAP an opportunity to improve its efficiency in providing its services in a cost effective manner. These are shown in Table 2 below.

Table 2 : Core Applications/Projects:

Initiatives	Description
1. OLTP – Online Transaction Process System, focus on Citizen data management system Integrated land management system Geographical Information System	• Provides a single window to citizens to access the services across multiple departments • Archives horizontal and vertical integration of departments at Mandal (lowest administrative unit), District and State levels.
2. E-seva (electronic services to citizens acting as a single window)	• Rolling out E-seva across the state • Already implemented across the state capital of Hyderabad • 100% potential for PPP model
3. Single window for businesses	• Provide single window to business to access the services across multiple departments • 100% potential for PPP model
4. Social Benefits Management System	• Monitoring and tracking various welfare schemes • Better targeting of beneficiaries
5. Complaints redressal -Help Desk and Call Centre	Centralized complaints receipts, distribution and tracking

6. Integrated Financial Information System	• Integration of applications in Finance department and its associated departments
	• Use of middleware product
7. E-Procurement	• Applying e-government concepts and technologies to the area of purchasing to reduce prices of goods and services
	• 00% potential for PPP model
	• CoTs solution preferred
	• E-procurement to be handle d by a govt-led private exchange (govt.>15% stake)
8. Human resource management system	• Centralised payroll and G2E portal
	• Self-service zone for 1 million government employees.
9. Generic Office Management System (SmartGov)	• Workflow automation + KM in AP Secretariat.
	• A bundle of 483 applications across 30 departments of Secretariat.

Table 3 : Core Technology Infrastructure Initiatives

Initiatives	Description
10. Government Portal	• Common gateway for all state services, applications, and information
11. Secure intranet	• Communication infrastructure to connect all the locations of government offices.
	Connectivity available from • Hyderabad to District offices

12. Data center	• One central facility where the application and database servers are located • To be implemented under a PPP model • The focal point for hosting all major applications and data of government departments.
13. Kiosks in rural areas	• Access points for rural location • Implementation under PPP model
14. Public Key Infrastructure	• Secure transactions over Internet • Digital signature • Implementation under PPP model
15. Identity cards for citizens	• Unique identification number (SSID) for citizens based on MPHS data
16. Data warehousing	• To analyze the huge historic data generated in the computerized departments & agencies.
17. IT organization	• To manage the IT infrastructure

Table 4 : Core Policy Initiatives

18. Architecture	• A compilation of open technology standards • A set of best practices in deployment of ICT, with spl. reference to government. • Already developed & published on the Internet@ www.ap-it.com in February,2002 • Standards have been man

	dated through Government order for compliance by all departments/developers
	• The Architecture developed is being updated with latest technology developments
	• Model to be improved incorporating role for NGOs
19. Security policy	• Already developed
20. PPP for e-government	• Policy for funding e-Government initiatives
	• —— through G.O.Ms.No. 40 dt. 14.08.2001
21. Change management policy	• Framework to manage the Organizational change due to e-Government
22. Privacy policy	• How to safe guard the information and provide confidence to stakeholders

Andhra Pradesh's vision of e-Government – The Big Picture:-

Government of Andhra Pradesh conducted a research on various aspects of e-Government over the last few years through implementation of a few projects and through external consultancies. The concepts and models developed in the process have been described in the foregoing portion of this paper. It was felt appropriate to draw **'The Big Picture'** by visually representing all the components of e-Government (other than the policies). The following picture emerged as a result of this effort.
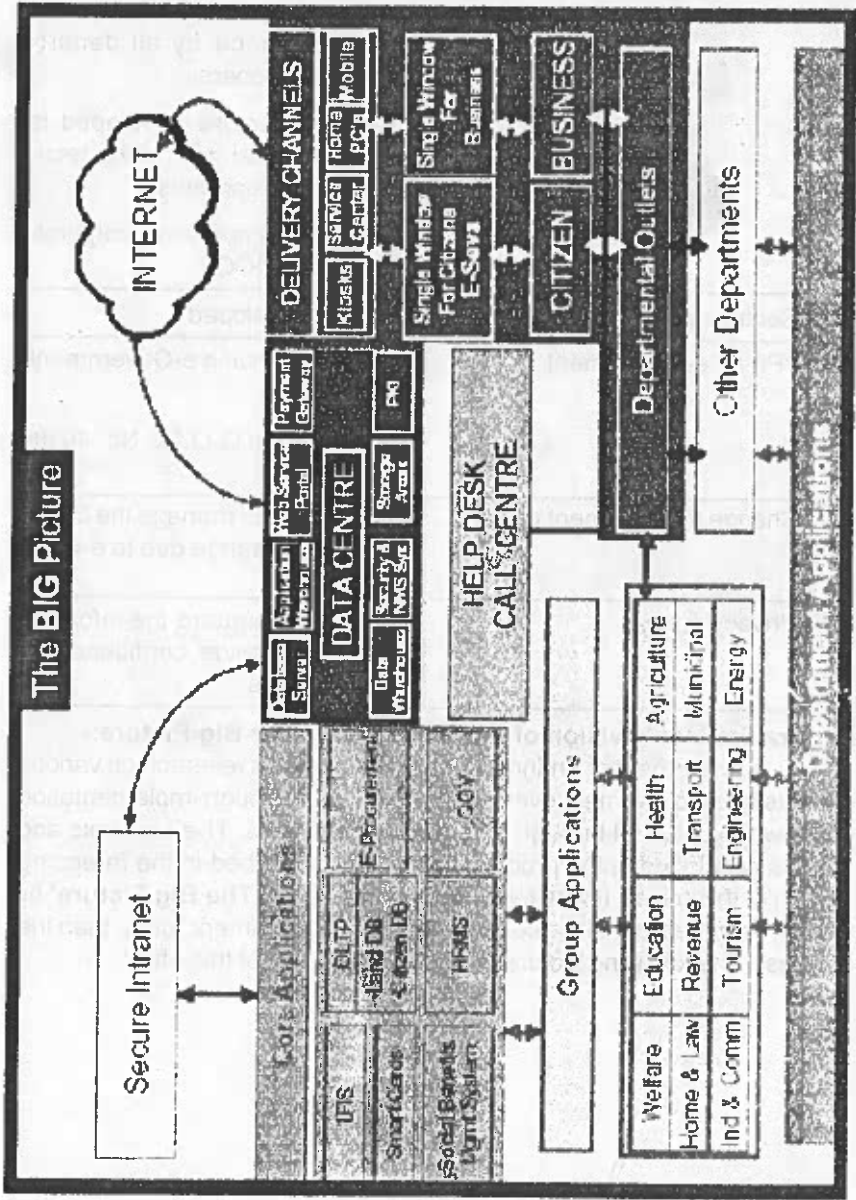
The BIG Picture

The 'Big Picture' has sharpened the understanding of Government of A.P of the key components of e-Government, their inter-se priority, interdependencies and linkages. The 'Big Picture' is not static but is being constantly reviewed and fine-tuned.

IV.6C MODEL FOR IMPLEMENTATION

A **6C model** has been evolved for implementation of e-governance projects from the experience of implementing/ coordinating a number of projects in the government departments. This model tries to incorporate the essential features of a structured approach to a successful implementation of IT projects. The 6C model comprises of the following:

C for Content

By 'content', we mean the application software that is capable of translating the end objectives of an IT project into visible results. Content is the heart of any IT project. The process of content development encompasses a whole range of activities starting with a comprehensive study of the system, identification of the objectives and ending up with delivery of the intended benefits to the citizens or other users of the IT system.

C for Competencies

Implementation and maintenance of e-Government projects through IT professionals hired from the market is likely to result in failure of the project as the organization is bound to disown such outsiders. Departments desirous of implementing major IT projects are required to simultaneously build up the required competencies at various levels. Typically, cadres are to be built at 3 levels – top, middle and cutting-edge levels.

Chief Information Officers, at the top level, should be proficient not only in the domain knowledge of the department but also in the various IT skills. The role of the CIO, after the completion of the training process, is to oversee the implementation of major IT projects in the parent department.

It is also absolutely essential to build a middle-level cadre of technical personnel at the district level in the departments intending to implement major IT projects- in parallel with the design and development of application software to ensure that the department is self-sufficient in most of the technical matters at the field level. Simultaneously with the design and development of the application software it is necessary to identify the required number of employees at the cutting edge level, who will have to operate the computers when the project is implemented.

Project Management skills

Implementation of major IT projects calls for immense skills in project management. It is necessary to build these skills at the apex

level. This not only sharpens the vision substantially, but also enables overseeing the several activities in parallel and thereby reduces the total implementation period.

C for Connectivity:

Widespread connectivity is a pre-requisite for provision of services at any-time, any-where basis and to achieve significant productivity gains in government agencies. Besides the APSWAN project, which connects Hyderabad with all district head quarters, the Government is promoting laying of optical fibre cables across the length and breadth of the state, by the private sector. It is expected that in 3 years, connectivity would not be a major issue.

C for Cyberlaws

The successful functioning of an IT project should not be contingent upon the whims and fancies of the personal likes and dislikes of those at the decision-making levels. All major IT projects should derive their legitimacy and strength from a suitably formulated cyber law. While the Information Technology Act 2000 provides the basic framework for giving legal support to IT projects implemented within the governments, we are also required to undertake a specific exercise in the departments implementing major IT projects, to identify the legal provisions which need to be specifically amended to take care of the requirements of the IT systems.

Besides the above, it is necessary to attempt a detailed examination of all the rules, procedures and forms in use by the department so as to make them compatible with the re-engineered procedures and processes of the IT system. The need for a separate set of laws to regulate and govern the cyber-economy stems from two factors. Firstly, the subject matter of concern here is intangible and exists in the unseen digital world, that defies the normal, time-tested methods of evidence and assurance. Secondly, the traditional methods of jurisprudence are too slow for the Internet world. The saying -Justice delayed is justice denied' is acutely true in the cyber-world! The IT Act essentially brings two fundamental changes. Firstly, it gives legal recognition to the records maintained electronically. Secondly, it gives legal recognition to the process of authentication of electronic records by affixing digital signatures. Though the IT Act 2000 excludes certain classes of documents from its applicability – like power-of-attorney, trust, will, contracts relating to immoveable property – it is still a major step forward. We have to evolve methods of operationalizing the Act very quickly to derive the intended benefit.

The IT Act brings with it a number of benefits like access control,

authentication, data privacy and confidentiality, integrity, non-repudiation and an institutional mechanism for management and audit of electronic transactions. These features are immensely useful in several areas of e-commerce, e banking, e-Government, telemedicine and the like.

C for Citizen Interface

However good the content, competencies, connectivity and cyberlaw may be, it is of no use unless the citizens have an affordable and ubiquitous access mechanism. There are several options like Citizen Service Centres, Internet Kiosks, Home PC's, Set-top-boxes etc. We should plan how the services of an e-Government project are to reach the intended beneficiaries, in a cost-effective manner while conceptualizing the project itself.

C for Capital

The implementation of IT projects involves the mobilization of capital investments as well as the funds required for maintenance of the systems on a sustained basis. With increasing pressures on the fiscal systems, governments are not in a position to extend an open- ended financial support to such projects. Against this background, it becomes increasingly necessary and almost imperative to find new and innovative methods of financing the IT projects.

ANDHRA PRADESH - ELECTRONICS HARDWARE POLICY

(Information Technology & Communications Department, G.O.Ms.No. 41, and Dated: 21.08.2001)

1. Electronic Hardware is one of the fastest growing sectors of economy in the world today. To take advantage of the rapid growth of this sector for the socio-economic development of its citizens, the Govt. of AP desires to create a world-class vibrant hardware industry in the State. The State shall match the best in the world in terms of innovation, quality, price and agility of manufacture and by doing so, become the leader of the industry in the country and achieve 10% market share by 2008.

2. The development of the industry will be done on the basis of the Industrial Policy 2000 – 2005. Accordingly, the provisions of the new Industrial Policy are fine tuned for the requirements of the Electronic Hardware sector in close association with the industry and a world-class consultant with the following objectives:

 i) developing benchmarks for the industry with respect to global practices

 ii) identification of key drivers of growth and gap analysis

 iii) assessment of market size and segments for the domestic and export market

 iv) global and domestic competitive analysis, and

 v) developing a road map for achieving excellence

3. The primary thrust of the policy will be towards creation of state-of-art infrastructure such as power, water, telecommunication facilities including Internet connectivity, roads, and drainage etc. and "providing them to the door step of the proposed industry" in identified areas. An area of about 5000 acres adjacent to the proposed International Airport has been identified for development of the **Hardware Park**. As a first step, the APIIC in association with a renowned private sector agency, will develop 100 acres with reliable power, adequate water supply systems, accessibility through a suitable road and transport network, sewerage systems and effluent treatment systems etc., conforming to international norms, on a pilot basis. The Govt. of Andhra Pradesh, will provide land to the developers, against equity in the venture.

Telecommunications/high speed data communication facilities will be provided at the pilot site. A Park Management Authority will be estab-

lished to provide a single window system to ensure quick and hassle free service to clients. As more industries are located in the Park, the area will be expanded, ultimately covering the entire 5000 acres. The Park will be extended into a logistics hub and will be the center of regional distribution. It will provide Warehousing, Container Depots, and Distribution facilities. Cargo movement through Air, Road, Rail and other Multi-modal transportation will be facilitated. The Park will be developed as an integrated township with all supporting facilities such as Housing, Hotels, Club houses, Recreation and Sports facilities etc. The State Govt. intends to eventually develop it as a **Special Economic Zone** as per the norms prescribed by the Govt. of India.

4. For the development of the infrastructure in the pilot project and to meet crucial balancing requirements from time to time in other Hardware Parks to be planned in future, a Hardware Infrastructure Development Fund (HIDF) of Rs. 50 Crores will be created by the Govt. This will be used as seed capital for development of the pilot project and will be used as a revolving fund subsequently. Resources for the HIDF will be met out of the provision for the AP Industrial Infrastructure Fund. The Fund shall also provide for accruals through contributions, levies and other sources of income from the industry to make it self-sustaining.

5. Agility of manufacture is critical to the growth of the hardware industry. The Govt. of India has provided various mechanisms to ensure such agility through creation of Special Economic Zones. To capitalize on the benefits of SEZs, GoAP will promote the development of such zones wherever feasible. The Govt. will also demarcate an exclusive area for the hardware manufacture within the SEZ notified in Visakhapatnam.

6. The following incentives will be provided to the Electronic Hardware Industry in the State:

i. Hardware Industry will be exempted from statutory Power cuts

ii. Whenever industries are located in places other than designated industrial areas, the Govt. will share the cost of infrastructure up to 25% or Rs. 100 lakhs whichever is less, if such a location is otherwise justified.

iii. 50% exemption will be allowed on Stamp duty, Registration and transfer duty on purchase of lands meant for industrial use. Exemption of Stamp duty and registration fee for loan agreements, credit deeds, mortgages and hypothecation deeds executed by the industries in favour of Banks or Financial institutions, will also be allowed.

iv. 20% Investment Subsidy on capital investment on land, buildings and plant & machinery up to a maximum of Rs.20 lakhs will be given to eligible SSI and tiny units. Out of this 50% up to a maximum of Rs. 10 lakhs will

be given as a cash subsidy. The balance subsidy of 50% up to a maximum of Rs. 10 lakhs will be provided for the following purposes:

1. Import of new (not second hand) machinery
2. Training of entrepreneurs
3. Training of workers
4. Testing and certification facilities for raw material and finished products

v. An additional cash subsidy of 10% on capital investment subject to a limit of Rs. 10 lakhs will be given to SC/ST entrepreneurs in the eligible SSI and tiny units.

vi. The need for conversion of land used from agricultural use to industrial use will be dispensed with except in the tank bed lands.

vii. All industrial units will be exempted from payment of Non –Agricultural Land Assessment.

viii. In case of Mega projects with capital investment exceeding Rs.500 Crores (US $ 100 million) Govt. may consider a special package of incentives except tax-based incentives on a case-to-case basis. These incentives are provided under the provisions of the new Industrial Policy vide G.O.Ms. No. 9, dated 5.1.2001, Industries & Commerce (IP) Department.

7. On the lines of G.O.Ms.No.28, dt. 21-4-2001, Labour Employment Training and Factories (Lab.II) Department, the hardware sector shall be permitted self-certification in the prescribed format under the following Labour Laws:

a. The Factories Act, 1948 and Andhra Pradesh Factories Rules, 1950;

b. The Maternity Benefit Act, 1961 and Rules made there under;

c. The Andhra Pradesh Shops and Establishments Act, 1988 and the Andhra Pradesh Shops and Establishments Rules, 1990;

d. The Contract Labour (Regulation and Abolition) Act, 1970 and Andhra Pradesh Contract Labour (Regulation and Abolition) Rules, 1971;

e. The Payment of Wages Act, 1936 and the Andhra Pradesh Payment of Wages Rules, 1937;

f. The Minimum Wages Act, 1948 and the Andhra Pradesh Minimum Wages Rules, 1949; and

g. The Employment Exchanges (compulsory Notification of Vacancies) Act, 1959.

8. No self-certificate need be issued in respect of the Workmen's Compensation Act, 1923. However, the Government and their authorized officers shall have full powers to inspect the above related Industries at any time on any complaint received, and to take action on the erring managements for the deviations, if any found, as per Acts and Rules made there under. The Government shall examine the other areas where self-certifica-

tion is fcasible.

9. In order to develop a "green" Hardware Industry in the State, the Govt. shall levy an Environment Tax equal to the cost of plantation and maintenance for 5 years for raising of green belts. Industries who raise green belt to the extent stipulated will be exempted from payment from this tax.

10. To control pollution and to ensure effective waste and effluent treatment, the Govt. will develop independent environmental audit agencies in association with the industry. The industry will be free to conduct environmental audits on their own or through private agencies. The Pollution Control Board will evaluate such independent environmental audits wherever required.

11. Single Window registration for clearance will be made compulsory by law. In the case of EOUs such clearances will be handled by STPI, Hyderabad. In SEZs the concerned Development Commissioner will handle such clearances. For all other units the GoAP will constitute a suitable authority.

12. To provide a conducive environment for speedy manufacture of Electronic
Hardware in the State, the State Government will take up relevant issues with the Govt. of India for simplification of Customs and Central Excise laws and for faster Airport clearances.

13. For the purpose of this policy the Electronic Hardware Industry will include electronic components, digital electronic equipment and intermediate products and specified Telecom products as per annexure of the WTO-IT agreement (Annexure)

14. The IT&C Department shall issue detailed guidelines for the implementation of the Policy separately.

15. This order issues with the concurrence of the Finance Wing of the Finance & Planning Department vide C.O.No. 3976/PFS/01, dated 17.08.2001.

ANNEXURE

Products covered under the definition of Electronic Hardware (Please see para 13 of GO Ms. No: 41, IT&C Dept., dated 21-8-2001)

There are two attachments to the Annex.

Attachment A lists the HS headings or parts thereof to be covered.

Attachment B lists specific products to be covered by an ITA wherever they are classified in the HS.

Attachment A, Section 1

HS 96		HS description
3818		Chemical elements doped for use in electronics, in form of discs, wafers or similar forms; chemical compounds doped for use in electronics
8469	11	Word processing machines
8470		Calculating machines and pocketsize data recording, re-producing and displaying machines with a calculating func-tion; accounting machines, postage franking machines, ticket issuing machines and similar machines, incorpo-rating a calculating devices; cash registers
8470	10	Electronic calculators capable of operating without an external source of electric power and pocket size data recording, reproducing and displaying machines with cal-culating functions
8470	21	Other electronic calculating machines incorporating a print-ing device
8470	29	Other
8470	30	Other calculating machines
8470	40	Accounting machines
8470	50	Cash registers
8470	90	Other
8471		Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for process-ing such data, not elsewhere specified or included:
8471	10	Analogue or hybrid automatic data processing machines
8471	30	Portable digital automatic data processing machines, weighing no more than 10 kg. Consisting of at least a central processing unit, a keyboard and a display
8471	41	Other digital automatic data processing machines comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined

8471	49	Other digital automatic data processing machines presented in the form of systems
8471	50	Digital processing units other than those of subheading 8471 41 and 8471 49, whether or not in the same housing one or two of the following types of units; storage units, input units, output units
8471	60	Input or output units, whether or not containing storage units in the same housing
8471	70	Storage units, including central storage units, optical disk storage units, hard disk drives and magnetic tape storage units
8471	80	Other units of automatic data processing machines
8472	90	Automatic teller machines
8473	21	Parts and accessories of the machines of heading No. 8470 of the electronic calculating machines of subheading 8470 10, 8470 21 and 8470 29
8473	29	Parts and accessories of the machines of heading No. 8470 other than the electronic calculating machines of subheading 8470 10, 8470 21 and 8470 29
8473	30	Parts and accessories of the machines of heading No. 8471
8473	50	Parts and accessories equally suitable for use with machines of two or more of the headings Nos. 8469 to 8472
8504	40	Static converters for automatic data processing machines and units thereof, and telecommunication apparatus
Ex 8504	50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus
8517		Electrical apparatus for line telephony or line telegraphy, including the telephone sets with cordless handsets and telecommunication apparatus for carrier current the systems or for digital line systems; videophones;
8517	11	Line telephone sets with cordless handsets
8517	19	Other telephone sets and videophones
8517	21	Facsimile machines

8517	22	Teleprinters
8517	30	Telephonic or telegraphic switching apparatus
8517	50	Other apparatus, for carrier current line systems or for digital line systems
8517	80	Other apparatus including entry phone systems
8517	90	Parts of apparatus of heading 8517
Ex 8518	10	Microphones having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 10 mm and a height not exceeding 3mm, for telecommunication use
Ex 8518	30	Line telephone handsets
Ex 8518	29	Loudspeakers, without housing, having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 50 mm, for telecommunication use
8520	20	Telephone answering machines
8523	11	Magnetic tapes of width not exceeding 4mm
8523	12	Magnetic tapes of width exceeding 4 mm but not exceeding 6.5 mm
8523	13	Magnetic tapes of a width exceeding 6.5 mm
8523	20	Magnetic discs
8523	90	Other
8524	31	Discs for laser reading systems for reproducing phenomena other than sound or image
Ex 8524	39	Other For reproducing representation of instructions, data, sound and image recorded in a machine readable binary form, and capable of being multiplied or providing interactivity to a user, by means of an automatic data processing machine
8524	40	Magnetic tapes for reproducing phenomena other than sound or image
8524	91	Media for reproducing phenomena other than sound or image

Ex 8424	22	Other
		For reproducing representations of instructions data, sound and image recorded in a machine readable binary form, and capable of being multiplied or providing interactivity to a user, by means of an automatic data processing machine
Ex 8425	10	Transmission apparatus other than apparatus for radio broadcasting or television
8525	20	Transmission apparatus incorporating reception apparatus
Ex 8425	40	Digital still image video cameras
Ex 8527	90	Portable receivers for calling, alerting or paging
Ex 8529	10	Aerials or antenna of a kind used with apparatus for radio telephoning and radio telegraphing parts of Transmission apparatus, other than apparatus for radio broadcasting of television
Ex 8529	90	Transmission apparatus incorporating reception apparatus Digital still image video cameras Portable Receivers for calling alerting or paging
8531	20	Indicator panets incorporating liquid crystal devises (LCD) or light emitting bodies (LED)
Ex 8531	90	Parts of apparatus of sub-heading 8531, 20
8532		Electrical capacitors, fixed variable or adjustable (preset)
8532	10	Fixed capacitors designed for use in 50x60 Hz circuits and having a reactive power handling capacity of not less than 0,5 kbar (power capacitors)
8532	21	Tantalum fixed capacitors
8532	22	Aluminum electro-lighting fixed capacitors
8532	23	Ceramic dielectric, single layer fixed capacitors
8532	24	Ceramic dielectric, multi layer fixed capacitors
8532	25	Dielectric, fixed capacitors of paper or plastic
8532	29	Other fixed capacitors
8532	30	Variable or adjustable (preset) capacitors

8532	90	Parts
8533		Electrical resisters (including rheostats and potentiometers), other than heating resistors
8533	10	Fixed carbon resistors, composition or film types
8533	21	Other fixed resistors for a power handling capacity not exceeding 20W
8533	29	Other fixed resistors for a power handling capacity of 20W or more
8533	31	Wire-wound variable resistors, including rheostats and potentiometers, for a power handling capacity not exceeding 20W
8533	39	Wire-wound variable resistors, including rheostats and potentiometers, for a power handling capacity of 20W or more
8533	40	Other variable resistors, including rheostats and potentiometers
8533	90	Parts
8534		Printed circuits
Ex 8536	50	Electronic AC switches consisting of optically coupled input and output circuits (insulated thyristor AC switches)
Ex 8536	50	Electronic switches, including temperature protected electronic switches, consisting of a transistor and a logic chip (chip-on-chip technology) for a voltage not exceeding 1000 volts
Ex 8536	50	Electromechanical snap action switches for a current not exceeding 11 amps
Ex 8536	69	Plugs and sockets for coaxial cables and printed circuits
Ex 8536	69	Connection and contact elements for wires and cables
8541		Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes; mounted piezoelectric crystals:

8541	10	Diodes, other than photosensitive or light emitting diodes
8541	21	Transistors, other than photosensitive transistors, with a dissipation rate of less than 1 W
8541	29	Transistors, other than photosensitive transistors, with a dissipation rate of 1 W or more
8541	30	Thyristors, diacs and triacs, other than photosensitive devices
8541	40	Photosensitive semiconductor devices, including photo-voltaic cells whether or not assembled in modules or made up into panels; light emitting diodes
8541	50	Other semiconductor devices
8541	60	Mounted piezoelectric crystals
8541	90	Parts
8542		Electronic integrated circuits and micro assembles
8542	12	Cards incorporating an electronic integrated circuit
8542	13	Metal oxide semiconductors (MOS technology)
8542		Circuits obtained by bipolar technology
8542		Other monolithic digital integrated circuits including circuits obtained by a combination of bipolar and MOS technologies (BIMOS) technology
8542	30	Other monolithic integrated circuits
8542	40	Hybrid integrated circuits
8542	50	Electronic micro assemblies
8542	90	Part
8543	81	Proximity cards and tags
8543	89	Electrical machines with translation or dictionary functions
Ex 8544	41	Other electric conductors, for a voltage not exceeding 80V, fitted with connectors, of a kind used for telecommunications
Ex 8544	49	Other electric conductors, for a voltage not exceeding 80V, not fitted with connectors, of a kind used for telecommunications

Ex 8544	51	Other electric conductors, for a voltage exceeding 80V but not exceeding 1000V, fitted with connectors, of a kind used for telecommunications
8544	70	Optical fibre cables
9009	11	Electrostatic photocopying apparatus, operating by reproducing the original image directly onto the copy (direct process)
9009	21	Other photocopying apparatus, incorporating an optical system
9009	90	Parts and accessories
9026		Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flow meters, level gauges, manometers, heat meters), excluding instruments and apparatus of heading No. 9014, 9015, 9028 or 9032)
9026	10	Instruments for measuring or checking the flow or level of liquids
9026	20	Instruments and apparatus for measuring or checking pressure
9026	80	Other instruments and apparatus for measuring or checking of heading 9026
9026	90	Parts and accessories of instruments and apparatus of heading 9026
9027	20	Chromatographs and electrophoresis instruments
9027	30	Spectrometers, spectrophotometers and spectrographs using optical radiators (UV, visible, IR)
9027	50	Other instruments and apparatus using optical radiators (UV, visible IR) of heading No. 9027
9027	80	Other instruments and apparatus of heading No. 9027 (other than those of heading No. 9027 10)
Ex 9027	90	Parts and accessories of products of heading 9027, other than for gas or smoke analysis apparatus and microtomes
9030	40	Instruments and apparatus for measuring and checking, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psopho-meters)

Attachment A, Section 2
Semiconductor manufacturing and testing equipment and parts thereof

HS Code		Description	Comments
Ex 7017	10	Quartz reactor tubes and holders designed for insertion into diffusion and oxidation furnaces for production of semiconductor wafers	For Attachment B
Ex 8419	89	Chemical vapor deposition apparatus for semiconductor production	For Attachment B
Ex 8419	90	Parts of chemical vapor deposition apparatus for semiconductor production	For Attachment B
Ex 8421	19	Spin dryers for semiconductor wafer processing	
Ex 8421	91	Parts of spin dryers for semiconductor wafer processing	
Ex 8424	89	Deflash machines for cleaning and removing contaminants from the metal leads of semiconductor packages prior to the electroplating process	
Ex 8424	89	Spraying appliances for etching, stripping or cleaning semiconductor wafers	
Ex 8424	90	Parts of spraying appliances for etching, stripping or cleaning semiconductor wafers	
Ex 8456	10	Machines for working any material by removal of material, by laser or other light or photo beam in the production of semiconductor waters	
Ex 8456	91	Apparatus for stripping or cleaning semiconductor wafers -	For Attachment B
8456	91	Machines for dry etching patterns on semiconductor materials	
Ex 8456	99	Focused ion beam milling machines to produce or repair masks and retiles for patterns on semiconductor devices	

Ex 8456	99	Lesercutters for cutting containing tracks in semiconductor production by laser beam	For Attach-ment B
Ex 8464	10	Machines for sawing monocrystal semi-conductor boules into slices, or wafer into chips	For Attach-ment B
Ex 8464	20	Grinding, polishing and lapping machines for processing of semiconductor wafers	
Ex 8464	90	Dicing machines for scribing or scoring semiconductor wafer	
8466	91	Parts for machines for sawing mono crys-tal semiconductor boules into slices, or wafer into chips	
8466	91	Parts of dicing machines for scribing or scoring semiconductor wafers	
8466	91	Parts of grinding, polishing and lapping machines for processing of semiconduc-tor wafers	
8466	93	Parts of focused ion beam milling ma-chines to produce or repair masks and recticles for patterns on semiconductor devices	
8466	93	Parts of laser cutters for cutting contact-ing tracks in semiconductor production by laser beam	For Attach-ment B
8466	93	Parts of machines for working any mate-rial, by laser or other light or photo beam in the production of semiconductor wa-fers	
8466	93	Parts of apparatus for stripping or clean-ing semiconductor wafers	For Attach-ment B
8466	93	Parts of machines for dry etching patterns on semiconductor materials	
8477	10	Encapsulation equipment for assembly of semiconductors	For Attach-ment B

8477	90	Parts of encapsulation equipment	For Attachment B
8479	50	Automated machines for transport, haling and storage of semiconductor wafer, wafer cassettes, wafer boxes and other material for semiconductor devices	For Attachment B
8479	89	Apparatus for growing or pulling monocrystal semiconductor boules	
9011	20	Photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
Ex 9011	90	Parts and accessories of optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
Ex 9011	90	Parts and accessories of photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
Ex 9012	10	Electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
Ex 9012	10	Parts and accessories of electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
Ex 9017	20	Pattern generating apparatus of a kind used for producing masks or reticles from photo-resist coated substrates	For Attachment B
Ex 9017	90	Parts and accessories for pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates	For Attachment B

Ex 9017	90	Parts of such pattern generating apparatus	For Attach-ment B
Ex 9030	82	Instruments and apparatus for measuring or checking semiconductor wafers or de-vices	
Ex 9030	90	Parts of instruments and appliances for measuring or checking semiconductor wafers or devices	
Ex 9031	41	Optical instruments and appliances for inspecting semiconductor wafers or de-vices or for inspecting masks, photomasks or reticles used in manufac-turing semiconductor devices	
Ex 9031	49	Optical instruments and appliances for measuring surface particulate contamina-tion on semiconductor wafers	
Ex 9031	90	Parts and accessories of optical instru-ments and appliances for inspecting semi-conductor wafers or devices or for in-specting masks, photomasks or reticles used in manufacturing semiconductor devices	
Ex 9031	90	Parts and accessories of optical instru-ments and appliances for measuring sur-face particulate contamination on semi-conductor wafers	

Attachment B

Positive list of specific products to be covered by this agreement wherever they are classified in the HS. Where parts are specified, they are to be covered in accordance with HS Notes 2(b) to Section XVI and Chapter 90, respectively.

Computers: automatic data processing machines capable of 1) storing the processing program or programs and at least the data immedi-ately necessary for the execution of the program; 2) being freely pro-grammed in accordance with the requirements of the user; 3) performing arithmetical computations specified by the user; and 4) executing, with-out human intervention, a processing program which requires them to

modify their execution, by logical decision during the processing run.

The agreement covers such automatic data processing machines whether or not they are able to receive and process with the assistance of central processing unit telephony signals, television signals, or other analogue or digitally processed audio or video signals. Machines performing a specific function other than data processing, or incorporating or working in conjunction with an automatic data processing machine, and not otherwise specified under Attachment A or B, are not covered by this agreement.

Electric amplifiers when used as repeaters in line telephony products falling within this agreement, and parts thereof.

Flat panel displays (including LCD, Electro Luminescence, Plasma and other technologies) for products falling within this agreement, and parts thereof.

Network equipment: Local Area Network (LAN) and Wide Area Network (WAN) apparatus, including those products dedicated for use solely or principally to permit the interconnection of automatic data processing machines and units thereof for a network that is used primarily for the sharing of resources such as central processor units, data storage devices and input or output units including adapters, hubs, inline repeaters, converters, concentrators, bridges and routers, and printed circuit assemblies for physical incorporation into automatic data processing machines and units thereof.

Monitors: display units of automatic data processing machines with a cathode ray tube with a dot screen pitch smaller than 0,4 mm not capable of receiving and processing television signals or other analogue or digitally processed audio or video signals without assistance of a central processing unit of a computer as defined in this agreement.

The agreement does not, therefore, cover televisions, including high definition televisions.

Optical disc storage units, for automatic data processing machines (including CD drives and DVD drives), whether or not having the capability of writing/recording as well as reading, whether or not in their own housings.

Paging alert devices, and parts thereof.

Plotters whether input or output units of HS heading No 8471 or drawing or drafting machines of HS heading No 9017.

Printed Circuit Assemblies for products falling within this agreement, including such assemblies for external connections such as cards that conform to the PCMCIA standard.

Such printed circuit assemblies consist of one or more printed circuits of heading 8534 with one or more active elements assembled thereon, with or without passive elements "Active elements" means diodes, transistors, and similar semiconductor devices, whether or not photosensitive, of heading 8541, and integrated circuits and micro assemblies of heading 8542.

Projection type flat panel display units used with automatic data processing machines which can display digital information generated by the central processing unit.

Proprietary format storage devices including media therefor for automatic data processing machines, with or without removable media and whether magnetic, optical or other technology, including Bernoulli Box, Syquest, or Zipdrive cartridge storage units.

Multimedia upgrade kits for automatic data processing machines, and units thereof, put up for retail sale, consisting of, at least, speakers and/or microphones as well as a printed circuit assembly that enables the ADP machines and units thereof to process audio signals (sound cards). Set top boxes which have a communication function: a microprocessor based device incorporating a modem for gaining access to the Internet, and having a function of interactive information exchange.

ICT POLICY 2002-2005 OF GOVT. ANDHRA PRADESH

The Department of Information Technology and Communications, Government of Andhra Pradesh, 10th July 2002 in Hyderabad announced the launch of the first of its kind ICT Policy 2002-2005 at a memorable evening among a gathering of top ICT company heads of the State. Hon'ble Chief Minister of Andhra Pradesh, Sri N. Chandrababu Naidu graced the occasion with his august presence and unveiled the ICT Policy to mark yet another first in the state's endeavours towards promoting the growth of the ICT industry.

**Path-breaking initiatives to promote ICT Industry...
a step towards realizing Vision 2020**

GoAP's industry-friendly initiatives & IT incentives policy are in line with the eGovernance vision of the State of "leveraging information technology to attain a position of leadership and excellence in the information age and to transform itself into a knowledge society". These initiatives from the State government, first of its kind initiative from any government, will provide a huge thrust to the industry and enhance global business opportunities for ICT players in the State besides providing efficient, transparent and responsive citizen services.

ICT Policy 2002-2005

The ICT Policy augments the sound functioning of the ICT sector to give it a new direction. The ICT Policy promotes growth of the ICT industry in the state and benefits the IT hardware and software industries that includes IT software, IT services and IT Enabled Services and the IT infrastructure industries. The government also extends the Policy to telecommunications companies, which include basic telecom service providers, VSAT, cellular companies, telecom infrastructure companies, ISP's. To facilitate the overall growth of ICT industry in the state, the ICT Policy 2002-2005 has been formulated to create an environment to realize the Vision 2020 and adoption of Information Technology in all aspects of development including e-governance.

This Policy gives a new direction to the ICT sector besides extending the earlier incentives, by providing a thrust in the following key areas:

Preference to AP Units for eGovernance Projects: A weightage of upto 10% in score shall be given to IT units with registered offices in Andhra Pradesh, during the technical evaluation in all e-Government projects.

- Subsidy for SME's for participation in International events: As a first of its kind initiative, GoAP aims to enhance business opportunities for SME units in the State by enabling their participation in international events. A 30% subsidy would be provided to the SME units, with turnover not exceeding Rs.10 crore in the preceding year, in respect of the stall rent payable for participation in international events notified by the IT&C Department.
- Promoting quality certification: To promote quality consciousness and quality control among IT Companies, the Government shall reimburse 20% of the cost incurred by an IT software company on securing quality certification of SEI CMM Level 2 and above, subject to a maximum ceiling of Rs. 4 lakhs.

Some of the incentives extended to IT companies in this Policy include:

- Exemption from purview of AP Pollution Control Act, except in power generation sets
- Self-certification and exemption from inspections under Factories Act, Maternity Benefit Act, AP Shops & Establishments Act, Contract Labour Act, Payment of Wages Act, Minimum Wages Act, Employment Exchanges Act
- Permission to run a three shift operation
- Concessional power tariff - Under this scheme, IT units will be eligible for a 25% rebate in power tariff for a period of 3 years from the date of commencement of commercial operation
- Reimbursement of stamp duty - A 50% reimbursement of the stamp duty, transfer duty and registration fee will be allowed to ICT companies
- Exemption from zoning regulations
- Rebate in cost of land
- Capital investment subsidy
- Special provision for mega IT projects - with an investment of Rs. 50 crores and above
- The government has also established an IT-enabled single window system for providing a smooth interface between industrial and business units and the regulatory agencies of the government

Andhra Pradesh is the first state to promote 'free right of way" telecommunication along highways, thus supporting increased PC and Internet penetration and teledensity leading to broadband. Andhra Pradesh is the ideal ICT destination' with the conducive business environment that it fosters, and the various incentives given and the initiatives taken to foster an environment to promote quality management, promote businesses

and enhance citizen services through e-Governance.
INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) POLICY
OF THE GOVERNMENT OF ANDHRA PRADESH – ICT POLICY 2002
(Information Technology & Communications Department, G.O.Ms No.27,
Dated. 27.06.2002)

The Government of Andhra Pradesh announced an industry-friendly
incentives policy for the IT sector in May 1999, through the GO first read
above, to promote the growth of the IT industry within the State. The IT
industry has grown significantly during the last 3 years, at a CAGR of over
80 %, with the exports of software reaching Rs.2855 crores for the year
2001-02, from a level of Rs.574 crores for the year 1998-99. The employ-
ment provided by the sector has grown from 12000 to 64000 during this
period. The scheme of incentives under the IT Policy 1999 has been ad-
ministered by a Consultative Committee on IT Industry (CCITI), consti-
tuted through the GO second read above. To mention a few facts and
figures, power tariff subsidy was provided to 153 IT companies, invest-
ment subsidy was provided to 26 IT companies, rebate in stamp duties
was given to 14 IT companies, besides allotment of land and exemption
from zoning regulations provided to 26 companies.

2. There has also been a significant progress in the implementation of
innovative projects in the area of e-Government, with the objective of de-
ploying the tools of ICT for increasing the efficiency of Government opera-
tions, providing better citizen services and above all, enhancing the qual-
ity of life of the citizens. These e-Government initiatives have acted as a
catalyst for the growth of the IT sector in the state.

3. The Government has also announced a Hardware Policy through the
GO third read above and a special policy for the IT Enabled Services
sector through the GO fourth read above.

4. The IT policy announced through the GO first read above was valid upto
24-5-2002. Considering the positive results of the IT Policy during the last
3 years, the Government feel that it is necessary to continue the thrust
being given to the ICT sector and give it a new direction. Accordingly, in
continuation and modification of all the orders issued earlier on the sub-
ject of ICT Policy, the Government approves the following policy for the ICT
industry.

5. Definitions:
a) IT Industry includes IT hardware and software industries. IT software
industry includes IT software, IT services and IT Enabled Services.
b) IT Infrastructure means the physical Infrastructure built by a firm or a
builder and sold/leased or transferred on lease-cum-sale to an IT Industry

for its own use or the Infrastructure built by an IT Industry for its own use.
c) Telecommunication companies include Basic Telecom Service Providers (fixed), VSAT, Cellular (Mobile) companies, Telecom Infrastructure companies, ISPs and any other value added services licensed by Ministry of Communications & IT, Government of India.
d) Date of commencement of commercial operations is the date on which commercial operations are started, subject to furnishing of the first sale bill/invoice.

6. Incentives available to the IT companies automatically:

(a) IT software units are exempt from the purview of the **AP Pollution Control Act, except** in respect of power generation sets.

(b) IT units are exempt from the **purview of statutory power cuts**.

(c) IT units are exempt from inspections under the following Acts and the Rules framed there under, barring inspections arising out of specific complaints. The IT units are permitted to file self-certificates, in the prescribed formats.

i. The Factories Act 1948
ii. The Maternity Benefit Act 1961
iii. The AP Shops & Establishments Act 1988
iv. The Contract Labour (Regulation & Abolition) Act 1970
v. The Payment of Wages Act 1936
vi. The Minimum Wages Act 1948
vii. The Employment Exchanges (Compulsory Notification of Vacancies) Act 1959.

(d) General permission is accorded to the IT Software Industry to run a three-shift operation.

7. Incentives to be sanctioned on application by the IT units:

The Consultative Committee on IT Industry (CCITI) - a joint committee with representatives from the Government and the IT Industry with the composition and terms of reference specified in the

Annexure I- shall administer the following incentives on specific application made by an IT unit.

(a) **Concessional Power Tariff:** New IT units, registered after the announcement of IT Policy 1999, shall be eligible for a 25% rebate in power tariff for a period of 3 years from the date of commencement of commercial operations. (**Annexure II**)

(b) IT software units shall be classified as industrial units for the purpose of availing the industrial power tariff. (**Annexure II**).

(c) **Reimbursement of Stamp Duty**: A 50% Reimbursement of the stamp duty, transfer duty and registration fee, shall be allowed to:

i. IT Infrastructure Companies on sale, lease or lease-cum-sale of built up space to IT Companies.

ii. Telecommunication Companies acquiring land on purchase, lease or lease-cum- sale, for setting up their facilities and

iii. IT companies acquiring land on purchase, lease or lease-cum-sale, for setting up facilities or IT Parks for their own use. This incentive shall be allowed subject to the criteria laid down in **Annexure III**.

(d) Zoning regulations: IT software companies intending to establish facilities for their own use and IT Infrastructure companies intending to set up IT parks, are eligible for an exemption from the zoning regulations and from the payment of conversion fee, subject to the criteria laid down in **Annexure-IV**.

(e) Rebate in cost of land: IT companies establishing their own facilities on land allotted by the Government or APIIC, are eligible for a rebate in cost of land calculated at the rate of Rs.20,000 per job created. The eligibility criteria, procedure for allotment of land and for availing of the rebate, are specified in Annexure-V.

(f) **Investment subsidy**: An investment subsidy, to the tune of 20 % of the fixed capital investment, shall be admissible for new IT units, subject to a ceiling of Rs.20 lakhs. The subsidy shall be 25 % with a ceiling of Rs.50 lakhs in respect of entrepreneurs belonging to Scheduled Castes and Scheduled Tribes. The eligibility criteria and the procedure are specified in **Annexure-VI**.

(g) **Special provisions for mega projects**: For Mega IT Projects, with investment of Rs.50 crores and above, a special land-pricing scheme will be applicable in respect of land allotted within the Hitec City layout. The details of the special land pricing policy are given in **Annexure - VII**. Besides this, other incentives may also be sanctioned in respect of Mega IT Projects, based on the gestation period of projects, pioneer nature of projects, locational aspects, State of the Art Technology, profitability and scope for further related investments.

(h) The CCITI shall endeavour to decide upon the applications for incentives, within a maximum period of 4 weeks.

8. The Government also expresses its intention to bring in a suitable legislation to establish an IT-enabled **single window system** for providing a smooth interface between industrial and business units and the regulatory agencies of the Government.

9. With a view to promote the **participation of IT units in international events**, the Government will provide a **30% subsidy to the SME units**, with turnover not exceeding Rs.10 crore in the preceding year, in respect

of the stall rent payable for participation in international events notified by the IT&C Department.

10. Preference to AP units in award of e-Government projects: A weightage of upto **10%** in score shall be given to IT units with registered offices in Andhra Pradesh, during the technical evaluation in all e-Government projects. The Government of Andhra Pradesh has drawn up an ambitious plan of action for implementation of e-governance which is expected to create large opportunities in the ICT sector during the next 3 years. An over view of the vision of the government on e-governance can be seen at **Annexure VIII.**

11. Reimbursement of expenditure on quality certification: With a view to promote quality consciousness among IT Companies, the Government shall reimburse, prospectively, 20% of the cost incurred by an IT software company on securing quality certification of SEI CMM level 2 and above, subject to a maximum ceiling of Rs.4 Lakhs. This incentive shall be available only at one time in respect of an IT software company even though it may go in for higher certifications at different periods.

12. The format of application, which is common for all the above incentives, is at Annexure- IX.

13. This policy will be in force for a period of **3** years.

14. This order is issued with the concurrence of the Finance department vide UO No. 2897/PFS/02 dtd. 11.06.02.

ANNEXURE – I

Consultative Committee on IT Industry

1. For administering the incentives to the ICT Industry in a smooth manner, a high level coordination between the various Departments of the Government and the Industry is required. For effectively resolving the problems, overcoming the impediments and ensuring growth of the IT Industry in the State, a Consultative Committee on IT Industry (CCITI) with the following composition is constituted:

1) Principal Secretary, IT&C Department Chairman
2) CMD, AP TRANSCO Member
3) MD, APCPDCL Member
4) Commissioner & IG Registration Member
5) ED, APIIC Member
6) GM Telecom (to be nominated by CGM) Member
7) Representative of Labour Department Member
8) Representative of Commissioner Customs Member
9) President, HYSEA Member
10) Secretary, HYSEA Member

11) One representative of IT Industry to be nominated in consulta-
tion with HYSEA Member
12) Representative of L&T Infocity Member
13) Joint Collector, R.R.District Member
14) Director, STPI, Hyderabad Member
15) Representative of Commissioner of Industries Member
16) OSD, ITES, IT&C Department Member
17) JD (Promotions), IT&C Department Member Secretary

2. The CCITI shall act as a single window for granting incentives announced through this ICT Policy.

3. The terms of reference of CCITI are indicated below:

a) To grant various incentives to ICT industry on examina-
tion of applications made by them.
b) To resolve the problems in implementation the ICT Policy
for speedy realization of the goals set forth.
c) To prescribe the procedures and to issue guidelines and
clarifications in the implementation of the ICT Policy.

4. The term of the CCITI shall be coterminous with the ICT Policy.

ANNEXURE – II

25% Rebate in Power Tariff

25% Rebate in Power Tariff is provided to the new IT Industry, Companies. Industrial Power Tariff is also admissible to the IT Industry including those in the Urban Areas. This concession is available to IT Industry as per the following terms and conditions:

1. Eligibility:

a) IT Companies registered on or after 25.05.1999 are eligible for
25% rebate in Power Tariff and for Industrial Category Power Tar-
iff.
b) IT Companies registered before 25.05.1999 would be eligible only
for Industrial Category Power Tariff prospectively subject to the
approval of CCITI.
c) The CCITI will consider the applications of all IT Companies after
one year from the date of commencement of commercial opera-
tions or earlier if substantial turnover is achieved by the IT Com-
pany.
d) All **power connections should be in the name of the IT Com-
pany** applying for concessions.
e) 25% rebate in power tariff would be limited to a maximum of Rs.30
lakhs for Small Scale IT Units (for investments made in Plant &
Machinery upto Rs.1 Crore) and Rs.50 lakhs for large IT Units

based on the consumption charges.

f) The concession would be available for a period of 3 years from the date of release of power or going into actual commercial production whichever is earlier.

g) IT Companies located in multiple premises or having multiple meters would be eligible for the concessions provided the power connections are in the name of the IT Company, subject however to the ceilings specified in (e), being computed on the consumption at/through all such premises/meters put together.

2. Procedure:

a) The application form is available for download at http://www.ap.gov.in/IncentiveTrack/default.asp

b) The application can be submitted online by adopting the following steps:

• Register through URL http://www.ap.gov.in/IncentiveTrack/newdetails/regform.asp

• After registration, login through URL http://www.ap.gov.in/IncentiveTrack/Login.asp

Complete the application and submit online.

3. The CCITI would consider the application and upon its approval a certificate would be issued by the Department of IT&C certifying the IT Company for being eligible for the 25% rebate in power tariff or for applicability of industrial tariff or both.

ANNEXURE – IV
Exemption from Zoning Regulation

1. IT Software Units are exempted from the Zoning Regulations and the payment of conversion charges for the location of IT Units as per the following terms and conditions:

i) The conversion / exemption from land use zoning regulations for setting up of Information Technology Software Units shall be made applicable only in the following notified land uses in the Master Plan /Zonal Development Plan.

a) Residential use zone.

b) Commercial use zone.

c) Institutional use zone.

d) Industrial use zone.

e) Conservation / Agricultural use zone.

ii) The conversion / exemption from land use Zoning Regulations as above shall be applicable to the Information Technology Units which are notified by the Information Technology & Communications Department.

iii) Information Technology Software Units so notified by Information Tech-

nology and Communications Department are exempt from payment of conversion charges.

2. Information Technology Parks being developed by Construction Firms / Builders are exempted from the Zoning Regulations as per the following terms and conditions:

i) The conversion / exemption from Zoning Regulations in land uses for setting up of Information Technology Parks developed by Construction Firm/Builders shall be made applicable only in the following notified land uses in the Master Plan / Zonal Development Plan:-

(a) Residential use zone.

(b) Commercial use zone.

(c) Institutional use zone.

(d) Industrial use zone.

ii) Information Technology parks notified by Information Technology and Communication Department are exempt from payment of Conversion Charges.

iii) The conversion / exemption from Zoning Regulations is subject to the following conditions:-

(a) The minimum area for the Information Technology Park for utilizing the above exemption shall be **4000** Square Meters.

(b) The Information Technology Parks developed by Construction Firms / Builders shall provide the amenities / infrastructure specific in List-I on a mandatory basis and those specified List-II as desirable amenities suit the needs of Information Technology Industry.

(c) The construction firm / builders shall furnish an undertaking to the Local Authority that the built space shall be sold / leased / rented only to Information Technology Units recognized by Information Technology and Communication Department and if any Information Technology Firm vacates the same will be informed to the Information Technology and Communication Department and subsequent lease etc., will be given only to the units recognized by Information Technology and Communications Department.

(d) The local authority shall obtain a Bank Guarantee for an amount equal to twice the conversion charges.

(e) The premises will be inspected on completion by the Information Technology and Communication Department for ensuring and compliance with the above stipulations before advising the Local Authority for discharge of Bank Guarantee.

3. Procedure:

a) The application form is available for download at

http://www.ap.gov.in/IncentiveTrack/default.asp
b) The application can be submitted online:
• Register through URL http://www.ap.gov.in/IncentiveTrack/newdetails/regform.asp
• After registration login through URL http://www.ap.gov.in/IncentiveTrack/Login.asp
Complete the application and submit online.
c) The following documents should be submitted alongwith the application:
i) Latest Annual Report.
ii) Copy of Title Deeds of the land in respect of which conversion is sought.
4. The Department of IT&C would issue a separate letter after the approval of the CCITI.
5. The mandatory specifications are enumerated at List-I and desirable amenities for all IT Parks are at List II, which are enclosed to this Annexure.

ANNEXURE – V
Rebate in Cost of Land

IT Companies establishing their own facilities can avail rebate in the cost of land linked to employment. The terms for allotting land and the procedure for availing the rebate are specified below:

1. Conditions for Allotment of Land:
a) The rebate shall be applicable only in respect of lands allotted by Government/APIIC with prospective effect;
b) The rebate shall be restricted to Rs. 20,000/- per job created or the cost of the bare land (excluding development charges) whichever is less subject to a ceiling computed at the rate 0.30 acres for every 100 jobs created. {Eg. If 3250 jobs are created the limit for allotment of land at concessional price would be 9.75 acres}.
c) The minimum number of employees to be hired by a company in order to avail of the concession on land cost shall be 100 (corresponding to a ceiling of 0.30 acres of land).
d) On areas allotted in excess of the limit i.e. the ceiling of 0.30 acres for every 100 jobs created, no concessions would be applicable;
e) The minimum gross salary/ wage for an employment to be considered to have been created would be **Rs. 5000/-** per month;
f) The period for which such employment would have to be sustained to be eligible to be reckoned for this incentive shall be two years;
g) The number of employees to be considered for the purpose of this

provision shall not exceed the number arrived at by the formula: [no. of computer work stations at a location x (1.33) x number of shifts (of 8 hours each) operated by the company at the location];

h) Government shall specify suitable guidelines to ensure that the benefit of this provision reaches a company only after it meets the stipulated conditions regarding job creation and that the employment figures reported are corroborated by other supporting data such as investment, turnover, returns filed with RBI, returns filed with STPI, Hyderabad, etc.;

2. Eligibility Criteria:

a).   The concessions linked to employment generation will be limited to the extent of the number of persons of Andhra Pradesh origin employed by the company. A Company will be free to employ persons as per their own policies. However, the concessions available under this incentive will be restricted to the number of persons of AP origin employed by the company. For the purposes of this provision, a person of AP origin is defined as specified below:

§   A resident of the State of AP.
§   Domiciled in the State of AP.
§   Born in the State of AP.
§   Studied in School/College/University in the State of AP.
§   A person either of whose parents was born or attended School/College/University in State of AP or was domiciled in AP.

b)   A resident of the State of AP is defined as a person satisfying any of the following criteria:

·   Whose name finds place in electoral roll anywhere in Andhra Pradesh

·   Whose name finds place in the citizens data maintained by the Revenue Department and is assigned with a multipurpose identity card no. (also termed SSID No:)

·   Who holds a ration card/telephone connection/gas connection in his/her name or in the name of any member of his/her family.

·   Who is able to furnish any other proof of residents like drawal of monthly salary through bank account.

A minimum time period of 2 years of residence in Andhra Pradesh is stipulated for this purpose.

3. Performance Guarantee:

For availing the above rebate on cost of land a Bank Guarantee has to be furnished for the rebate amount for a period as per the terms of the MoU to be signed between the IT Company and the Government of Andhra Pradesh. The format of Bank Guarantee is available at http://

apit.com/govtorders.html.

4. Computation:

a) For computing the number of eligible employees two schemes are pre-scribed as below:

Scheme-A: Taking a count of the number of eligible employees at any date chosen by the company within the maximum admissible period in terms of the MoU signed between the Government and the IT Company.

Scheme-B: Counting the number of eligible employees on any conve-nient date chosen/suggested by the company and counting the additional number of eligible employees at the end of each year thereafter within the maximum admissible period, in terms of the MoU signed between the Government and the IT Company. The bank guarantee will be discharged to the extent of eligible employees counted at the end of each period as above, the count being done on an incremental basis.

b) The IT companies availing rebate may furnish the statement of names and number of eligible employees after satisfying themselves of compli-ance with the eligibility criteria and furnishing a declaration to the effect.

5. Procedure:

a) The application form is available for download at
http://www.ap.gov.in/IncentiveTrack/default.asp

b) The application can be submitted online:

•Register through URL: http://www.ap.gov.in/IncentiveTrack/newdetails/regform.asp

• After registration login through URL http://www.ap.gov.in/IncentiveTrack/Login.asp

Complete the application and submit online.

c) Project Report should be submitted along with the application.

6. The Department of IT&C would enter into a Memorandum of Under-standing (MoU) with the IT Company on receiving approval from CCITI. The format of MoU is available at http://apit.com/govtorders.html

ANNEXURE – VI
Investment Subsidy

Investment Subsidy is available to **new IT Companies set up after 25.09.1999** on fixed capital Investment as per the following terms and conditions:

1. Definition:

Fixed capital investment (land & building, plant, machinery and equipment including hardware & software) wherever referred to in this or-der shall always mean the original fixed capital invested in the project

before depreciation.

2. Eligibility:

(a) All new IT Companies, which have commenced their commercial operations after 25.05.1999 and have filed for Investment Subsidy within 1 ½ year from the date of commencement of commercial operations would be eligible.

(b) Existing industrial units establishing separate/new IT unit with separate identifiable investment will be eligible. "Separate Identifiable Investment" shall mean that the new IT Unit should not have any production linkage with the existing business process, i.e. if the existing Industrial unit is already an IT Company, then it will not be eligible for Investment Subsidy under Separate Identifiable Investment. The new IT Unit should be in a separate building, should maintain separate books of accounts and project should be appraised independently by financial institution as a viable project. A new project will not, however, be regarded as a "Separate Identifiable Investment" if the utilities of the existing unit for water, electricity are extended to the new IT Unit.

(c) IT Industry availing rebate on land cost will not be eligible for availing this subsidy.

3. Procedure:

(a) IT Companies should file the applications for applications with **GM, District Industries Centre** of the concerned District for availing Investment Subsidy. The address of the respective GM, DIC can be obtained from the AP Portal (www.aponline.gov.in) or from: Office of the Commissioner of Industries, Chirag Ali Lane, Abids, Hyderabad-500 001, Tele Phone:040-3201235, Fax:040-3201335, Email: ci@industry.ap.nic.in.

(b) The GM, DIC will certify the fixed capital Investment made by an IT Company including the date of commencement of commercial operations as per the detailed guidelines given in the Industrial Policy of Andhra Pradesh.

(c) The **Consultative Committee on Information Technology Industry (CCITI)** shall sanction the Investment Subsidy based on the merits.

4. The Department of IT&C would issue separate orders for the disbursement of the Investment Subsidy on receiving approval from the CCITI.

5. More details are available in Industrial Policy G.O.Ms.No.9, Industries and Commerce (IP) Department, dtd.05.01.2001 alongwith guidelines for implementation of scheme for Investment Subsidy from URL http://ap-it.com/incentivesgo/gono9.pdf3

ANNEXURE – VII
Special provisions for Mega Projects

1. A special land pricing policy for the sale of land in and around Hitec City for Mega IT Projects is provided as per the following terms and conditions:

a) An IT project with an Investment of Rs.50 crores or more is treated as a Mega Project.

b) The land shall be offered at a cost of Rs.50 lakhs (Rs.5 million) per acre at the Hitec City layout prospectively for Mega IT Projects.

c) Rebate in the cost of land linked to employment @ Rs.20,000/- per job created would be available (as per the details in Annexure –V) limited to the cost of land i.e.Rs.50 lakhs per acre.

d) APIIC/L&T Infocity will limit the development charges to Rs.30 lakhs (Rs.3 million) per acre only for Mega IT Projects.

e) The incidence on account of premium on FAR (Floor Area Ratio) to be imposed by Cyberabad Urban Development Authority will be limited to Rs.20 lakhs per acre in respect of Mega IT Projects. If necessary the additional cost over and above Rs.20 lakhs per acre, if any, but limited to FAR of 1:1.75 only, will be paid from the budget of IT&C Department.

f) The above land pricing structure will be valid upto 31.12.2003.

g) The land allotted under the Mega IT Project incentive scheme cannot be alienated or transferred in future for any purpose other than to a person/company undertaking IT or ITES activity specified by the IT Policy and the ITES Policy respectively.

2. The application for allotment of land for establishing a Mega IT Project should be submitted in the format available at the following URL:

a) The application form is available for download at http://www.ap.gov.in/IncentiveTrack/default.asp

b) The application can be submitted online:

• Register through URL http://www.ap.gov.in/IncentiveTrack/newdetails/regform.asp

• After registration login through URL http://www.ap.gov.in/IncentiveTrack/Login.asp

Complete the application and submit online.

c) Detailed Project Report to be submitted along with the application.

E-GOVERNANCE INITIATIVES OF GOVERNMENT OF ANDHRA PRADESH

Government of Andhra Pradesh has embarked upon eGovernance initiatives with an objective to offer to its citizens, a Simple, Moral, Accountable, Responsive and Transparent (SMART) Government, providing convenient, anytime, anywhere services without geographical constraints.

With this aim, GoAP has implemented a large number of eGovernance projects like eSeva, a comprehensive citizen services portal – AP Online (www.aponline.gov.in), Computer-aided Administration of Registration Dept (CARD), Citizen-Friendly Services of Transport Department (CFST), electronic files and knowledge management systems – SmartGov and KM Atom, Land Records Management Information System (LRMIS), Integrated Financial Information System (IFIS), Computerized Operations for Police Services (eCOPS), eProcurement, COMPACT (Commercial Taxes), Online Transaction Processing System (OLTP) etc. The primary focus of these initiatives has been fulfillment of service to the citizens, in a manner the citizens' want.

In recent months, the eProcurement project has achieved remarkable results, with more than 656 tenders worth Rs. 2266 crores processed by this system. This web-based system whose services are accessed by participating departments through an ASP (Application Service Provider) model, has resulted in a reduction in the cycle time for large engineering tenders from 6 months to 1.8 months, increase in the average number of bids per tender from 3.4 to 6.7, and has enabled finalization of tenders at an average of more than 20% below the initial estimates. Overall savings to the government through use of this system alone are estimated to be more than Rs. 200 crores so far, apart from several indirect benefits of greater transparency, reduced implementation time for projects and a significant simplification of the underlying processes. Success in eProcurement has triggered several related projects in engineering departments that leverage the full power of information technologies for all their processes.

Projects taken up in the area of health and family welfare include a comprehensive Family Welfare and Health Information Management System (FHIMS), Computerization of Hospitals and Telemedicine involving multiple hospital chains. Effective use of PDAs by Auxillary Nurses and Midwives (ANMs) in the rural area is a notable feature of the India Health Care project taken up jointly by Government of AP and CMC Limited in

conjunction with the FHIMS project. In the area of education, computer literacy programme has been taken up in more than 1000 schools, a comprehensive database of all children in the school-age group has been built up that will shortly be supported by 4700 Mandal Resource Persons (and supervisory officers) with PDAs having such information for all schools in their respective areas, and comprehensive computerization of education department has been taken up. These systems bring to life the concept of information flowing seamlessly from PDA to portal and are designed to bring about tremendous transparency and changes in these crucial areas. Apart from these, in collaboration with ISRO, the state has also set up an Andhra Pradesh Network (APNET), that currently telecasts 4 channels focusing on school and college education, professional (technical, engineering and medical) education, training to employees, training and support to self-help groups. Its programmes include a spectrum of pre-recorded as well as live, interactive programmes, in which students and other participants at around 1800 institutions across the state can actively participate.

The Government of AP has also been a pioneer in creating a comprehensive multipurpose household database system (MPHS) that is now accessible over APOnline and serves as a common shared resource for various projects that use citizens' data. The electoral rolls for the entire state can also be accessed through APOnline.

A large number of recent projects, implemented with in-house resources, have leveraged web-based technologies and created statewide information systems for Performance Tracking (PTS), Food-for-Work (FFW) & SGRY, Drought Relief, A P Micro Irrigation Project (APMIP), *Koti Varalu* (1 crore boons), agriculture and allied areas. These projects bring in remarkable transparency into major programmes, with data of these programmes made available on the Internet with facilities to drill down to the data pertaining to each habitation and village, and a provision for a common man to file complaints and if required, question the accuracy of the data.

Another notable initiative is a Call Centre (Parishkaram), that can be accessed toll-free from any BSNL phone throughout the state and provides information and expert advice and receives complaints and requests for various services, initially focusing on agriculture and allied areas. This project has been in operation for the past six months and is planned to be extended to eventually provide information, services and grievance handling for all departments.

Projects currently under implementation include a Human Re-

sources Management System (HRMS), that would eventually cover all the 1.2 million employees of the government as well as a comprehensive Social Benefits Management System (SBMS), that facilitates easy access to benefits for various priority segments of population such as SCs, STs, BCs, Minorities, Physically Handicapped, Women and Children, and hostel students.

Andhra Pradesh has also made significant investments in creating an enabling environment for eGovernance. The state was the first in the country to come out with a comprehensive IT architecture, prepare its security policy, try out Public Key Infrastructure (PKI), create a State Wide Area Network (APSWAN), and extensively use video-conferencing and tele-conferencing. AP has also been in the forefront in using Geographical Information Systems (GIS) in Forest Management, Roads and Irrigation. The forest cover status is monitored on an annual basis using the remote sensing and GIS technologies. The transfers and postings of forest sub-ordinates is taken up through counseling based on their performance for the year, which includes the forest cover status as well. In the past 2 years nearly 6000 transfers have been affected using this objective methodology thus rewarding the good workers. The state is also about to adopt and publish its Data Standards and Metadata Framework that would enable extensive interoperability across software projects and applications. It is relevant to note that many eGovernance projects implemented by Government of Andhra Pradesh follow an architecture and design that would enable them to be quickly replicated throughout the country – technology partners are also encouraged by the Government of AP to create not just solutions for AP but products that can be customized and deployed elsewhere with ease.

Having created an extensive network of eSeva Centres in all the municipal areas of the state, operationalized the citizen services portal APOnline and initiated the setting up of 2500 kiosks in semi-urban and rural areas (out of which around 911 kiosks are already operational as on 31-12-2003), the State is now making a transition to a system where the concerns of front-end service delivery mechanisms are separated from back-end processes within departments and organizations, using a core middle layer comprising of a Unifie messaging gateway and some other components that will provide key enterprise-wide services. Projects for a statewide broadband network (A P State Communication and Information Network) and suitable data centre(s) are initiated to support this system. This system would facilitate several competing front-ends, providing basic and value-added services to the citizens, providing them much needed

choice of service providers even for government services, while helping government departments and organizations to rapidly configure and offer new services, making use of an extensive service delivery network. This framework would also enable new services to be added by various departments (handling the back-end processes) without requiring extensive planning and investment into conventional departmental computerization projects.

The State has successfully built a large pool of more than 100 Chief Information Officers, trained in four spells of about three months each by IIM, Ahmedabad and Dr. MCRHRD Institute of AP, as professional managers of IT within Government. The state has also created a pool of technical personnel (District and Department Information Officers – DIOs), who are thoroughly trained in the latest technologies, especially in rapid creation and deployment of web services.

The primary aim of these initiatives is to provide to the citizens of AP much more convenient, comfortable and effective services, with a choice of multiple service providers, cutting down the need for citizens to visit government offices and reducing their direct interface with Government officials. Apart from this, projects like eProcurement, SmartGov, APSWAN and APSCIN bring in remarkable transparency and efficiency into back-end processes of the government, such as procurement of goods and services, entrustment of engineering contracts, file processing and intra-government communications.

Government of Andhra Pradesh has developed a spectrum of public-private partnerships (PPP) to implement a very large number of projects, tapping significant investments from the private sector. Increasingly, the Government of AP is using PPP models to devolve technology risks upon its technology partners, while focusing on defining services, the quality of service expected, and suitable Service Level Agreements (SLAs) that enable fulfillment of its Citizen Charters.

AP TECHNOLOGY SERVICES LTD.,
A GOVERNMENT OF ANDHRA PRADESH ENTERPRISE

Set-up by the Andhra Pradesh State Government in 1986,APTS has come a long way ever since. A modest outfit conceived essentially to computerise the state administration, is today, a frontline organisation providing IT Solutions of every hue to a host of varied organisations - Governmental, Non-governmental, Social etc.

APTS extends consultancy on a varied range of quality IT services from Conception to Commission in Application Development, Project Consultancy, Web Applications, Message Applications, Networking, Software Purchase, Office Automation, Customer Support Services, Training in IT Related Areas, Hardware Procurement etc.,

KM-ATOM File Management System

Imagine a paper-less office where bureaucratic red-tapism is non-existent, every one is computer literate and file-processing time is minimal. Almost all Collectorates in Andhra Pradesh, Tamilnadu Women Development Corporation in Chennai, National Center for Jute Diversification in Calcutta, General Administrative Department in Gandhinagar, the revolution of KM-ATOM is fast spreading showing the way for others to follow the same.

Company Highlights

Established in 1986, November, 1983 – AP State Government approved a policy frame for introducing computers in government departments and it constituted a study group for identifying areas of application .The Study Group recommended setting up an organisation to provide system development including research, maintenance (AMC), training and computer operations including data preparation services. The Government accepted recommendations of the study group and constituted an organisation under the name and style 'Andhra Pradesh Technology Services Limited' and registered under the Companies Act 1956 on 17.01.1986 and kept under the administrative control of the Finance & Planning (Planning Wing) Department vide G.O Ms.No.71 Finance & Planning (Plg.Wing) Department Dt.30.12.85. Consequently on creation of a separate department for Information Technology, APTS has been brought under the administrative control of IT & C department.

APTS Vision

To enable the A.P Government to make use of IT for
- Improved functioning

- Improved citizen services

Objectives

Provide consultancy to Govt. of Andhra Pradesh on

- Hardware and Software Procurement
- Software Development
- Networking
- Training
- Office automation
- Customer support services
- Communication

APTS extends consultancy on a varied range of quality IT services from Conception to Commission in Applications Development Division:

The division has accomplished computerisation for many departments such as:

- Employment exchanges
- District Rural Development Agencies
- Treasuries and Accounts Department
- Transport Department
- Market Yards Computerisation
- School Education Department
- Social Welfare Department
- Small Savings Department
- AP Bhavan, New Delhi
- Pay roll package compatible to all Government departments and Undertakings
- KM-Atom – File Management System compatible to any Govt office or Undertakings
- Analysis of Socio-Economic Survey (SES) pertaining to Directorate of Economics And Statistics
- Procurement module for internal use of APTS
- Adult Education
- Markfed
- AP Govt. Life Insurance
- Mandal Computerization covering the modules of citizen database services, petition monitoring, payroll package
- Enforcement application for Prohibition & Excise Department
- Budget Monitoring in Finance Department

Project Development & Feasibility Study Division

APTS undertakes Project Consultancy, advises the departments

on the approach to computerisation specific to their needs, finalises the tender process, evaluation of software and acceptance test.

Major Departments are

- IT & C Department
- Transport department
- Singareni Collieries
- Excise & Prohibition
- Registration
- Education
- Social Welfare
- TWINS-eSeva
- Finance
- Forest
- Rural Development
- Revenue
- APCOB

Web Applications & Internet Technologies

Major projects developed are

- AP BC Finance Corporation
- AP Government Orders
- AP Housing Board
- AP Social Welfare Residential Schools
- AP Women Commission
- APSWAN Telephone Directory
- Civil Supplies Dept.
- Small Savings
- Video Conference booking

Major projects hosted are

- AP Forest Development Corporation
- AP Press Academy
- Singareni Collieries Company Ltd.,
- Social Welfare Department
- Tribal Welfare Department

Messaging Application

The basic role of this division is to provide E-mail network to all the Government Departments of Andhra Pradesh through dial-up connectivity

Our major customers -

- Industries Department

- Social Welfare Department
- BC Commission
- Forest Department
- Marketing Dept.
- Vigilance and Enforcement Dept.
- Horticulture Dept.
- College Education Dept.

Networking Division

Extend the following Services to GOAP Departments

- Consultancy services
- Design of WAN/LAN
- Defines Technical Specifications
- Implementation of Network

Major projects completed

- AP State Wide Area Network
- APTS Local Area Network
- Aranya Bhavan LAN
- Commercial Taxes Departmental LAN
- Tribal Welfare Department LAN
- AP SCAN – Secretariat Campus Network
- HRD Institute
- IIT
- Singareni Collieries
- Education Departments

Software Purchase Division

The Division supplies requisite system and developed software for use in user departments on highly competitive rates through entering into MoU with reputed International IT Giants like

- IBM
- Microsoft
- Oracle etc.,

Also undertakes CD replication and CD writing.

Office Automation Division

The Division helps the user departments in the purchase of office automation products like

- Fax machines
- Photocopiers
- Telephone system
- LCD Projectors
- Access control system etc.

Customer Support Division

    The Division is fully equipped with skilled manpower and Infrastructure and provides

- AMC services
- Acceptance test of hardware and peripherals.
- Site-preparation

Training & Educational Services Division

    The Division is espoused to the cause of promoting IT Culture in the user departments through state-of-the art training infrastructure at APTS. Major Objectives:

- Organising Computer Training Programmes for Government staff
- Training content selection

Hardware Procurement Services

1.0.0.Introduction

    APTS is a Government of Andhra Pradesh enterprise for providing technical support to Government of Andhra Pradesh and its organisations. Procurement of Hardware, software and office automation products is one of the major functions of APTS.

    As per the policy of GOAP, APTS takes up the activity of procurement of hardware, software, networking components and other goods and services on behalf of Government agencies (Users). However, the goods and services are directly provided by the vendors to users under the supervision of APTS. The entire procurement process is done through a committee called Technical-Cum-Purchase Committee (TCPC) which comprises of representatives from the respective Government Department (user) and staff from APTS.

2.0.0. APTS Procurement functions

2.1.0. General procurement function:

1. Assisting the user department in finalizing specifications for goods and services
2. Estimating cost for the indented goods and services
3. Inviting bids or Request For Proposal (RFP) from interested vendors
4. Bid/RFP evaluation by TCPC members
5. Selection of vendors
6. Raising purchase orders
7. Follow up on delivery
8. Verification of delivery and conduct of Acceptance Test
9. Bill processing and payments to vendors

2.2.0. Vendor Mailing List functions:
1. Identifying vendors for different types of goods and services
2. Assessment of vendor performance

2.3.0. Rate Contract List Functions:
1. Identifying goods/services for rate contract
2. Identifying vendors for such items.
3. Calling quotes periodically for rate contract prices
4. Finalising rate contract

3.0.0. APTS Service Charges
GOAP vide GO No.43, Dated 15-06 1998 has fixed the following service charges for various services rendered by APTS to users:

3.1.0.Table for Service Options and Service Charges

SERVICE OPTION	ROLE OF APTS	ROLE OF DEPT.	SERVICE CHARGE
1. Full procurement or Evaluation Services	Full procurement cycle comprising of Fixing of Tech. Specs, inviting bids, evaluation of bids, Identification of vendors, issue of purchase order, acceptance testing and making payment to vendor. User is involved at each stage of decision-making.	To indicate its requirement and to participate in the APTS procurement process.	5% of the total cost
2. Evaluation and Acceptance Services	Evaluation of bids called by user, from the point of view of technical and financial scrutiny. Acceptance testing of delivered goods/services.	Finalisation of technical configuration, inviting bids, preparation of comparative statement, issue of purchase order, and making payment to vendor.	3% of the total cost.

SERVICE OPTION	ROLE OF APTS	ROLE OF DEPT.	SERVICE CHARGE
3. Evaluation Service	Evaluation of bids called by user from, the point of technical and financial scrutiny.	Finalisation of technical configuration, inviting bids, preparation of comparative statement, issue of purchase order, making payment to vendor and Acceptance testing.	2% of the total cost.
4. Acceptance testing Service	Conduct of Acceptance testing and verification whether they conform to the specifications.	All tasks connected with the procurement except acceptance testing.	2% of the total cost

4.0.0. Philosophy of Procurement

Most of the procurements undertaken by APTS on behalf of Government Departments/agencies are in the nature of technical products/services. As such, as a first step, the product/services procured for user deptt. should meet the minimum technical requirement, before product is considered for price evaluation. To meet above requirement, the tender evaluation is done in sequence at two broad stages.

1.) Technical evaluation and

2.) Financial evaluation

Technical Evaluation:

For large-scale procurement technical evaluation will comprise of Pre-qualification of bidder followed by technical evaluation of product/services. In other cases, first stage will have only one evaluation i.e. technical evaluation. Pre-qualification/technical evaluation will be followed by financial evaluation in both the cases. In brief, for large-scale procurement, it will be three step evaluation and for other cases it will be two-step evaluation. In all these steps sequential system of evaluation is followed, i.e. product/ services which is being evaluated must pass through first step, before it could be considered for second step and so on, i.e., a product/service which does not qualify at first step, will not be considered for second step evaluation and the second step bid contents (technical or financial part) will be of no consequence irrespective of its value/competitiveness.

Financial evaluation:

Total cost of ownership and product meeting the expectation of user is the basic criterion for financial evaluation.

5.0.0. Role of Technical-Cum-Purchase Committee (TCPC)

In order to ensure transparency in decision making process, wider discussion forum and for full involvement of user deptt. at all stages of procurement, TCPC concept has been the integral part of APTS procurement procedures.

5.1.0.Composition of TCPC:

a. MD - APTS

b. Representative of user deptt.

c. GM concerned of APTS

d. The manager and Project Leader concerned of APTS

e. Representative of IT & C deptt.

6.0.0. APTS Vendor Registration Process

APTS deals in procurement of various goods and services indented by various user departments: Registration of vendor is open in following specific areas -

1. Hardware procurement
2. Software procurement
3. Office equipment procurement like Fax machines/ photo copiers/ telephone systems etc.
4. Networking and maintenance services
5. Training

The process for registration of vendors shall be by publication of an advertisement in the daily newspaper having circulation through out AP. This exercise is done every year in the month of January/February.

6.1.0. Use of Vendor database:

The list of registered vendors is used by each of the divisions for one or all the following purposes:

1. For inviting quotations/tenders/offers/proposals for supply of goods and services under limited tender system
2. For inviting rate contract prices for various items/services every month.

6.2.0. General eligibility:

Registration of vendors shall be open to all firms located in Hyderabad (AP) or having registered office(s) in Hyderabad (AP) at least for more than 12 months from the date of publication of notice inviting proposal and are eligible to do business under relevant Indian laws as are

in force from time to time.

Vendor's marked/considered ineligible by APTS for registration, for the reason of non- satisfactory past performance, corrupt, fraudulent or any other unethical business practices, shall not be eligible for registration.

6.3.0. Specific Qualifications:

The vendor should be a manufacturer/authorized representative of a manufacturer and should be in business of manufacture/supply and maintenance of the offered items/services for a minimum period of one year in Hyderabad (AP)

General strength of organisation in relation to ability to provide goods/services, technical capability to supply and maintenance goods and services and financial strength for executing work order

Satisfactory track record of vendor for last one year in supply and maintenance of goods

At least 1.) one service centre at Hyderabad with 5 service engineers and 2.) three additional service centres spread across AP with atleast 3 service engineers at each centre. (Note - Condition no. 1 is mandatory for all cases and condition no.2 is mandatory for those vendors who wish to be registered for supplies out side Hyderabad also)

The minimum annual turnover for registration for supply of various items/services in last financial year is indicated in the table:

6.3.1.Table of Turnover

1	Computer hardware- Servers, PCs, laptops	Rs.200.00 Lakhs
2	Computer peripherals - Printers, UPS, Modems, CVT and furniture	Rs.50.00 Lakhs
3	Office Automation equipment - Fax machines, photocopier, telephone equipment	Rs.50.00 Lakhs
4	Software products	Rs.25.00 Lakhs
5	Networking products/services	Rs.25.00 Lakhs
6	Training services	Rs.50.00 Lakhs

Note: Turn over counted for this purpose will be the turn over under relevant product /service only.

6.4.0. Registration Fee: Refundable

The vendors considered for registration/empanelment with APTS should deposit Registration fee refundable) in the shape of DD/Cash as follows:

1	Computers hardware	Rs.2.00 lakhs
2	Computer peripherals	Rs.0.50 lakhs
3	Software products	Rs.0.25 lakh
4	Office Automation products	Rs.0.25 lakhs
5	Training services/network services	Rs.0.25 lakhs

Note: Vendor desiring registration under more than one category, should furnish RF separately for each item.

6.5.0. Renewal of registration:

Renewal of registration will be considered after one year with out any renewal fee and shall be on the basis of past performance with regard to -

a.) General conduct of vendor

b.) Timely delivery of goods/services

c.) Quality of supplied/maintenance of goods and services during warranty and AMC.

Vendors who default on above may be disqualified either for a limited period or on a permanent basis on case-to-case basis in addition to imposing such penalties as may be permissible under bid/tender condition.

6.6.0.Refund of Registration fee:

Registration 'fee will be refunded within 30 days of deletion of vendor's name from the list either under act of APTS or under vendor's request.

7.0.0. APTS Purchase Procedures:

7.1.0. Open competitive bidding (OCB)

This system is followed when estimated value of procurement is

of the order of Rs.50 lakhs and above or where in previous procurements sufficient response was not obtained in other systems of procurement, or its a new product/service although estimated value of procurement may be less than Rs.50 lakhs. A tender call notice for submitting bids will be given through a newspaper advertisement having circulation throughout AP. Bids received will be evaluated as per the APTS bid evaluation procedure.

7.2.0. Limited tender system:

APTS will draw a list of qualified vendors under each category of goods and services. The enquiry for procurement for respective item will be sent directly to concerned listed vendors. All procurement where in estimated value of each case is less than Rs.50.00 Lakhs or where product is a propriety item supplied by limited reasonably known vendors only, although estimated value may be more than Rs.50.00 Lakhs, will be done under this system. Except process of inviting bids/RFP as mentioned above, all other steps for procurement will be as per OCB system.

7.3.0. Single tender system:

The single tender system may be adopted in case of articles which are specifically certified as propriety in nature by the indenting deptt. or where it is reasonably known that only a particular firm is the only supplier /manufacturer/developer of the product/services. In such cases proposal will be called from that single party. However rest of the procedure will be same as that for OCB.

7.4.0. R.C. price based procurement

APTS as part of its procurement function calls rates for those items/services which have been identified for RC list from qualified vendors every month. The low value procurement where number of items are one or two with total estimated cost not exceeding Rs.1.50 Lakhs, may be done under this system or based on last procurement price (Not more than 30 days old. Repeat order) which ever is lower.

7.5.0. Guidelines on Acceptance Testing:

The goods supplied by vendors are grouped into two parts for AT/ performance report. Following Table indicates the nature of testing required for each item for assessing the correctness of supply made by the vendor:

7.5.1.Table of Nature of Test

S.No.	Name of Item	Nature of Test
1	Server, PC, Laptop, UPS, CVT, Networking components,	Acceptance Testing by APTS
2	Fax machine, photocopier, printers, modems, telephone equipment,	30 days Satisfactory Performance report from user

7.5.2. Acceptance Testing:

Customer Support Division in APTS is entrusted with the responsibility of Acceptance Testing of the systems. The Division is equipped with technical support staff viz. Asst. Hardware Engineer and Hardware Assistants to conduct AT. The engineer visit the user site and complete AT with in 30 days of date of installation of systems or from the date of intimation of installation by vendor which ever is later to verify -

1. Whether supply of goods is per the purchase order
2. Whether specification of systems supplied tally with the specification mentioned in purchase order
3. Whether systems have been installed with all required components

7.5.3. Performance Report:

For category-2 items, vendor should produce 30 days satisfactory performance report from user to APTS to assess the quality of product supplied. In case variation or defects are noticed in PR or there is complaint from user, the vendor is notified by APTS to rectify the defects to the satisfaction of APTS/user.

7.6.1.Payment terms:

APTS makes eligible payment to the vendor with in 30 days of filling of valid claim supported by required documents. Payment steps are as follows:

7.6.2. Category -1 items where AT is required

1.) 90% of the payable amount on successful installation of the systems
2.) 10% (Balance) of the payable amount on success full completion of Acceptance Testing by APTS. In case AT is delayed beyond 30 days because of reasons attributed to APTS, balance 10% can be released on production of PR (Perforce Report) in prescribed format from user deptt. This payment will be subject to result of AT and vendor will be liable to make good the short comings if any in the system. Recovery

if any required can be made from other payments due to vendor or any other mean.

7.6.3. Category -2 items where Performance report is required

1.) 90% of the payable amount on successful installation of the systems
2.) 10% (Balance) of the payable amount on production of 30 days satisfactory performance certificate from the user in the prescribed format.

7.6.4. Off the self-Software:

1.) 90 % of the payable payment on delivery of software to user
2.) 10% (Balance) of the payable payment on satisfactory installation and certificate to that effect from the user

Note - Payable or eligible amount means the net amount payable to vendor after deducting amount if any on account of delay in delivery, short supply and or any statuary deductions, from the invoice value or purchase order value which ever is lower.

8.0.0. Integrated Procurement System

APTS has developed an in-house Integrated Procurement System (IPS), application software that supports the full procurement life cycle operations of APTS☐fs Procurement Process.

The objective of the software is to improve the standards and quality of customer service by streamlining the procurement process. The software will provide a common interface to the different procurement entities and integrate the activities of each entity and division of APTS involved in the various stages of the procurement function, such as purchase (hardware, OA, software), accounts and customer support and maintain one database for all the procurement operations.

8.1.0. Features of IPS

1. User request entry.
2. Generation of Cost estimates
3. Generation of Performa Invoice
4. Generation of Tender Call notice for vendors
5. Generation of Comparative Statement for TCPC
6. Generation of Purchase Order
7. Entry of delivery, Installation and AT details
8. Processing of bill for payment
9. Vendor payment details

IPS provides following reports for efficient management of procurement process.

1. Items pending for issue of Cost Estimates
2. Items pending for issue of Performa Invoice
3. Items pending for issue of Issue of Tender notice

4. Items pending for issue of Purchase Order
5. Items pending for Delivery PO wise and Vendor wise.
6. Items pending for Installation
7. Items pending for AT
8. Items pending for Payment

13.2.0. Internet Interface for Users:

APTS has provided Web based interface to GoAP Departments for sending indents through Internet and also to view the status of procurement. This facility is available at http://www.apts.gov.in/ips

MAJOR PROJECTS COMPLETED

A.P. State Wide Area Network (APSWAN)
Introduction

Government of Andhra Pradesh as part of its vision to improve services to its citizens through efficient and transparent administration, has planned to create the backbone infrastructure for

*   Catalysing IT development in the state
*   Supporting IT solutions for e- governance

As part of the building of IT infrastructure, a Wide Area Network (APSWAN) was created linking State Secretariat and all district Collectorates with 2 mbps fiber optic line.

Why APSWAN

APSWAN envisages the following services

*   Data Communication
*   Voice Communication (Telephone facility)
*   Video Communication

Main features of APSWAN

APSWAN will be the backbone network for voice, data, and video communication through out the state of A.P

APSWAN connects Secretariat at Hyderabad to all District Collectorates, Tirupathi and Vijayawada RDO offices with 2Mbps backbone for data voice and video communication.

The campus network in the A.P Secretariat and the Local Area Networks in various government offices at different locations are linked to APSWAN.

In brief Government offices at Secretariat, district collectorates and other offices at the district level are the part of a common network. In the subsequent phases APSWAN would extend to Mandal headquarters, other towns and eventually to the villages either with dedicated line or Wireless or Dial Up facilities.

Applications

A.P.State Wide Area Network will act as the basic information highway for the following IT related applications of the Government –

- Data sharing and interchange among different wings of the government resulting effective, efficient and transparent administration.
- Providing reliable and dedicated telephone facility to state government departments.
- Mailing and Internet facility for all the Government departments..
- Provides high quality video conference facility that helps in
- Administrative Reviews and Conferences
- Distance and On-line training for Government officials
- Demonstration of best practices

Technical Features

Network Components

- Multiservice Switch
- Routers
- Firewall
- Network Management System

Capacity of MSS – at SNC – Hyderabad

- 2.048 mbps trunk interface – 30 Nos.
- Voice Channels – 120 Nos.
- Video Connectivity – 30 Nos.
- V.35 Interfaces – 41 Nos.

At each DNC -

- 2.048 mbps trunk interface - 02 Nos.
- Voice Channels   - 10 Nos.
- V.35 interfaces   - 08 Nos.
- Video Connectivity   - 01 Nos.

Capacity of Routers at SNC – Hyderabad

- V.35 Interface – 25 Nos.
- ISDN Ports – 16 Nos.
- Data Ports – 64 Nos.

At each DNC -

V.35 port	-	1 No.
Data Ports	-	32 Nos
Backbone	-	2 mbps optic fibre connectivity.
Technology	-	TDM

AP State wide Videoconference facility

Hon'ble Chief Minister inaugurates Video Conference facility on 1st November 1999 and reviews the developmental Programmes like "DEEPAM" with all 23 District Collectors.

Technological developments in data communication and video conferencing enable face-to-face conversation of the Government functionaries from multiple locations of the state. AP Video Conference connects Secretariat Hyderabad with all 23 District Collectorates, Vijayawada and Tirupathi RDO offices. The facility can be operated from 128 Kbps to 2 Mbps data transfer rates to meet the quality requirements of users. Presently it is being operated at 768 Kbps to provide T.V. quality viewing for the users. It is a multipoint, voice-activated system and facilitates.

- Review and Monitoring of the program implementation across state.
- The coordination between State and District headquarters.
- Will reduce time and expenditure overheads on the travel between State and District headquarters.
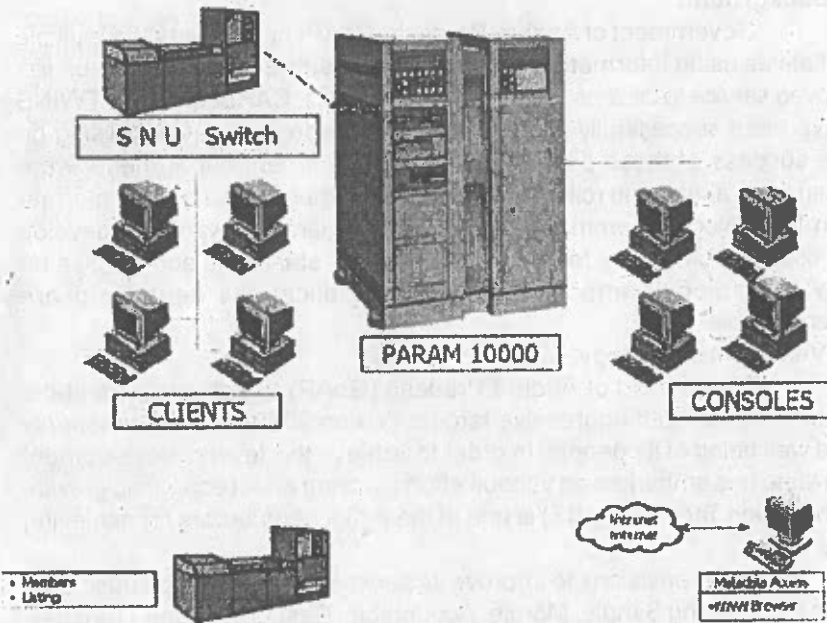
Data Warehousing

APTS and CDAC-Pune joint project based on PARAM open frame architecture for state level governance.

The Data Ware House project for Andhra Pradesh State Government will have initially two core objects i.e. (i) Person object and (ii) Land object. The main source of data for these core objects is MPHS data and Land Records data. The Personal database and Land database are being corrected and loaded in each MRO office server. The same database will also be loaded in PARAM very soon. The web-enabled data will be made available for the planners and analysts for arriving at better decisions.

- Secretariat Knowledge and Information Management System (SKIMS)
- AP Secretariat Campus Area Network (APSCAN)
- Voice facility over APSWAN
- APCOB
- Fully Automated Services for Transport Dept. (FAST)
- Twin cities Integrated Network Services (TWINS) - eSeva
- Multipurpose Household Survey (MPHS) Project
- Teleconference facility for all Districts
- VGTM - Urban Development Authority
- APNET - Satellite Ku band based communication for distance education, HRD & Training

DATA WAREHOUSE
Secretariat Hyderabad

ap

S N U Switch

PARAM 10000

CLIENTS

CONSOLES

• Members
• Listing

Intranet
Internet

Metadata Axim
HTML Browser

(Source: www.apts.gov.in)

Conclusion:

The State of Andhra pradesh naturally interested in speeding up development in all sectors with the application of technology services is covering several sectors. It is an going process and over a period of time will embrace every field saving time, making it easy, providing all services to the public as well as to the private sector. As one could see, the state is on march towards advanced technology. In view of the resources needed and organizations required, it is a state which could afford taking up this challenge of development through software technology.

IT ARCHITECTURE

I. Background

Government of Andhra Pradesh (GoAP) has undertaken multiple initiatives using Information Technology as a strategic tool to provide improved service to citizens. The pilot projects FAST, CARD, MPHS & TWINS have been successfully piloted and widely appreciated. Capitalising on the success of these pilot projects the government departments were keen to go ahead and rollout the solutions to other locations. The Information Technology & Communications (IT&C) department wanted to develop an overall architecture for the state along with standards and policies for key technology components, so that applications developed are interoperable.

II. Vision and Strategy

Government of Andhra Pradesh (GoAP) is a progressive state, which has set itself aggressive targets (Vision 2020) to bring prosperity and well being of its people. In order to achieve this level of development the state has embarked on various efforts to bring about economic growth. Information Technology (IT) is one of the major contributors for achieving this vision.

GoAP envisions to improve its services to citizens and businessmen by providing Simple, Morale, Acountable, Responsive and Transparent (SMART) governance. The government foresees that services to citizens will be made available through various delivery channels (department interfaces, integrated citizen interface counter, Internet, kiosks, etc). Some key benefits that can be achieved through e-Governance are:

- Improved quality of service to citizens
- Improved efficiencies within the government
- Better enforcement of law
- Education and information dissemination

Key imperatives that will enable the vision to be achieved are:

- Accessibility of services to all sections of society
- Affordability of services by citizens and business
- Information accessed through various delivery channels must be uniform, reliable & secure
- The services offered through various delivery channels should be economically viable to develop, operate and maintain
- Processes need to be re-engineered before automation

- Departments need to collaborate and share information to provide improved services

Information technology can be used effectively to achieve the vision in light of the business imperatives. Key IT imperatives for e-Governance are:

- Adoption of standards and policies for various technology component Shared database across multiple departmental applications ??High reliability on hardware and communication
- Training department employees on various technologies
- Increased IT investments across multiple levels of governance (Mandal, division, district, etc)

III. Overall Architecture

The overall architecture for e-Governance needs to ensure that the architecture components are extensible and scalable to adapt to the changing environments. In order to minimise the risk, there is an increasing trend where the applications development is moving towards n-tier architecture. Communication cost will continue to fall in the years to come with convergence of technologies. The cost of skilled technical resources will continue to increase in the future.

The architecture options are decentralised architecture, hybrid architecture and centralized architecture. It is recommended that the state government architect its solutions around centralised architecture. The government employees will access the applications over a secure Intranet using browser as their front end. Citizens and businesses can access the services over Internet. This target architecture would achieve in phased manner based on availability of infrastructure such as communications, PKI, payment system, etc.

IV. Building blocks of e-Governance

The GoAP Architecture is comprised of a series of interrelated components. The twelve components of the architecture, in concert, provide the basis for the state to take advantage of adaptive systems in support of its business. The twelve architecture components are:

- Application
- Information
- Group ware
- Component ware
- Data
- Applications Middle ware
- Integration
- Network

- Platform
- Security and Directory Services
- Systems Management

For each of the architecture components, key guiding principles, best practices and standards are outlined below.

Application Architecture

I. Definition Application Architecture identifies criteria and techniques associated with the design of applications for the state's distributed computing environment that can be easily modified to respond quickly to the state's changing business needs, as well as to the rapidly evolving information technologies available to support those needs.

II. Introduction and Background

Recently, application development tools and technology have begun to evolve to help address these problems. A number of options now exist for meeting business needs and delivering information to people when and where they need it. These options include:

- Reuse of Code: Units of code previously duplicated in many applications can be packaged into components or services that can be easily reused by different applications.
- Middleware: Shared software can allow applications to communicate with each other, access data residing on different platforms, and access shared services.
- New User Interface Options: An expanding array of user interface options – including Web browsers, personal digital assistants (PDAs), and interactive voice response units (IVRs) - have been introduced.

Implementing these components in well designed 3-tier or N-tier, client/server application architectures can create solutions capable of satisfying the state's ever changing business needs. Portfolio of applications for a government department is outlined below:

- Application Architecture
- Application Portfolio

Executive Information System		
Geographical Information System		
Employee Payroll and HRM	Requisition to Payment	Citizen services
Attendance Recording	Requisitions/Indents	Lodgment /Registration
Employee Payroll	Tendering/Quotation	Issue of permits, licenses, certificates, etc
Expense and travel processing	Purchase order	Receipt of payment
Loans and advances	Inventory management	Payment to citizens
Training & career development	Accounts payable	Complaints management
Policies and employee info		
Planning	Budgeting and Finance	Project/Schemes Management
Financial modeling	Budgets preparation/ monitoring	Project planning
Development Planning system	General ledger	Project monitoring
	Fixed assets	Project reporting
	Cash management	
E-Business Applications	Communications	Groupware
Content Management	E-Mail	Enterprise wide document management system
Personalization	Integrated messaging system	Scheduling & Calendaring
Customer Relationship Management	Electronic meeting	Discussion Database
	Electronic bulletin board	

III. Principles

The principles listed below are key guidelines for the design or purchase of applications and application components supporting distributed, client/server computing across the state.

Principle 1: Design applications to be highly granular and loosely coupled

- The designer should allow for the possibility of re-partitioning an application in the future.
- Being highly granular and loosely coupled provide flexibility in physical implementation (i.e., in the deployment of application components on different platforms).
- Highly granular, reusable application components are key to increased productivity and rapid application deployment. The Componentware Architecture supports a highly granular design.

Principle 2: Plan for extensibility and scalability?

- Applications must evolve to support new business requirements and make use of new technologies.
- Extensibility provides functional scalability.

Principle 3: Design application to reuse components

- Applications should be built by assembling and integrating existing components, rather than by creating custom code. Shrinking cycle times do not allow for artisan programming.
- Managing component reuse is supported by the Component-ware Architecture.

IV. Technical Topics

Technical Topic 1: Designing and Developing Applications

Introduction

All computer applications - regardless of what they do or with which technology they are implemented - have three general areas of functionality:

1. Interfaces allow applications to communicate with users as well as with other applications and data resources. In N-tier applications changes in business rules do not usually require changes in interface code. Interfaces may need to be updated for other reasons. Examples include when changes occur in another computer system that interfaces with that application, or when users need a graphical user interface instead of a character-based interface for that application. Since applications interface with people, the user interface receives the most attention, but other interfaces are equally important. Traditionally, people interfaced with computer applications using character terminals or graphical user interfaces (e.g., Microsoft Windows). Recently new interfaces such as telephones (via

IVRs), web browsers, and wireless devices have been introduced.

2. Business rules support the business processes Departments follow. They automate the process, defining what must be done and how it must be done. As the business processes of Departments change, the business rules in the applications that support those Departments must also be changed. Business rules can be isolated into components. (See Component ware Architecture)

3. Data access. Data access code automates the storing, searching, and retrieving of data by computer applications. In N-tier applications, changes in business rules may not require changes to the code that accesses data, but occasionally, they do. Development approach for the portfolio of applications is as follows:

Application Architecture

OLTP Applications	Development Approach	Sample Package Vendors
Citizen services	Custom Development	
Employee Payroll	Package	Ramco, People Soft, Oracle HR,
Human Resource Management	Package	Ramco, People Soft, Oracle HR,
Purchase	Package	SAP R/3, Oracle, People Soft
Planning	Package	SAP R/3, Oracle, People Soft
Budgeting and Finance	Package	SAP R/3, Oracle, People Soft
Project/Schemes Management	Package	SAP R/3, Oracle, People Soft
Customer Relationship Management	Package	Oracle, Siebel, Clarify, Vantive
Geographical Information System	Package	ESRI, NIIT, MapInfo, Rolta, Siemens, ISRO

Content Management	Package	Vignette, Broad Vision, Inter World, Open Market
Personalization	Package	Vignette, Broad Vision, ATG Dynamo
Web Server	Package	Apache, MS IIS, iPlanet

Note: The above are some sample list of package vendors available in the market.

Recommended Best Practices

The recommended best practices in this section apply to the designing and developing of applications.

Best Practice 1: Design for the N-tier service oriented architecture.

- While many of the problems inherent in the monolithic and two-tier applications can be overcome by implementing applications with a three-tier architecture, large, complex projects that are anticipated to have high usage volumes and/or long life spans will be better served by an N-tier service oriented architecture.
- N-tier applications are easily modified to support changes in business rules.
- N-tier applications are highly scaleable.
- A N-tier architecture offers the best performance of any application architecture.
- Any combination of user interfaces (e.g., character, graphical, web browser, and telephone interfaces) may be implemented in an N-tier application.
- N-tier applications are less expensive to build and maintain because much of the code is prebuilt and shared by other applications (see Componentware Architecture).

Best Practice 2: Generalize application interfaces

- Generalize application interfaces.
- The code providing input and output to the user interface should be designed to provide input and output to as wide a range of interfaces as possible. This should include other applications as well as other types of user interfaces.
- Do not assume that application components will always be accessed via a graphical user interface (or any other user interface).
- Avoid assuming a specific page size, page format, layout language or user language whenever possible.

Best Practice 3: Assign responsibility for business rules to business units

- Assign responsibility for defining and maintaining the integrity of business rules to business units.
- IT staff is responsible for coding and administering the software that implements business rules in the network.
- The business units are responsible for the definition and integrity of business rules, and for communicating changes in business rules to IT.
- Every business rule should be assigned to a custodian.

Best Practice 4: Make business rules platform-neutral

o Implement business rules in a non-proprietary, cross-platform language.
o This approach provides platform independence and portability.

Best Practice 5: Implement business rules as discrete components

Implement business rules as discrete executable components or services (see Componentware Architecture).

Best Practice 6: Access data through business rules

o Design applications so business rules control access to data.
o Data is created and used by business processes. In computer applications, data must be created, used by, and managed by the application component that automates the business process.
o Accessing data in any way other than by business processes bypasses the rules of the module that controls the data. Data is not manages consistently if multiple processes or users access it.
o Centralised data should be used wherever possible to assure data accuracy and simplify data management.

Best Practice 7: Adopt coding standards

o Adopt coding standards, in all languages, on all platforms.
  Coding standards make debugging and maintenance easier. They should address (but not be limited to):
o Naming conventions for variables, constants, data types, procedures and functions.
o Code flow and indentation.
o Error and exception detection and handling.
o Source code organization, including the use of libraries and include files.
o Even the earliest code developed in a project should adhere to the standards.

Standards

The standards in this section perta   to the design and develop-
ment of applications.

Standard 1: Develop 3-tier or N-tier Applications

- All new Department applications should be developed using 3-tier or
  N-tier architecture in order to maximize flexibility and scalability.
- Large, complex projects that have high usage volumes and/or long life
  spans will be better served by an N-tier service oriented architecture.
- The logical separation of the tiers for: user interface(s); business rules;
  and data access code allows for simple, straightforward additions to
  each of the three tiers without undue impacts on the others.
- The logical separation of the tiers also allows for changing the plat-
  forms where the tiers are deployed, resulting in a high degree of
  scalability. As transaction loads, response times, or throughputs
  change, a tier can be moved from the platform on which it executes to
  another, more powerful platform - or be spread over multiple machines
  - without impacting the other tiers.
- While many of the problems inherent in the existing monolithic and
  two-tier applications can be overcome by implementing applications
  with a three-tier architecture, the goal should always be true, N-tier
  applications.
- The maximum benefits of an N-tier architecture are realized when
  many N-tier applications are deployed across the state, sharing com-
  mon software services and offering multiple user interfaces.
- Large, complex projects that are anticipated to have high usage vol-
  umes and/or long life spans will be better served by implementing
  applications with a three-tier architecture with access to an N-tier
  service oriented architecture
- With three-tier client/server applications, there is less risk in modify-
  ing the code that implements any given business rule.
- Three-tier client/server applications can be made to support multiple
  user interfaces:
- Character, graphical, web browser, telephones, and others

Standard 2: Isolate Customizations to Purchased Software

Isolate customizations into separate modules from the purchased
software itself to improve the ability to upgrade and move to new releases
as required over time. For purchased line-of business applications, loosely
couple custom developed modules from the standard application software.
Standard 3: Avoid Common Gateway Interface (CGI) for business logic
or to publish information to the Web.

- The Common Gateway Interface (CGI) does not scale, is not portable and is not easily integrated with application servers. Avoid use of CGI for information publishing, back-end applications or data access.
- Publishing information to the web with HTML or XML via Java servlets reduces overhead and works in conjunction with EJB-based components.
- The use of ASP or other HTML publishing is acceptable for publishing only (not business logic) but JSP and Servlets are preferred.

Technical Topic 2: Managing Applications

Introduction

Due to the state's dependency on computer applications, applications must be managed as carefully as any other business-support infrastructure. Application management is a necessity, not an option. Application management requirements are as important to the enterprise as an application's functional requirements. Therefore, management requirements for an application should be documented during the requirements phase of the project.

Recommended Best Practices

The recommended best practices in the section pertain to managing applications.

Best Practice 1: Design for end-to-end management.

- Manage the application as a whole entity by managing every component of the application and everything each component depends on. Application developers must instrument every component of the application to facilitate its management.
- Application dependencies include infrastructure (e.g., middleware, databases, and networks), other applications, and shared software components. Application teams must specify these dependencies when an application is deployed.
- Application reporting should be standards based and must be compatible with the state's SNM tool.

Best Practice 2: Design for proactive – rather than reactive – application management.

- Proactive application management supports the business better. With proactive
- Management, applications report potential problem conditions at predefined thresholds, before errors occur. This gives system administrators the opportunity to take corrective action to prevent an application from failing.
- While applications can be managed by administrators responding to

errors, the ideal management is automatically undertaken by the SNM tools, and is proactive.

- Use thresholds to provide early alert to possible error conditions. For example, rather than sending an alarm when an application fails because its database table is full, send an alarm when the table is 90% full, so corrective action can be taken to prevent a business-impacting outage.
- Reactive application management is better than no application management at all. Reactive management is when administrators respond to errors and outages reported by applications after they have occurred.

Best Practice 3: Instrument applications to report the information necessary to manage them.

- Applications should report status, performance statistics, errors, and conditions. Decide at design time what status events the application should report to users (e.g., erroneous input); to application managers (e.g., database table 90% full); and to both (e.g., can't find needed file).
- Operations staff must be provided procedures for dealing with all conditions that are detected and reported. For example, if an application reports it can no longer access its database, operations staff must have instructions for handling the situation.
- At design time, decide the specific reporting requirements of an application module. Different applications may have different management needs, depending on their respective impact on the business the applications support.
- Applications should only report. Interpreting the reports and deciding on the appropriate response should be performed external to the application, by agents and the SNM framework.
- Application reporting should include run-time tracing to assist troubleshooting operational problems. Tracing should be able to be turned on and off by administrators.
- If no SNM environment exists, applications should still report status to local log files that can be monitored by administrators. Applications should still be able to read and respond to commands from administrators.

Best Practice 4: Instrument applications to facilitate administration

- Instrument applications to receive and process commands from administrators.
- Decide at design time what control operators and SNM tools should

have over application components.
- Design applications to read and respond to commands from system administrators.
- Commands may include, but are not limited to, shut down, shutdown and restart, reconfigure yourself, and turn tracing on or off.
- Make application configurations parameter-driven, so applications can be reconfigured without recompiling and redistributing code.

Standards
The standards in this section pertain to managing applications.
Standard 1: All applications deployed must be designed to be managed by SNMP.

By standardizing on SNMP as the instrumentation protocol, there is an opportunity for the state to benefit from reusing management instrumentation code.

Information Architecture

I. Definition

Information Architecture provides standards for accessing data for online analytical processing (OLAP), including executive information systems (EIS) and decision support systems (DSS).

II. Introduction and Background

Important data is stored in multiple application systems across the state and is used to perform day-to-day operations. If this distributed data is grouped together in a meaningful format, it can provide valuable information to the state's business organizations. Information is a compilation of data used for reporting, analysis, and decision support. Information compiled from data coming from many sources, including historical and summary information, can facilitate business decisions.

III. Principles

The following principles apply to the Information Architecture.

Principle 1: Information is one of the most valuable assets for making business decisions.
- The successful delivery of government services depends on conclusions derived from accurate, timely, well maintained, and secure information.
- The value of information is proportional to its availability. If information is not accessible or is too hard to use, it is of questionable value.
- Information used frequently or used by many organizations is extremely valuable.

Principle 2: In general, there is no new data, but there is new

information. Existing data from multiple sources is being transformed into intelligent and proactive information.

- How the data is used is far more important than the data itself (i.e., even if data is accurate, it can still be used ineffectively).
- The most effective use of data is to turn it into proactive information that responds to business events (e.g., the "push model" of information).

3: Decision-makers should not be overwhelmed with an excessive volume of unnecessary information.

- Too much information gets in the way of focusing on the most important issues that arise at a specific point in time. Some data warehouse efforts put any data in a data warehouse that may be useful in the future, not just the information to assist in a business need. If there is much more information than is needed, it can overwhelm an end user rather than answering their specific decision support need.
- Information that supports OLAP analysis should be proactively presented to business users. Information in a data warehouse can be presented to business end users so that they know it is available and they can use it.

Principle 4: Online transaction processing (OLTP) databases and online analytical processing (OLAP) information databases should have separate data storage areas.

- Separate data storage isolates OLTP systems, which perform mission critical business processing, from large ad hoc queries and online analytical data processing. If data storage is not separate, ad hoc queries and direct access of data for OLAP systems can adversely impact online transactional processing.
- Data design for each type of application, OLTP or OLAP, can be optimized for perf~
- ~l~ ~ ~uire different database designs. OLAP typi-
  ~rations involving time series and trend analy-
  ~ well with relational database technology
  ~er methods of data storage are needed to
  ~lti-dimensional databases or flat files).
  OLTP data, refer to the Data Architecture

house

ollection of data designed to support

decision-making and analytical processing. Data warehouses contain a wide variety of data, usually from multiple data sources, presenting a comprehensive view of a particular business environment. Due to the nature of the data stored in a data warehouse, the size of the data warehouse is usually very large, so it requires special design and planning.

A data mart is a subset of a data warehouse. Where data warehouses are designed to support many requirements for multiple business needs, data marts are designed to support specific requirements for specific decision support applications (i.e., particular business needs). Although a data mart is a subset of a data warehouse, it is not necessarily smaller than a data warehouse. Specific decision support needs may still require large amounts of data. Data marts are typically considered a solution for distributed users who want exclusive control of the information required for their business need. Data warehouse efforts should begin with a specific requirement for a specific decision support application, similar to the practices of a data mart design. For scalability, the tools and databases used should be designed to support a very large data warehouse, instead of using data mart specific products.

Recommended Best Practices

The recommended best practices in this section pertain to the implementation of a data warehouse.

Best Practice 1: Begin data warehouse efforts by addressing a specific requirement for a specific decision support application, keeping growth and scalability in mind.

- This practice is similar to data mart design, but the tools and databases used should be designed to support a large data warehouse.
- Use vendor supplied products designed to support a large data warehouse. Vendor-supplied data mart tools are not typically scaleable to support the migration from a data mart to a data warehouse solution. These tools are designed to quickly implement a specific solution.

Best Practice 2: Identify specific requirements for data availability, freshness (i.e., live, 24 hours old, etc.), and recoverability.

Some data warehouses need to be updated more frequently than others. When the original data is frequently changing or is more volatile, it may be necessary to update the data warehouse on a near real time basis.

On the other hand, if the original data is fairly stable and not as volatile, the data warehouse may only need daily, weekly, or even monthly updates. For example, a data warehouse that stores criminal data contains more volatile information and needs to be updated more frequently

than a data warehouse that stores state registered corporation name and address information for public access.

Best Practice 3: Perform benchmarks on the database design before constructing the database.

- Expect to make changes and adjustments throughout development.
- Changes during the early cycles up to, and including implementation, are primary mechanisms of performance tuning.

Best Practice 4: Allow only read only access to end users of data warehouses. Updates should only occur to the operational (OLTP) source where the data originates.

Best Practice 5: Direct all information queries against decision support databases, not OLTP databases. Conversely, operational transactions should be directed to operational databases only, not OLAP databases.

- Data warehouses, and data marts contain data that has been checked for consistency and integrity, and represents a cross-functional view of data.
- Data in transaction (OLTP) systems typically support a specific business group or function.
- OLTP transactions should not depend on a data warehouse database. They require a stable operational environment that is not affected by ad hoc usage or external data.

Best Practice 6: Store atomic-level data in the data warehouse in addition to summary data.

- Atomic data is transaction-level data. It contains much more detail than summary data.
- Atomic-level data addresses the business need to recast history. Due to the fast pace of business change, many organizations are going through multiple reorganizations. After a reorganization, many decision makers want to recast history (e.g., to get a feel for what test scores would have been like if the number of school districts was already reduced to respond to legislation or funding).
- If only summary level historical data is kept in the data warehouse, it is not possible to recast history.

Best Practice 7: Perform periodic validity audits against the data warehouse information model to ensure a high level of confidence in the quality and integrity of the data.

- Accelerated decision-making requires high quality data. If operational data has changed or additional data is needed, changes must be made in the information model and in the data warehouse itself.
- The data stored in a data warehouse should conform to the informa-

ti‹·n model.
- The source data populating a data warehouse should be verified for consistency and accuracy.
- The data warehouse should still correspond to business needs.
- Ensuring the integrity and quality of data is the responsibility of both the business users and IS.

Technical Topic 2: Repository
Introduction

A repository contains detailed information about the data that is stored in a data warehouse (i.e., metadata). The repository stores the following information:
- Federated data definitions for the data stored in the data warehouse database.
- Aliases that can be used to reference the data.
- Data structures.
- Systems where the original data is found, including the format of the original data.
- Processes used to extract the data from the original location.
- Sources of record for the data. A source of record is an authoritative source for data, where data in a source of record is trusted to be accurate and up-to-date. The original data and the source of record may be the same. If changes are made that may affect systems and users using the data, it is important to keep this type of information in the repository.

Recommended Best Practices

The recommended best practices in this section pertain to the selection, design, and maintenance of a repository.
Best Practice 1: Maintain a repository for every data warehouse.
The repository contains metadata, or information about the data, in the data warehouse.
- The repository represents the shared understanding of the organization's data.
- The repository can be built incrementally, in stages, based on data warehouse design and implementation.
- The repository should support multiple types of data elements, such as graphics.
- Changes in the repository must occur before the changes to the data warehouse environment.

Technical Topic 3: Data Hygiene Tools
Introduction
         Data hygiene is the process of the data scrubbing or data cleans-
ing of data stored in a database. Data can become "dirty" due to many
reasons. For example, consider a data entry application that has an open
text field called "Description." If no limitations are placed on the entry of
data in that field, end users can type anything in that field, including mis-
spelled words or multiple text descriptions for the same data element.
Data hygiene:
- Standardizes and elementizes data according to specifically defined
  rules. Corrects data and eliminates redundancy to increase data
  query accuracy and improve the value of other forms of data analysis.
- Reduces the cost associated with inaccurate, incomplete, and re-
  dundant data.
- Reduces the risk of invalid decisions made against incorrect data.
Recommended Best Practices
         The recommended best practices in this section pertain to data
hygiene.
Best Practice 1: Use the data warehouse metadata repository to docu-
ment the rules applying to data scrubbing.
- The information about how the data is to be scrubbed should be saved
  for historical purposes.
Best Practice 2: Ensure data entry quality is built into new and existing
application systems to reduce the risk of inaccurate or misleading data in
OLTP systems and to reduce the need for data hygiene.
- Provide well-designed data-entry services that are easy to use (e.g.,
  a GUI front end with selection lists for standard data elements like
  text descriptions, product numbers, etc.).
- The services should also restrict the values of common elements to
  conform to data hygiene rules.
- The system should be designed to reject invalid data elements and to
  assist the end user in correcting the entry.
- All updates to an authoritative source OLTP database should occur
  using the business rules that own the data, not by direct access to
  the database.
- Attention to detail should be recognized and rewarded.
Best Practice 3: Move to commercial off the Shelf data hygiene software.
Over the past few years, data warehousing software products have be-
come a commodity. Use of these existing technologies is recommended
to ensure quality and stability. Often times these types of technologies

are included with an ETL suite.

Technical Topic 4: Data Extraction and Transformation Tools

Introduction

Data extraction and transformation are used to extract data from existing operational and external systems, transform the data, and put the transformed data in a data warehouse. Typically, data extraction is accomplished through custom-developed programs. They are usually written by application developers responsible for the existing operational systems that are familiar with the existing data required for a data warehouse. However, there are data extraction and transformation tools available from vendors that can be customized to address particular extraction and transformation needs.

Recommended Best Practices

The recommended best practices in this section pertain to data extraction and transformation.

Best Practice 1: During data warehouse design, determine the logic needed to convert the data, plan and generate the extraction and transformation routines, and quality assure the data populating the data warehouse.

- Planning for data extraction and transformation should start at the same time the data warehouse design starts.
- Data extraction and transformation is an important process for populating the data in a data warehouse and for ensuring that the data in a data warehouse is accurate.
- Data extraction and transformation logic includes data conversion requirements and the flow of data from the source operational database to the data warehouse.

Best Practice 2: Assess the source data that will populate a data warehouse for accuracy and quality.

- Data needs to be accurate to ensure good business decisions.
- Data needs to be relevant to the business need and consistent across multiple sources.
- Data must be complete. It must contain the information necessary to answer the data warehouse business need.
- The data assessment also involves evaluating the business rules associated with that data.
- The appropriate business rules must be applied to the data to maintain accuracy.

Best Practice 3: If a vendor-supplied extraction and transformation product is selected, it should support the same metadata repository that supports the data warehouse. It should also support the physical data ware-

house.

- Select products that are capable of interacting with the metadata repository and the data warehouse.
- Metadata drives the operations of the extraction and transformation tools. If the data warehouse repository is not supported by a vendor-supplied extraction and transformation product, a separate metadata repository must be developed and maintained.

Technical Topic 5: Data Replication Tools
Introduction
        Replication of data in a data warehouse environment is sometimes needed to address the business needs of distributed users or applications. In the state, there are users located in remote offices that require data to be loaded in their local environment in order to meet their performance needs. Also, there are mobile users, who carry laptop PCs, who do not have a constant connection to the network. In both cases, when the distributed users are using a data warehouse application, replication is needed to propagate the data warehouse data to the remote systems.
Recommended Best Practices
        The following recommended best practices apply to data replication for decision support, executive information, and OLAP systems.
Best Practice 1: Replicated data should be read-only, except where business practices clearly allow inconsistencies.

- It is easiest to manage data quality and integrity when replicated and distributed data is read only.
- Some business applications require updates to occur against the local database.
- Distributed independent updates require a reconciliation process that may be quite complex.

Technical Topic 6: Business Intelligence Tools
Introduction
        Business intelligence tools provide the ability to analyze and access data contained in the data warehouse. Typically, several tools are selected within an organization, based on the function needed.
Recommended Best Practices
        The following recommended best practices apply to business intelligence tools.
Best Practice 1: Implement decision support and executive information applications using an N-tier application architecture.

- By developing and application system in N tiers, systems can respond quickly to changes in business needs.

- Decision support and executive information systems application programs benefit from the use of N-tier and reusable and shared components.
- For more information about N-tier application programs and reusable components, refer to the Application Architecture and Componentware chapters.

Best Practice 2: There should be no ad hoc query access to OLTP databases.

Ad-hoc query access to online operational databases can severely impact the performance of mission critical operations. A data warehouse should be implemented for users with ad hoc query needs.

Standards

Standard 1: When accessing relational databases, use the industry standard of ANSI Standard SQL.

When using a database access tool that uses SQL calls, do not use any vendor specific extensions.

Standard 2: Use ODBC from any data access programs rather than vendor-specific database access tools.

ODBC allows flexibility in programming. A database can be easily modified or relocated. If a change is needed, the change is made to the ODBC configuration file, not to each business intelligence program or tool.

Standard 3: Implement a server-based ODBC solution rather than a workstation-based ODBC implementation.

A server-based ODBC solution is easier to administer. ODBC database changes and additions are easier to manage, since updates are made to ODBC servers, not every workstation that uses ODBC.

Standard 4: Use domain name system (DNS) names for databases that are accessible via TCP/IP.

A DNS server provides the capability for a long or complicated TCP/IP location to be accessed by a generic, short alphabetic name. It is basically a lookup service. It maps the generic alphabetic DNS name to its complicated TCP/IP location. The client application programs can be configured to use the generic names when they need to access a database (e.g., a database can be accessed by a client by using the generic name "Summary." The DNS server accepts "Summary" and translates the address into \\MIX00001\SRV1\DBASE\DATAWAR.FIL. The client then is able to access the database). If the database location changes, the DNS configuration is changed, and no changes are needed to each client configuration.

Groupware Architecture
I. Definition
          Groupware Architecture establishes a foundation for collaboration and communication. Collaboration focuses on local and ad hoc workgroups, while communication focuses on sharing information both within and outside the state.
II. Introduction and Background
Groupware is a combination of technologies enabling an organization to create, share, and leverage an accumulated knowledge base. Groupware technologies include electronic mail (email), calendaring and scheduling, electronic document management, shared file and print services, as well as some newer multimedia technologies. For an enterprise-wide groupware implementation to succeed, the comprised technologies must comply to a set of common protocols and infrastructure standards, allowing them to communicate with one another. Some groupware technologies, such as email, have made considerable progress in the standardization of protocols across software products. Other groupware technologies are still maturing and have not yet standardized on protocols.
III. Principles
          The following principles are provided to guide the design and selection of groupware components that will support distributed client/server computing activities.
Principle 1: Groupware requires a consistent infrastructure to truly support collaboration and communication.
??Content exchange, directory services, and authentication services are key infrastructure components necessary to facilitate communication and collaboration.
Email is the communications infrastructure component within and outside the state. A significant portion of business communications is occurring across email services.
Principle 2: Groupware technologies overcome time and distance barriers.
- Groupware technologies must encompass all scenarios from working the same time at the same place to working any time from any place.
- Geographical boundaries are eliminated by groupware technologies, providing communication and real-time access to information from any location.
- The efficiency and quality of a process are partially measured by the timeliness in which the work is performed. The notion of timeliness

must be qualified for each task to determine if groupware is providing value to that process. For example, a month may be considered acceptable for passing a specific group of documents through an organization for approval. In contrast, a month to send email to that same group of people is unacceptable.

Figure 3-2. Time and Distance Barriers
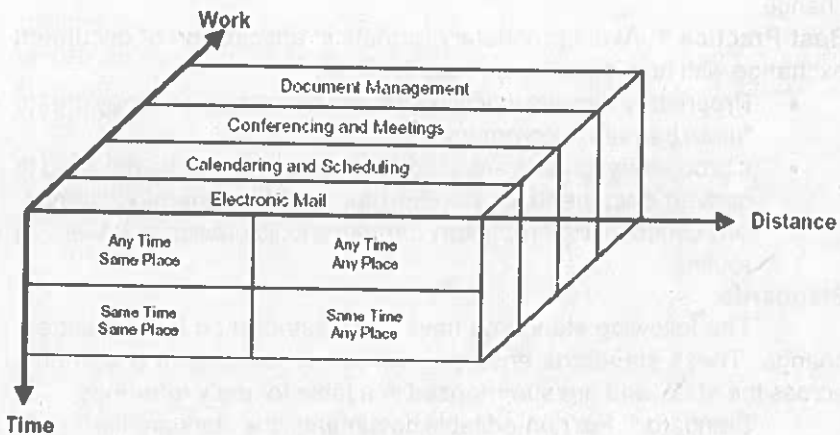
IV. Technical Topics
Technical Topic 1: Infrastructure – Content Exchange
Introduction

Content exchange is a critical groupware infrastructure component, enabling the exchange of electronic information and data between individual users and groups. It includes the interchange of editable and non-editable documents between applications and individuals.

Recommended Best Practices

The recommended best practices in this section pertain to content exchange.

Best Practice 1: Avoid proprietary formats in anticipation of document exchange with outside users and applications.

- Proprietary formats inhibit document exchange, and may create future barriers to communication.
- If proprietary formats are used, the capability must be provided to convert documents to standard formats for content exchange. Any vendor using proprietary formats should provide a conversion routine.

Standards

The following standards have been established for content exchange. These standards ensure seamless processing of documents across the state, and are summarized in a table for easy reference.

Standard 1: For non-editable documents, the standard file format is PDF. Typical application software using this file format includes word processing, imaging systems, and World Wide Web publishing.

Content Exchange standards
- PDF is widely deployed for non-editable content exchange.
- The reader is available at no cost.

Standard 2: For monochrome documents or drawing, the standard file format is TIFF using CCITT/ITU Group IV compression.

- Typical application software uses this file format includes word-processing, archive and retrieving, workflow, multimedia, medical systems, digital publishing, pattern recognition, and geographic information systems.

Standard 3: For color documents, drawings, or photographs, the standard file formats are GIF and JPEG.

Typical application software using this file format includes multimedia, word processing, medical systems, digital publishing, and geographic information systems.

Typical Document Input Source	Typical Application Software Used	File Format Standard
Non – editable documents	Word Processing Imaging Systems World Wide Web Publishing	PDF
Monochrome documents or drw	Word Processing Archive & Retrieval Work flow Multimedia Digital Publishing Pattern Recognition Geographic Information Systems	TIFF using CCITT/ITU Group IV compression
Colour documents, drawing or photographs	Multimedia Word Processing Digital Publishing Pattern Recognition Geographic Information Systems	GIF JPEG
Facsimile documents	Word processing Archival and Retrieval Workflow	TIFF using CCITT/ITU Group III compression
Multimedia images	Multi-media	MPEG

Standard 4: For facsimile documents, the standard file format is TIFF using CCITT/ITU Group III compression.

Typical application software using this file format includes word processing, archival and retrieval, and workflow.

Standard 5: For vector or geometric data, the standard file formats are DGN and DWG

Typical application software using this file format includes CADD and geographic information systems.

Standard 6: For multimedia images, the standard file format is MPEG-1/2.

Typical application software using this file format is multimedia.

Technical Topic 2: Communication – Electronic Mail (Email)
Introduction

As one of the fastest growing areas of communication, electronic mail (email) is becoming critical to the state's business operations. It is a powerful medium that allows the exchange of ideas and messages, as well as text documents, videos, images, and sounds. Integrated with other applications, email facilitates timely communication, opens access to documentation, and increases productivity. Email transport capabilities are also used as a delivery mechanism by other groupware services, such as workflow and calendaring and scheduling.

Recommended Best Practices

Since delivering services to citizens requires inter-department cooperation, departments must have compatible communications systems. A statewide email infrastructure facilitates communication on an enterprise-wide basis. For a statewide implementation, the state must implement an email architecture based on the following best practices.

Best Practice 1: Email servers should be administered and managed as a part of the strategic infrastructure.

- A properly structured email system can provide the state with a comprehensive, effective, inexpensive, and widespread method of communication, while permitting a choice of email clients.
- Email is a valuable tool because it provides the structure for easily moving messages and attachments in a timely manner between clients, thereby increasing workflow and productivity.
- Email service should be available at all times from any location. Time, distance, and location should not restrict email service.

Best Practice 2: Email servers should support multiple email clients.

A properly structured email system can provide the state with a comprehensive, effective, inexpensive, and widespread method of communication, while permitting a choice of email clients.

Best Practice 3: Use a common email directory service throughout the state.

- An enterprise-wide email directory service should be accessible by everyone within the organization. The statewide directory service should be a seamless integration of each department's directory service. If a user in one department requests an email address for a user in another department, the action should be transparent, without the requester knowing where in the organization the address is stored.
- The directory service should be compatible with the directory services of other components in the network. Other applications require use of an email directory service. Use of a single directory service will facilitate reuse of information and directory access routines. It is necessary for heterogeneous components to access the directory service.
- For more information about directory services, refer to the Directory Services sub-topic in this chapter.

Best Practice 4: Select an email client that includes standard APIs for email-enabling other applications.

- Email is a key component of workflow. If a user is working on a docu-

ment and chooses to send that document to another user, the user should not have to close the document creation application and open email to send it. Instead, the user should be able to mail the document directly from the native application.

- Calendaring and scheduling applications can use email message delivery for meeting proposals.
- Common APIs in use today are the messaging application programming interface (MAPI), vendor independent messaging (VIM), and common messaging calls (CMC).

Best Practice 5: Implement security for email message transport and storage.

Private and official correspondence will require varying degrees of protection including authentication and encryption. SMTP/MIME was created as a means of "casual" communication over the Internet. It was not created to be a completely secure medium. Protocols are currently being developed bridge the security gap.

Standards

Similar to other groupware products, email protocols and standards are still emerging. For almost every protocol, there are several competing, non-compatible standards. If two email systems conform to different standards to access their mail servers, errors may occur when messages are sent between the two systems. Approval of new standards is slow, leading to the proliferation of proprietary protocols and protocol extensions. Without consistent standards, a barrier in communication is created between platforms, applications, and components. To overcome these barriers, email gateways have been developed to integrate incompatible email systems.

Standard 1: Use Simple Mail Transport Protocol (SMTP).

Simple Mail Transport Protocol (SMTP) is the standard transport protocol for sending messages from one MTA to another MTA over the Internet. Using MIME encoding, it enables the transfer of text, video, multimedia, images, and audio attachments. It is the predominate transfer protocol utilized by web browser-based email user agents.

Standard 2: Use Multi-purpose Internet Mail Extensions (MIME).

Multi-purpose Internet Mail Extensions (MIME), a SMTP message structure, is the standard specification for the attachment of audio, video, image, application programs, and ASCII text messages. The content type is stored in the message header as mail extensions. When the message is delivered, the player or application specific to the content type is opened so that the attachment can be viewed in its native format.

If the player or application is not included with the browser, then the user must load it. Common image and video players are included with most browsers.

The MIME standard will require standardization of certain protocols in the near future. By its definition, MIME is transformable. Although two applications may be MIME-compliant, each application can use a proprietary or custom set of extensions. The data associated with the proprietary extensions may be lost in transfer. Common protocols cut down on the risk of a loss of data occurring.

Standard 3: Use Internet Message Access Protocol version 4 (IMAP4).

Internet Message Access Protocol version 4 (IMAP4) is the standard protocol for access to the mail server. The user has the option of storing and manipulating messages on the mail server, which is important for job functions that require the user to access email from several different clients. IMAP is also ideal for situations where the user has a low speed link to the mail server. Instead of downloading all messages to the client, IMAP allows the user to select which specific messages to download. If a message has several MIME attachments, the user can specify that only the text portion of the message is to be downloaded for viewing. This practice is considerably more efficient in the event that a high-speed link is not readily available.

Note: Options sometimes exist to configure email servers and clients without IMAP4 settings. Email servers and clients should be implemented using IMAP4.

Standard 4: Use Lightweight Directory Access Protocol (LDAP).

Lightweight Directory Access Protocol (LDAP) is the standard directory access protocol. LDAP is based on Directory Access Protocol (DAP), an X.500 standard access protocol. X.500 is a set of CCITT/ITU standards for electronic directory services. LDAP has been proven to be more efficient for MUA to directory services transactions. In addition, LDAP can be utilized to access databases other than the email directories, which will add value to other groupware applications, such as scheduling.

Standard 5: Select an email server system that allows multiple standards-based email clients.

When an email server uses IMAP4 standard, any IMAP4-based client can access that server.

Technical Topic 3: Collaboration – Calendaring and scheduling
Introduction

Calendaring and scheduling (C&S) is the process of scheduling events and accessing calendar information for people, facilities, and equip-

ment. A calendaring and scheduling application manages the calendars and schedules of individuals, groups, facilities, and equipment. Through C&S, events and activities can be easily coordinated through the electronic exchange of scheduling information between individuals and groups.

Recommended Best Practices

The following recommended best practices pertain to calendaring and scheduling (C&S) and should be followed when selecting a C&S application.

Best Practice 1: Select an open C&S application, which maintains transparent interoperability with other C&S applications and computing platforms used across the state.

The C&S system must be capable of supporting multiple server platforms and client platforms. The operating environment within the state is, and will remain, heterogeneous. The C&S system must therefore be capable of transparently transferring schedules and meeting information across each of the operating systems.

C&S applications are typically purchased independently by each department based on the particular needs that the departments must satisfy. The selected applications must be capable of exchanging schedules, notifications, and materials with the C&S applications utilized by other departments. The user of one application must be capable of viewing a user's calendar created and stored on another application.

Best Practice 2: Select a C&S application that provides a mechanism for attaching supporting documentation, such as meeting materials, to the notification message.

- The capability to include or attach meeting agendas, supporting documentation, and deliverables maximizes the efficiency of C&S as a productivity tool.
- The user should not be required to compose a separate email message to send attachments. The transport mechanism for attachments should be accessible from the scheduling application.

Best Practice 3: Select a C&S application that allows the user to create both public and private notification groups and contact lists.

Public and private notification groups are lists of people and/or resources that have common calendar and schedule needs, such as project groups or a list of conference rooms. Users can assign selected individuals to their private groups, and administrators can assign selected individuals to public groups. When a group name is entered as a participant, available times can be selected based on the group's information, and a notification message is forwarded to all individuals included in that group.

This feature streamlines the use of C&S applications, making them more efficient.

Best Practice 4: Select a C&S application that enables task and re-source management.

- In addition to people, the user must have the ability to schedule facili-ties and equipment. For example, the user should be able to reserve a meeting room and an overhead projector through the C&S applica-tion.
- The C&S application should be capable of tracking tasks (e.g., "To Do" lists that automatically send reminder messages for upcoming deliverables).

Best Practice 5: Select a C&S application that allows remote and proxy access.

- The user should be capable of disconnecting from the network and still maintain access to personal and shared calendars. Any updates to the calendars or schedule notifications made while the user is offline should be uploaded and synchronized at the time that the user recon-nects to network.
- Incoming schedule notifications should be held by the C&S server until the user reconnects to the network at which time the messages are synchronized with the user's local calendar.
- Proxy access enables a C&S user to allow another authorized user or users to administer their personal calendar. This function may be limited to viewing, or allow full maintenance capabilities.

Best Practice 6: Select a C&S application that can be accessed through a web front-end.

Both Intranets and Internets are accessible by anyone within the organization via a webbrowser. Web enabled C&S applications allow us-ers access to C&S information for anyone, anywhere in the state.

Technical Topic 4: Collaboration – Document Management
Introduction

Groupware products in the form of "office automation suites" have come to embody the typical user's view of sharing work by allowing the creation and exchange of many different types of electronic documents (e-docs). These documents include those created with word processors, spreadsheet and presentation software tools. In most local area networks (LANs) there are common areas where e-docs can be stored and ac-cessed by users, if they know where to look for them.

Recommended Best Practices

It is essential that an organization devise a document manage-

ment strategy as an information "architecture" rather than as just another application or imaging system. This means planning beyond a single standalone application. Recognize that EDM is not necessarily about "imaging." There are real problems with simply managing and sharing the documents created with ordinary word processors and other office automation programs used in the day to day administration of any office.

Best Practice 1: Evaluate potential requirements over a longer-term basis and implement a "platform" that can be used to develop document-enabled applications and provide a uniform approach to document storage and access.

- Use the standards guidelines to assure the implementation of "scalable," open systems.

Best Practice 2: Assure the availability of open application program interfaces.

- Adhere to APIs and integration standards being advanced by the Association for Information and Image Management.

Best Practice 3: Select EDM and workflow tools that comply with AIIM open standards, are platform independent, and can be shown to be interoperable with similar tools and other components of the statewide technical architecture.

- Selecting application components that adhere to industry standards is important for flexibility and adaptability.
- Products must support multiple server, workstation, and application platforms.
- Workflow components should trigger or send some message-based notification when human intervention is needed (using middleware, email, etc.) Partial automation of the office environment will cause confusion as to which activities need human initiative and which activities are being managed by the workflow system. This confusion will cause inefficiencies and leave a wider margin of error in work to be performed.
- Workflow systems should provide a standard interface to other workflow systems for the purpose of passing and processing work items between business units and processes.

Standards

As the state progresses with the development of a departmental and statewide document management infrastructure, and universal access to information, there are many obstacles to overcome related to the inter-operability between departmental systems and their interaction with an evolving enterprise level locator service. In the standards area depart-

ments planning for EDM systems and services needs to take into account three general sets of guidelines.

- Existing and evolving standards and guidelines being advocated by public institutions and private industry through the Association for Information and Image Management International (AIIM).
- Other standards and guidelines put forth by related parts of the State-wide Technical Architecture, especially as they relate to the development of document and/or business process-centric applications in an n-tier architecture.

There is no limit to the creativity and innovation occurring in the development of solutions to the problems of document management, workflow, and universal access. The framework embodied by these standards is intended to be moving users and developers toward the goals described previously.

Standard 1: Implement document management systems and components that conform to the Document Management Alliance specifications (DMA 1.0 and ODMA 2.0).

- There are numerous issues related to interoperability among document management applications, services, and repositories. Standards are needed to manage the increased life expectancy and complexity of re-usable electronic documents and content.
- The Document Management Alliance (DMA), is a task force of AIIM. DMA conforming products will support open design for user interfaces, workstations, network operating systems and servers. The DMA provides a framework for vendors to deliver products that provide query services (simple transparent access from every desktop to information anywhere on the network), and library services (including check-in and checkout, version control, security, and accountability). The DMA is working with the Open Document Management API (ODMA) group which specifies the common application program interfaces, and high level call interfaces that enable other client applications (such as MS Office) to work seamlessly with DMA compliant document management systems.

For more information about AIIM standards programs, refer to the Web site: http://www.aiim.org/industry/standards.

Standard 2: Implement workflow systems that conform to the interface specifications of the Workflow Management Coalition (WfMC).

WfMC is another working group of AIIM and is closely aligned with the work of the DMA. As automated workflow systems continue to evolve, the complexities associated with a common approach to process

definition, process repositories, object manipulation and transport, and user interfaces are enormous. The Workflow Management Coalition (WfMC) has proposed a framework for the establishment of workflow standards. This framework includes five categories of interoperability and communication standards that will allow multiple workflow products to coexist and inter-operate within a network environment. This framework is contained within a Reference Model for workflow management systems that includes five interface specifications. The model includes the following:

- Process Definition Tools.
- Workflow Enactment Services.
- Workflow Client Applications.
- Invocation of Native Applications.
- Workflow Package Interoperability.
- At this time, there are many companies designing products that comply with one or more of these interface specifications. Departments planning production workflow applications that need to route work outside of the production system for processing or decision making should work carefully with vendors and service provides to determine functional requirements and WfMC standards compliance.
- For more information about the WfMC and the work of the coalition refer to the Web site at: http://www.aiim.org/wfmc/index.html.

Standard 3: Use Adobe Acrobat Portable Document Format (PDF) for Non-editable Electronic Documents.

All documents in final form and prepared for distribution and publishing with no intention for further modification must be stored and delivered in Adobe.PDF format.

Standard 4: Ensure hardware/software and image file compatibility using TWAIN, ISIS, and TIFF standards.

- For typical business document imaging applications, software that controls the operation of the scanner (and some other recognition peripherals) is provided. Not all scanner hardware and scan software are compatible. The industry standards to adhere to are TWAIN and more recently ISIS (Image and Scanner Interface Specification). These are API standards that provide low-level integration facilitating the control of the peripherals from many common user Private & Confidential applications. For specialized applications (e.g. hand held devices) other standards requirements need to be investigated.
- The scanned images of typical business documents should be committed to storage in Tagged Image File Format (TIFF) Version 6.0 using CCITT/ITU Group III or IV compression. Organizations planning

imaging applications should investigate and demonstrate that any product selected is capable of exporting images in a format that they can be reused. Images that cannot be shared are a wasted investment and could result in the loss of critical data.

- Avoid new deployment or migrate away from proprietary image file formats. The current technology direction for image file formats is TWAIN. The emerging technology file format is ISIS.

Standard 5: Select magnetic storage subsystems. Select optical storage subsystems based on smaller standard form factors.

- Typical electronic documents, created with office automation suites, will reside on industry standard magnetic disk that is server or network attached. This will generally be transparent to the users of an EDMS. The images of scanned paper documents might also be stored on standard network attached magnetic disk. Magnetic storage will always provide the most performance in the speed of retrieval, and magnetic disk is increasingly cost competitive with optical disk storage. When selecting any magnetic storage solution, adhere to other parts of the STA that provide the standards for these types of systems.
- Very large document collections (usually image applications) will probably require optical storage subsystems (many are proprietary). Where there is a requirement for the permanent storage of unalterable documents, optical is chosen in the form of Write Once Read Many (WORM) disks. These types of systems generally involve special software that is used to manage the storage and movement of documents from optical to magnetic when documents are requested by users. Optical disks may be mounted in single standalone drive units or they may be loaded into various sizes of "juke boxes." Software handles the retrieval and loading of specific disks in response to user requests. Typical EDMS systems today will use a 5 ¼ form factor and will be WORM or Compact Disk type formats. Larger disks are available for specialized applications and are generally proprietary.
- Avoid new deployment or migrate away from proprietary or large format optical storage subsystems. The current technology direction is WORM and various types of compact disc in 5¼" format. The emerging technology is magneto Optical and DVD.

Standard 6: Use extensible Markup Language (XML 1.0) when capturing or authoring document content that requires further automated processing by other information systems and Web based clients using standard XML enabled browsers.

- This standard is promulgated by the World Wide Web Consortium (W3C).
- XML is a subset of the Standard Generalized Markup Language (SGML, an ISO standard).
- XML encodes a description of a document's storage layout and logical structure with a document type definition (DTD). It provides a mechanism to combine structured data and unstructured information content.
- XML allows information systems and applications to automatically process XML documents when the systems are combined with an XML processor.
- The specification (DTD) describes the required behavior of XML processors in terms of how they read XML documents, and what information they must provide to the processing application. For more information about the W3C and XML refer to the Web site at:http://www.w3.org.

Componentware Architecture
I. Definition:

Componentware Architecture enables efficient reuse of existing application assets, faster deployment of new applications, and improved responsiveness to changing business needs. Reusable software components are the building blocks that make a system able to respond quickly to change.

II. Introduction and Background

Components are program modules that provide a complete package of business functionality. Shared components must be designed for portability across platforms.

Components within an application system can be developed in any supported language, with any development tool appropriate for the particular tier where they are deployed. Monolithic applications perform comprehensive business functions and operate independently from other applications. Making changes to a monolithic system is a major undertaking because changes in one area often cause problems in other areas.

III. Principles

These principles provide guidelines for the design or purchase of application components that support distributed, client/server, and adaptive computing across the state.

Principle 1: Componentware Architecture facilitates the reuse of components across the enterprise.

Reusable components increase the productivity of the applica-

tion development departments within the enterprise.

- Sharing components across the enterprise greatly increases the ability of the system to meet the changing needs of the business.
- The use of proven components enhances the accuracy of information processing.

Principle 2: The focus of Componentware Architecture is to improve business performance.

- A component-based development strategy enables adaptive systems to meet the changing business needs and technical environments.
- A component-based development strategy aligns information technology with the commonly used functions of the business.

Principle-3: Shareable components must be callable by any component-enabled application.

- Reusing existing shared components eliminates duplication of development, testing, and maintenance effort.
- Reusing existing shared components eliminates processing inconsistencies because business rules are maintained in one piece of code.
- Use of components reduces the time and effort required for developing and updating applications.
- Reuse results in quality improvements because many applications are being built based on same components.

Principle 4: New components must be platform independent.

- Components must be developed so they can be deployed on any supported platform.
- If the business needs change or a new platform is required, the component should easily migrate to a new platform.

Principle 5: Purchase rather than build components whenever possible.

- Purchased components must be capable of being implemented in a service-oriented environment; (i.e. can be integrated into an N-tier environment with a published Interface Definition Language (IDL) interface).
- Components should be purchased whenever possible, such as class libraries, allowing developers to focus on the development of specialized business rule components.

Principle 6: Design components to be fully self-contained.

- All necessary validation, error detection, and reporting capabilities, logging/debugging/tracing functionality, monitoring and alert function-

ality, and system management capabilities must be incorporated in the component.

- This facilitates operation, administration, and maintenance functions.

IV. Technical Topics

Technical Topic 1: Component Reuse

Introduction

A successful implementation of an N-tier, reusable component service-oriented architecture is not solely dependent on the ability to develop reusable components. Success also depends on the ability to provide the tools and management of the components for reuse. Following a reuse methodology and understanding reuse techniques are key to developing and managing statewide reusable components.

Recommended Best Practices

The recommended best practices in this section pertain to reusable components.

Best Practice 1: Establish a reuse methodology for the identification and implementation of components.

A methodology that supports reuse contains the following steps:

- Classify the business requirements by service type (e.g., application, interface, support, or core).
- Search the repository for reusable components that support the business or functional requirements.
- Analyze candidate components to ensure they fully meet the requirements.
- Incorporate the selected components into the new or re-engineered application using standard IDL's.
- Harvest new components from new or existing applications that have not been componentized yet. Placing the new component information into the repository.
- Incorporate the reuse methodology into the system development life cycle.
- To successfully implement the Componentware Architecture, the Network and Middleware Architecture must be in place.

Best Practice 2: Establish a component review board to identify common components. Components used by multiple business units must be commonly understood and consistently referenced by all business users. Component development can be achieved through the context of projects. The review board should start with small, achievable, and strategic projects.

In order to create reusable components, cooperation is needed

among the business process owners. A framework needs to be put in place that allows for:

- Centralized management of reusable, shareable components.
- Design reviews of new and existing projects for reusable components.
- Enterprise access to information about reusable components.

Best Practice 3: Establish a repository for maintaining the information about available reusable components.

- The repository provides a place to store documentation about the component API's.
- The repository should be made available to all application developers as a tool for performing their jobs.

Best Practice 4: Every component must have a published API.

- A published API defines the public interface for a component or service. The API is how other applications will communicate with the component. Documentation should include input and output parameters, which parameters are required, which parameters are optional, and the lengths and types of the parameters.
- The API should be entered into the component repository that is available to all application developers.

Best Practice 5: Harvest components from existing applications to initially build the component repository.

- Legacy applications are a good resource for building a component repository.
- There is no need to reinvent a process or piece of functionality if software already exists that performs the desired function.
- If feasible, develop a wrapper that defines the API for the service and allows the legacy application to become a reusable component.

Standards

The standards in this section pertain to component reuse.

Standard 1: No vendor proprietary API calls for infrastructure security services. Use Generic Security Services-API (GSS-API) or Common Data Security Architecture (CDSA) compliant API calls and products.

- Applications requiring security services prior to CDSA products or services being available can use the GSS-API.
- The GSS-API is an Internet Engineering Task Force (IETF) standard (RFC 2748, released in January 2000, obsoletes RFC 1508 and RFC 2078) and supports a range of security services such as authentication, integrity, and confidentiality.
- It allows for plug-ability of different security mechanisms without chang-

ing the application layer.
- It is transport independent, which means it can be used with any underlying network protocol.
- Applications using GSS-API can be retrofit to a CDSA foundation without major modifications; therefore providing an interim step to CDSA based services.

Technical Topic 2: Component Services
Introduction
A service completes a task requested by an application. The service itself may call one or more components to complete the task. To the calling application, however, it appears as a single task. Typically, a service is created when it is identified as a common task that would be (repeatedly) coded by several applications.

Recommended Best Practices
The recommended best practices in this section pertain to component services.

Best Practice 1: Component services should be callable by any component-based application or any other component.
- Components must be designed and developed with the understanding that the process that invokes it may or may not be developed in the same language or in the same environment.
- A component should be callable from any supported language on any supported platform.

Standards
These standards in this section pertain to component services.
Standard 1: Custom developed application components must be written in a portable, platform-independent language, such as C, C++, or Java.
Application components written in a portable language are easier to move from one platform to another because they require fewer modifications to conform to the new host. This portability allows an application to be more adaptive to changes in platform technology.
Standard 2: Statewide infrastructure services must be atleast Common Data Security Architecture version 2.0 (CDSA v2.0) compliant.
- The CDSA version 2.0 architecture is an Open Group specification for providing security services in a layered architecture and managed by a Common Security Services Manager (CSSM). CDSA provides a management framework necessary for integrating security implementations. Version 2.0 of the specification is a cross-platform architecture, which includes a testing suite for inter-operability testing.
- A wide range of vendors has announced support for the specification

and products for a broad set of platforms can be expected.

- Security protocols such as SSL, S/MIME, IPSec can all be built from the Common Data Security Architecture base.

Technical Topic 3: Object-oriented Components
Introduction

Object-oriented components encapsulate both the business logic and the data accessed by the business logic. They have the potential to become intelligent, self-managing entities, allowing for more simplified management.

Recommended Best Practices

The recommended best practices in this section pertain to object-oriented components.

Best Practice 1: State application developers should develop Enterprise components using object technology based on Enterprise Java Beans. Departments should enter an appropriate object-oriented analysis and design lifecycle prior to the implementation.

- Object oriented programming starts with the definition of objects. Therefore analysis and design are critical.
- Object-oriented design and development is well understood by many developers and the software industry often provides solutions based on objects rather than APIs.
- EJB together with Servlets hide most of the required infrastructure service requirements programming for web-based applications. Where sharing of services is desirable, departments can offload the burden of such programming and can focus on the business logic rather than communication code.

Standards

Standard 1: Purchased applications must be CORBA 2.0 or later and IIOP (Internet Inter-ORB protocol) compliant.

CORBA and IIOP standards are open standards devised for platform independence.

Standard 2: Build or purchase Enterprise solutions on an Enterprise Java Bean and servlet model. Application servers should be compliant with EJB 1.1 or better.

- Enterprise solutions benefit from reduced requirements to code underlying services and can focus on business logic.
- Vendors provide solutions based on an EJB model. These solutions can be purchased and used without customization.

Standard 3: Avoid OLE/DCOM and the Windows DNA object model for applications with Enterprise or strategic implications.

- OLE/DCOM standards do not scale well and run only on Windows platforms.
- OLE/DCOM applications are not easily portable or integrated into enterprise-wide solutions.

Data Architecture

I. Definition

The mission of Data Architecture is to establish and maintain an adaptable infrastructure designed to facilitate the access, definition, management, security, and integrity of data across the state.

II. Introduction and Background

Data and information are extremely valuable assets of the state. Data architecture establishes an infrastructure for providing access to high quality, consistent data wherever and whenever it is needed. This infrastructure is a prerequisite for fulfilling the requirement for data to be easily accessible and understandable by authorized end users and applications statewide.

III. Principles

The following principles apply to the enterprise Data Architecture. Enterprise principles are relevant to both statewide and department-wide data.

Principle 1: Design an adaptive data infrastructure.

- Design the data infrastructure to easily accommodate changes in the data model and database technology. The data infrastructure is a crucial component of establishing an overall adaptive architecture.
- An adaptive data infrastructure provides extensibility in adding new functionality and facilitates vendor independence.

Principle 2: Design the enterprise Data Architecture so it increases and facilitates the sharing of data across the enterprise.

- Sharing of data greatly reduces data entry and maintenance efforts.
- Data sharing requires an established infrastructure for widespread data access. This includes integration with the Application, Componentware, Integration, Messaging, Network, and Platform Architectures.
- Consistent shared data definitions ensure data accuracy, integrity, and consistency.
- Data sharing reduces the overall resources required to maintain data across the enterprise.

Principle 3: Separate the data sources for online transaction processing

(OLTP) data and online analytical processing (OLAP) information.

- Separate data sources isolate OLTP systems, which perform mission critical business processing, from large ad hoc queries and online analytical data processing. If the data sources are not separate, ad hoc queries and direct access of data for OLAP systems can adversely impact online transactional processing.
- Data design is adapted for optimal performance for each type of application, OLTP or OLAP. For optimal performance, OLTP and OLAP may require different database designs. OLAP typically includes complex operations involving time series, dimensional, and trend analysis, which do not perform well with relational database technology alone (e.g., sometimes other methods of data storage are needed to support OLAP, such as multi-dimensional databases or flat files).

IV. Technical Topics
Technical Topic 1: Centralised Metadata
Introduction

The state should develop applications that cooperate and share data, both within a single department and between departments. In this model, common data elements are defined consistently even when they are stored in multiple databases and data can be shared between applications. This type of data is referred to as centralised data.

When centralised data is defined consistently, data is described the same way in each table where it is defined. Definitions include traits such as name of the field, length, number format, data format, and the values it can have. When the data has the same format, it is much easier to exchange data across system and organizational boundaries.

The way to describe or define data is through metadata. Metadata is "information about data." Metadata is stored in a repository containing detailed descriptions about each data element. By using the formats described in the metadata repository, whether the data resides in a single location or in multiple databases across the state, the same data management principles apply. A list of sample Metadata elements are as follows:

Definition of Standard and Data Elements

Data Element Attribute Name	Element Definition	Field Length	Data Element Type	Example	Remarks
Person Related Elements					
SSID	Social security identification Numbe:	12	Number	9999-9999-9999	Unique number for each person as per MPHS database
Surname	Person's surname	20	Varchar	Mullapudi	
Name	Person's name	30	Varchar	Subba Rao	
Father / Husband's Surname	Father / Husband's Surname	20	Varchar	Mullapudi	
Father / Husband's Name	Father / Husband's Name	30	Varchar	Venkata Rao	
Date of Birth	Person's date of birth	8	Date	12-09-1965	DD-MM-YYYY format
Sex	Sex of the person	1	Char	M	Male/Female Flag
Caste Category	Caste category of the person	3	Varchar	01	SCA,SCB,SCC,SCD, BCA, BCB, BCC, BCD, ST, OC, OBC
Religion	Religion of the person	20	Varchar	Hindu	

Religion Code	Religion code of the person	02	Varchar	01	Codified field with name displayed
Marital Status	Marital status	02	Varchar	Y	
STD Code	STD code of the area	06	Varchar	040	
Phone No	Contact phone no	08	Number	4036409	
Fax No	Fax no.	08	Number	4030103	
E-Mail ID	Electronic mail id	50	Varchar	mullapudi.sub barao@yahoo.com	Electronic mail id
PAN No	Permanent Account Number of the person	10	Varchar	ABTPR2507M	Number allotted by Income Tax Dept
PAN No	Permanent Account Number of the person	10	Varchar	ABTPR2507M	Number allotted by Income Tax Dept
Location Related Elements					
Address1	Persons address first line	50	Varchar	205, AnnapurnaApts	First address Field
Address2	Persons address second line	50	Varchar	Street No. 5, Srinivasa Colony	Second address Field

Field	Description	Length	Type	Value	Notes
District	District name	20	Varchar	RR District	
Code	District codea	02	Varchar	02	
Mandal	Mandal name	20	Varchar	Saroor Nagar Mandal	
Code	Mandal code	02	Varchar	05	
Village	Village name	20	Varchar		
Village Code	Village code	20	Varchar		
Municipality	Municipality	20	Varchar	L B Nagar	As per Janmabhoomi
Municipality Code	Municipality name	02	Varchar	02	
Municipal Ward Code	Municipal Ward Code	03	Varchar		
Panchayat	Panchayat	20	Varchar		
Panchayat Code	Panchayat Code	02	Varchar		
Habitation	Habitation	20	Varchar		
Habitation Code	Habitation Code	02	Varchar		
PIN Code	PIN code of the area	06	Varchar	500035	
Department	Department name	50	Varchar		
Department Code	Department code	04	Varchar		Codified field with name displayed
Survey No.	Survey no. of property	30	Varchar	12/24/345/496-a1	Survey no. where property is Located

ID's					
Vehicle Reg. No.	Vehicle Regn. no.	10	Varchar	AP37AX8420	Number as allotted by RTA
Passport No.	Passport no. of the person	08	Varchar	A1155679	Number as issued by Passport authority
Driving License No.	Driving License no. of the person	20	Varchar	AP37/4235/BV RM/99	Number as allotted by Licensing authority

For Storage in Telugu (ISCII)

Surname	Person's surname	20	Varchar	ᵃ«sVVfiÁþx msp²T¶	
Name	Person's name	30	Varchar	xqsVÉØ÷L Sᵃ«so	
Father / Husband's	Father / Husband's	20	Varchar	ᵃ«sVVfiÁþx msp²T¶	
Father / Husband's Name	Father / Husband's Name	30	Varchar	®ᵃsLiNRPÈ Á LSᵃ«so	Number as allotted by RTA

					First address Field / Second address Field
Address1	Persons address first line	Varchar	50	205, @@«sôxms pLñRi @FyL'iï@ªs VLiÉp=	First address Field
Address2	Persons address second line	Varchar	50	{qisûÉp @«sLi.5, $¬sªyxqs NSlÁ¬ds	Second address Field
District	District name	Varchar	20	LRiLigSILñi T¶i	
Mandal	Mandal name	Varchar	20	xqsLRiWL'i @«sgRiL'i	
Village	Village name	Varchar	20		
Municipality	Municipality name	Varchar	20	Fsib. ÔA. @«sgRiL'i	
Panchayat	Panchayat name	Varchar	20		
Habitation	Habitation	Varchar	20		As per Janmabhoomi

* At present the SSID No. is with the following structure and it is planned to migrate to the arrangement specified above. The detailed guidelines regarding migration from the existing to the recommended SSID will be issued separately.

SSID	Social security identification number	16	XX-XX-XXXXX-XXXXXXX XX-XX-XXXXX-XXXXXXX (Dist-Mandal- Munici- pal- Village/Ward - Household- Member of HH)	Unique number for each person as per MPHS database

Recommended Best Practices

The recommended best practices in this section pertain to centralised metadata.

Best Practice 1: Use and actively maintain the Centralised Metadata Repository to store centralised metadata definitions.

- Storing data element definitions in a central repository incrementally builds the enterprise data model.
- The repository must be actively maintained (e.g., changes to metadata occur in the repository before the changes occur in operational applications).
- The repository serves as a centralized data administration tool and helps promote data reusability, reliability, and sharing across the enterprise.

Best Practice 2: When designing or modifying a database, review the Centralised Metadata Repository for existing standard and proposed data elements before implementing a new database to ensure data elements are defined according to CMR standards.

- Design reviews are essential to ensure that shared statewide data is defined consistently across all applications. Design reviews also determine whether data that already exists is consistently defined and not redundantly stored.
- ?Design reviews should document the following:
- Where is this application getting its data?
- What other applications are getting data from this application?
- Is data used by this application defined consistently with statewide definitions? If not, is there a plan to define the data according to enterprise definitions?
- A design review evaluates the data requirements of a project and identifies the following:
  - A data requirement that can be solved by using existing centralised metadata element.
  - Data not already identified, as centralised metadata must be proposed as an inter-department or statewide standard to the

Metadata Element Review Team to become centralised metadata.
- Access is available for application development projects to reference the CMR in order to actively research data requirements. Review the existing standard and proposed data elements in the CMR before implementing a new database to ensure data elements are defined according to standards.
- Key information about data is stored in the systems that are already implemented in the state. If possible, evaluate existing systems to propose statewide and department data elements.

Best Practice 3: Use the CMR and the Metadata Element Review Team to create centralized definitions of enterprise level data and encourage the sharing of data across departments.
- Data used by multiple business units must be commonly understood and consistently referenced by all business users. Enterprise sharing of data can only be achieved by creating centralised definitions.
- Centralised definitions of data emerge through the context of projects. An enterprise model evolves over time through ongoing projects.
- In order to create centralised definitions of data, cooperation is needed among the business data owners.
- Centralized management of distributed enterprise-level data is provided through the state's Centralised Metadata Repository. This repository is available through the Internet.

Best Practice 4: Identify authoritative sources for centralised metadata.
- Authoritative business sources for centralised metadata must be identified, documented, and actively maintained in the repository. Authoritative business sources are the business units responsible for the accuracy of the data stored.
- A source of record is an authoritative source for data. Data in a source of record is trusted to be accurate and up-to-date. All other data stores should synchronize to the source of record. The data in record sources must be actively managed and the data model should be verified by data administrators. Tools and quality control techniques must be applied to the contents of the data stores themselves, in order to ensure the quality of the data.
- Each application must identify data sources for all data that it does not originally capture. The application capturing the original data is the authoritative source, and is responsible for the quality of the data. All application data models for ongoing projects should be reviewed to ensure that data existing in authoritative systems is reused and not redundantly stored.

Standards

Standard 1: Custom systems must comply with CMR standard data element definitions.

- New databases belonging to custom systems must comply with CMR element definitions. The Metadata Element Review Team will review the data elements to determine if the elements conform to existing standards.
- Any new potential data element standards must be proposed and reviewed for approval as a state standard.
- If the data element definition cannot be customized to conform to existing standards, a waiver must be requested.

Standard 2: Commercial off-the-shelf (COTS) systems that support client-controlled data element definitions must comply with the CMR standard data element definitions. Otherwise, the vendor must provide a conversion routine to conform to metadata exchange standards for data sharing.

- If an off-the-shelf system has data formats that can be modified, the data elements should be adapted to conform to the standard data requirements.
- If the data element definition cannot be customized to conform to existing standards, the vendor must provide conversion routines to conform to the CMR metadata exchange standards.

Standard 3: Use Centralised Metadata Exchange Standards when exchanging data across departments.

If data needs to be exchanged across department boundaries and the data is physically stored differently, then the data must be exchanged through the exchange standard as specified in the CMR.

Technical Topic 2: Data Modeling

Data modeling is the process of defining a data model for a project or application and is typically performed at the same time as the business model during the design phase of a project.

Recommended Best Practices

The recommended best practices in this section pertain to Data Modeling.

Best Practice 1: Take the Entity-Relation (ER) model to the third normal form, then denormalize where necessary for performance.

1. The third normal form is the most commonly recommended form for the ER model.
2. In some cases, a denormalized database can perform faster as there can be fewer joins, or reduced access to multiple tables. This pro-

cess saves both physical and logical input and output requirements.
Best Practice 2: In a dimensional model, use a star schema whenever possible.

Use a snowflake schema only if it increases user understandability or improves performance. A snowflake schema may add unnecessary complexity to the data model.

Best Practice 3: Restrict free form data entry where possible.

- In the design phase, consider the values that may be input into a field. These values or domains should be normalized so that data is consistent across records or instances. For example, using consistent values for gender or address information.
- Use look-up tables and automate data entry for column or attribute domain values to restrict what is entered in a column.

Best Practice 4: Setup indexes and form relationships carefully.

- Limit the number of indexes on databases that will be experiencing significant insert and update activity. When an insert is performed, not only is the record updated, but all the indexes are updated as well.
- Increase the number of indexes on databases where importance lies in retrieval time. Indexes can increase performance on retrieval time.
- Before creating a database, indexes, or data access programs, verify that all relationships have been documented.

Best Practice 5: Design the data model to allow for growth and/or change.

- Design data models to accommodate any future changes, including growth and changes in business requirements or database technologies.

Best Practice 6: Archive and protect the data model.

- Data models store a wealth of department and statewide information and must be archived and protected.
- Data models should be catalogued with the department's project documentation and used to facilitate future revisions.

Best Practice 7: Each department should standardize on a common data-modeling tool for designing and maintaining all new database instances.

- Department Technical Architectures specify each department's common data modeling tool.
- A data model ensures that data is defined accurately so it is used in the manner intended by both end users and remote applications.

Best Practice 8: Use a data-modeling tool to reverse engineer existing databases.

Data-modeling tools can evaluate an existing database structure and reverse engineer a data model. The reverse engineered data model can be used to capture valuable information about the existing database.

Technical Topic 3: Data Access Middleware

Introduction

Data access middleware is the communication layer between data access rules and the Data itself. Data access middleware is designed to enable communication between a data access tier and a database, as opposed to application communication middleware, which enables communication between the programming tiers of an N-tier application.

Recommended Best Practices

The recommended best practices in this section pertain to data access middleware.

Best Practice 1: Provide centralized administration for data access middleware through central IT staff.

- Typically, workstations and servers are used for multiple applications and require connectivity to multiple databases. If administration for data access middleware is provided by central IT staff, any changes that are required are more easily managed and executed
- Support costs and efforts to support data access middleware are reduced.

Best Practice 2: Avoid use of extensions that create vendor lock-in.

- To differentiate their database from other vendors, many database vendors have
- Implemented special extensions beyond the SQL-compliant commands. Although sometimes these extensions may be useful for a particular function, they are not recommended.

Standards

The standards in this section pertain to data access middleware.

Standard 1: Use OLE DB or JDBC database access middleware when accessing a database.

- Use OLE DB or JDBC to access a database instead of vendor specific database middleware.
- OLE DB and JDBC allow flexibility in programming. A database can be easily modified or relocated. If a change is needed, the change is made to the OLE DB or JDBC configurations, not to each data access program or tool.
- These technologies are widely supported by the industry and make an application more adaptable to changes in database or other tech-

• nology requirements.

Standard 2: Implement a server-based OLE DB or JDBC solution as opposed to a workstation-based OLE DB, ODBC, or JDBC implementation.

A server-based solution is easier to administer. Database changes and additions are easier to manage, since updates are made to database middleware servers, not every workstation that requires access.

Standard 3: Use domain name system (DNS) alias names when accessing databases through OLE DB and JDBC.

If the database location changes or if the server name changes, the DNS configuration is changed, and no changes are needed to each client configuration.

Technical Topic 4: Data Access Implementation
Introduction

Since data is at the core of most applications, data access is a vital component of the Data, Application, and Componentware Architectures. Depending on the application, data can be stored and accessed in numerous databases in multiple locations. When data is centralized or when data is distributed across an organization, data access must be carefully implemented with usability, accessibility, cost, performance, adaptability, and security in mind. This topic provides an overview of the different types of data access and discusses practices and guidelines to use when implementing data access including:

• Overall data access methods
• Specific data access methods
• Data integrity
• Data access design considerations.

Recommended Best Practices

The recommended best practices in this section pertain to Data Access Implementation.

Best Practice 1: Establish a data infrastructure that can accommodate rapid changes in data models based on changes in business requirements or changes in database technologies.

• Business requirements change frequently. The data infrastructure and design must be adaptive and allow for changes to be easily implemented.
• Technology changes are fast emerging. The infrastructure must allow for replacement of the database technology if necessary.

Best Practice 2: Centralize data that needs to be shared and current.

- High-volume transaction data that is shared across locations and that needs to be current for all locations must be centralized so all locations have access to the same data source
- Replicating frequent updates to distributed databases increases systems complexity and network traffic.
- Data must be centralized when one or more of the following criteria occur:
- Many users need access to latest data (i.e., OLTP systems).
- The number of users is small and there are no distributed sites.
- There is a lack of skills and tools at multiple sites to manage distributed data.
- There is a need to provide a consolidated and integrated database for centralized metadata on an open platform.

Best Practice 3: Design databases to be modular, business driven and aligned with application services, not monolithic.

- Aligning data with the application service facilitates changes in business processes. Only the data associated with a particular business process is potentially affected when a change is needed, not all the data associated with an entire application. It also increases performance for backup and recovery and provides higher reliability, availability, and scalability.
- By modularizing data, this practice provides better performance for backup and recovery, higher reliability, availability, and scalability, and better transaction performance due to parallelism (e.g., a complex request can be broken down and be processed by multiple databases at the same time).
- Very large databases (VLDBs) typically use a terabyte or more of storage. It is recommended that VLDBs be partitioned based on the appropriate business elements to improve application and database performance. VLDB partitioning can enable more efficient backup and recovery capabilities (e.g., it is more efficient to backup five 10 million row tables simultaneously than it is to backup one 500 million row table).
- In order to align data with application services, the following items need to be defined:
    - Business processes.
    - Data required to service the business processes.
    - Business units responsible for providing the business process.
    - Access to the data, and the know-how to use the data, by

other business units or applications.

Best Practice 4: Minimize the replication of data within operational applications by replicating only stable data when necessary and based on business requirements.

- It is better to maintain only one version of data whenever possible, particularly for mission critical OLTP systems.
- ??Replication must not be used unless it is required for performance or decision support.
- A replication infrastructure is simpler to design for stable data. If replicated data is updated frequently, it is much more difficult to design and maintain a replication infrastructure.
- Replication may be appropriate when there are users in different locations needing similar data that does not need to be current 24 hours a day and a central source database is not a possible solution.
- Specific application requirements for data availability, recoverability, and freshness (near real time, 24 hours old, etc.) must be identified.

Best Practice 5: Design the data access infrastructure to support the transparency of the location and access of data by each application.

- This means designing an N-tier architecture where all data access is managed through a middle tier. This design makes databases easy to relocate, restructure, or re-platform the back end services with minimal disruption to the applications that use them. It is essential for adaptive systems.
- A client should not send SQL requests directly to a server. Instead of using SQL code, the client should communicate with the database through data access rules. The application receives a request from a client and sends a message to the data access rule. The data access rule sends an SQL call to the database. With this method, the client does not send SQL to the server, it sends a request for work.

Best Practice 6: Design for data to be accessed only by the programs and business rules owning the data, never by direct access to the database.

This practice ensures security, data integrity and accurate interpretation of the data and allows for adaptability to changes in business needs.

Best Practice 7: For data quality management, implement tools, methods, processes and policies to provide high-level data accuracy and consistency across distributed platforms.

- Both business users and Information Technology (IT) staff are responsible for data accuracy and consistency. Policies and procedures

must be established to ensure the accuracy of data.

- ?IT staff is responsible for and must provide security mechanisms to safeguard all data under IT control. The business users must determine functional security requirements, while the physical security must be provided by IT.
- Applied systems management provides safeguards against data loss and corruption and provides the means of recovering data after system failures. This implies that effective backup and recovery systems are imperative and that data can be recovered in a timely basis regardless of the cause of loss.
- To satisfy service-level requirements, if the data is not too volatile, data replication can be used. If the data is extremely volatile, using replicas must be avoided. Additional requirements may include providing redundancy for extra bandwidth for communications volume and for availability in the event of a disaster. For critical functions, plan for survivability under both normal operations and degraded operations.
- It would be ideal to record the flow of data across systems, even if it is built incrementally starting with existing application development projects.

Best Practice 8: Optimize the physical database design to support an optimal total performance solution.

As with all application and data access design, performance is always a factor to consider. However, database performance is only part of the total solution and must be evaluated in conjunction with other components that impact performance, such as network and application. When implementing data access, several practices can help performance, including:

- Limit the number of indexes in a database. When a record update occurs, not only the record is updated, but all the indexes are updated as well.
- Limit ad hoc data access. End user ad hoc access can impact the performance of the database.
- Limit the number of rows returned in a query. In OLTP, most users normally work with only a single row at a time or a few rows displayed in a grid, list or combo box. If a user will only be working with a handful, there is no reason to return all the rows in a table.
- Return only the columns needed. Provide an explicit column list instead of a "SELECT *" query.
- Limit the number of joins. Complex multi-table joins have negative performance ramifications.

- Avoid sorts. Sorts can be slow, especially if sorting large amounts of data. If sorting is required, sort on indexed fields.
- Limit the rows used for pick lists, combo boxes, or lookup tables. If a large list is necessary, find an alternate method to provide the list.

Best Practice 9: Implement a minimal number of data access rules.

- A typical n-tier application has numerous business rules. The data access logic for these business rules should be shared through a minimal number of reusable data access rules. Due to the commonality of database queries, many similar queries can execute using a single, properly planned data access routine.
- ?Portability to another database platform or vendor is simplified by having a fewer data access rules.

Best Practice 10: Use ANSI-Standard SQL programming language to access a database.

- Data access to relational data stores must be through ANSI-standard SQL programming language access, not proprietary SQL extensions.

Best Practice 11: Implement a minimal amount of data access rules stored in the database as stored procedures and triggers to avoid vendor lock-in.

- Code data access rules into a data access service. When implemented through the Andhra Pradesh Service Broker (APSB), these services are callable by multiple applications. If a database changes, there is minimal impact to the calling applications since the API should not change.
- Stored procedures and triggers are specific to the database vendor and are more difficult to migrate to a new database if required.
- Database triggers must only be used to support referential integrity.
- Other technologies such as object transaction monitor (OTM) can be used to negate the impact of executing dynamic SQL.

Best Practice 12: Use the State Service Broker for intra-department and intra-application data sharing.

- The department owning the data is responsible for writing the shared service to access the data. This ensures data integrity and proper data interpretation.
- The department requesting the data is responsible for writing the request to retrieve shared data according to the shared service specifications.

Best Practice 13: Use the state's interface engine for data sharing of legacy platform data or other data where the application source code cannot be modified or interfaced.

- Some legacy systems do not have an application program interface (API) and there is no access to the source code. When requiring data access to one of these systems, use the state's interface engine.
- The state's interface engine can be used in instances where the source code is unable to be modified or the data layouts are unavailable. It is an unobtrusive interface to accomplish data sharing.
- Use of database gateway or database-specific middleware must be avoided.
- For more information about the interface engine, refer to the Integration Architecture.

Standards

The standards in this section pertain to Data Access Implementation.

Standard 1: Use the State Service Broker (APSB) for inter-department data sharing.

- Service Broker is the standard for inter-department data sharing. Inter-department services deployed using APSB can be easily leveraged by other authorized applications.
- The department owning the data is responsible for writing the shared service to access the data. This ensures data integrity and proper data interpretation.
- The department requesting the data is responsible for writing the request to retrieve shared data according to the shared service specifications.

Standard 2: Use the industry standard of ANSI Standard SQL when accessing relational databases.

- When using a database access tool that uses SQL calls, do not use any vendor specific extensions.

Technical Topic 5: Data Security

Introduction

The state's data is a very valuable resource, and establishing a secure data environment is a key component of the Statewide Technical Architecture, particularly since more and more applications use the Internet to access data. It is critical that the state's data be protected against any unauthorized access. Data security is designed to protect data against the following threats:

- Unauthorized use of the database or application.
- Accidental modifications and deletions.
- Confidentiality and integrity breeches for data in data transport and physical storage.
- Disasters.

Recommended Best Practices

The recommended best practices in this section pertain to Data Security.

Best Practice 1: Use generic, protected user accounts for direct database access to streamline administration, ensure scalability, and protect against non-application data access.

- When a generic, protected user account is used, each individual user account is not defined to the database, so end users are unable to gain ad hoc access to the data. Their only access should be through the application.
- The individual user account is only defined at the application level, and does not have to be maintained in more than one place.
- Implementing generic users makes applications scaleable since each process is not tied to a specific user.
- The generic user account and password used to access data in the back end must not be protected and not accessible to end users.

Best Practice 2: Implement data security to allow for changes in technology and business needs.

- Implement security to be a roadblock to unauthorized access, but not a hindrance to access by authorized users. Implement the minimal number of sign-on or authentication processes if possible.
- An adaptable security infrastructure must be implemented to allow for changes in technology, business needs, and reactions to intrusions.
- Monitor ITS and industry security alerts and recommendations. Security tools and techniques are rapidly changing and enhancements are being made. Monitor the industry and ITS recommendations and implement changes to security configurations as needed.

Best Practice 3: Handle sensitive data carefully.

- Confidential or private data must not be stored on a laptop without password protection or encryption. Laptops are vulnerable to loss of data through hackers, thieves, and accidents. Sensitive data must be secured on a database server with proper policies and procedures in place to protect the data.
- Ensure that passwords are encrypted both inside application executables and across the transport layer. ??Password and data encryption in databases and laptops can be provided by third party products.
- A backup and recovery plan for databases and laptops must be in place.

Best Practice 4: Provide measures for laptops to backup their data, like zip drives, etc.

- Only non-sensitive data should be stored on a laptop. If possible, the authoritative source must be on a server, and data should be replicated to the laptop.
- When data is stored on a laptop, provide easy-to-use backup facilities. Implement policies to ensure and automate backup.

Best Practice 5: Record information about users and their connections as they update and delete data. Auditing can determine who updated a record and their connection data.

The information that can be captured by the application includes:

- The user account the user logged in with.
- The TCP/IP address the connected user's workstation.
- The certificate information (if using certificates) about that user.
- The old values that were stored in the record(s) before the modification.
- The new values that were input to the record(s).

Best Practice 6: Implement transaction logging so recovery of original data is possible and protect the transaction log.

- Transaction logging records activity on the database and can be used to roll back a transaction.
- Protect the transaction log through access control and backup. Only the database should be writing to the transaction log. All other access should be read only.
- The transaction log should be located on a separate physical disk if possible. If not possible, use RAID to protect the integrity of the log file.

Best Practice 7: Implement security scanning and intrusion detection at the database level if possible.

- Scan the database and database server for potential weaknesses before they become a problem. Implement any recommendations of the security management tool. For example, a tool may advise to disable FTP services on a database server.
- Monitor the database for possible intrusions. For example, monitor and alert when multiple invalid login attempts occur. Intrusion detection protects the database server from attacks from both sides of the firewall (e.g., internal network, WAN, or Internet).
- Audit logins, user account creation, and failed login attempts.

Best Practice 8: Ensure data integrity by securing data movement or data transport.

- When high impact, sensitive data is transported through the LAN, WAN, or Internet, ensure that the data is encrypted and protected

from alterations. This can be accomplished through Secured Socket Layers (SSL) or Virtual Private Network (VPN).

- Other types of data must be encrypted and protected if there is a risk of the data being altered.

Best Practice 9: Protect database servers from hardware failures and physical OS attacks.

Database servers must be located in a climate-controlled, restricted-access facility, and preferably a fully staffed data center. Uninterruptible power supplies (UPSs), redundant disks, fans, and power supplies must be used.

Best Practice 10: Protect source code in data access rules, particularly if it contains password information.

- On the back end, an application needs to store account and password information in order to authenticate to a database or other application service. Protect the source code from unauthorized viewing.
- Store passwords in an encrypted format when possible.

Best Practice 11: Do not store credit card numbers in the database for non-recurring charges or infrequent recurring charges. Store authorization numbers and discard credit card numbers after use.

- For infrequent recurring charges (for example an annual fee), or non-recurring charges (for example a one-time fee), storing credit card numbers and expiration dates in a database, even encrypted, can present an unjustifiable risk for the state.
- A credit card number is only necessary to request authorization. Keep the credit card number only until authorization is complete, then discard. The authorization number can be used to track activity and verify authorization.

Best Practice 12: Protect and encrypt credit card numbers when storing for recurring charges. Store personal verification information independently.

- Certain business requirements, such as frequent recurring charges, may require credit card numbers to be stored in a database.
- When it is absolutely necessary to store credit card numbers, encrypt the credit card number in the database. To further protect the credit card, store personal verification information, such as name and address, in a separate database from credit card information. Use different user accounts for each database connection.

Standards

The standards in this section pertain to Data Security.

Standard 1: Change all default database passwords

System administrator accounts have full access to all databases

in a database server. Hackers often attempt a login to a system administrator account using a default password. As soon as a database is set up, change all default passwords.

Application Communication Middleware Architecture
I. Definition
Application Communication Middleware Architecture facilitates and simplifies communication within and between heterogeneous, distributed application systems. The focus of this chapter is limited to application communication middleware, as opposed to data access middleware or network middleware, which are separately discussed in the Data Architecture and the Network Architecture chapters respectively.

II. Introduction and Background
There are two areas that require application communication middleware:

Intra-application. Handles communication within the tiers of an application system.

Inter-application. Handles communication between the application system and external services, such as common shared services and other application systems

III. Principles
The following principles guide decisions on the use of application communication middleware.

Principle 1: Using application communication middleware is required in a heterogeneous, distributed environment.

- The tiers of a distributed application, which often run on different hardware and operating systems, must communicate.
- Application communication middleware enables both inter- and intra-application communications.

Principle 2: Using message-oriented middleware changes the fundamental design for building distributed applications.

- Messaging allows asynchronous processing so applications can continue processing after a message is sent.

Principle 3: Using remote procedure calls (RPCs) offer a good migration strategy.

- RPCs are the easiest transition for mainframe programmers. An RPC is simply a subroutine even though it is running a business rule on the network.
- RPCs are a mature technology. They are already bundled with many operating systems and databases.

Principle 4: Minimize the use of distributed units of work
- Distributed transaction monitors are becoming less and less a re-

quirement as high speed networks and messaging subsystems are deployed.

- The need for a transaction monitor can be eliminated or reduced by using features of message-oriented middleware, combined with application design.

Principle 5: Do not use database middleware for application communication

- Database middleware has limited usefulness. It allows an application component to access data, thereby supporting a two-tier application design.
- Database middleware does not have the capability to provide all levels of inter-component communication. Stretching its use to inappropriate environments will ultimately result in systems that have performance problems.

Principle 6: Using a broker facilitates reuse and shortens development cycles.

- A broker provides access to common services that can be reused and shared, thus reducing development costs. See Componentware Architecture.
- The state can reduce the resources spent on developing and maintaining "islands of applications," which include redundant code. Application developers can focus on new work rather than rework.
- New applications will be a combination of new business rules and common shared business rules. Since part of the application is "pre-written" and "pre-tested," delivery of the total application should result more quickly.

Principle 7: Precede selection of application development tools with an application communication middleware strategy.

- In the long term, use of middleware by many applications is of more strategic importance than any one-application development tool. Middleware selection should drive the choice of application development tools, not vice versa.
- A range of communication methods is available through middleware. A combination of products may be required.

Principle 8: Select third-party middleware rather than middleware supplied with a development tool.

- De-coupling the middleware from the application development tool provides more flexibility in changing development tools in the future. For example, integrated CASE tools often provide third-party message oriented middleware as well as their own, proprietary message

oriented middleware.

- When given the choice of proprietary middleware versus third party middleware, select the third party middleware option. For instance, message oriented middleware provided by the integrated CASE tool vendor limits flexibility and links to a specific vendor and product strategy more closely.
- If message oriented middleware is linked directly to a specific development package, then there is the risk of limited usefulness with other applications that are not developed with the same tool.

Principle 9: Document application programming interfaces (APIs) and interface definition language (IDL).

- APIs and IDL for components and services must be documented so that developers know where they are and how to use them.

IV. Technical Topics

Technical Topic 1: Application Communication Middleware Types

Recommended Best Practices

The recommended best practices in this section apply to application communication middleware types.

Best Practice 1: When possible, design applications to use asynchronous communication.

- Message oriented middleware supports asynchronous communications.
- Asynchronous messaging requires a distinctly different design. It is implemented with a very basic set of message oriented middleware commands.
- Message oriented middleware provides a reliable form of communication.
- Asynchronous communication offers more flexibility than synchronous communication. The downstream application has more control over its operation.

Best Practice 2: Use Remote Procedure Calls (RPCs) when message oriented middleware is not available.

- RPCs provide an acceptable, albeit limited, method of communication between software components.
- RPCs require synchronous communication and are less efficient in the use of resources; they tie up resources from both the client and the server until the service has been provided.
- Synchronous communication requires error handling in the client application if the request is made while a server is unavailable.

Standards

The standards in this section pertain to application communication middleware types.

Standard 1: There is no Remote Procedure Call (RPC) standard. Use the Andhra Pradesh

Service Broker (APSB) 1 for inter-application communication.

- Even with an RPC that is endorsed by a vendor neutral party, such as The Open Group, there is no standard RPC.
- RPCs are available from different vendors, such as The Open Group's DCE RPC, Sun Microsystems'
- ONC/RPC, and Microsoft's RPC.
- Each vendor's version has a different application-programming interface and they do not inter-operate with one another.

Standard 2: There is no Message Oriented Middleware (MOM) standard. Use the state of Andhra Pradesh's service broker for inter-application communication.

At present, all message-oriented middleware is proprietary. Products from different vendors have different application programming interfaces, which do not inter-operate with one another.

Standard 3: There is no distributed transaction processing (TP) monitor standard. Use the state of Andhra Pradesh's service broker for inter-application communication.

The applications coordinated by a transaction monitor will run on different platforms with access to different databases and resource managers.

The applications are often developed using different tools and have no knowledge of one another.

Industry standards specify how a TP monitor interfaces to resource managers, other TP monitors, and its clients.

- X/Open XA specification defines specifications for two-phase commits that work with distributed databases.
- X/Open TX standard defines transactions.
- X/Open X/ATMI provides a standard transaction management interface.

Technical Topic 2: Application Communication Middleware Brokers
Introduction

For communication external to the application or access to common services, another technology component called a "broker" is required to establish the relationship between the applications. This broker performs the same function as a real estate broker or stockbroker: the broker

brings parties together. Brokers are built on top of other communications middleware (e.g., RPC and MOM).

Statewide Recommended Broker Strategy

Implementing an Object Request Broker (ORB) statewide would very likely require a significant investment. An ORB solution would require integrating message-oriented middleware, communication protocols, or operating systems in order to provide a complete, statewide solution.

To be formed as a part of the e-Governance initiative Service brokers are a proven technology. However, there are no industry-standard service broker products available. Successful implementations of service brokers usually require the interface to be developed specifically for the organization. Like other organizations 'using a service oriented architecture, the state must invest in the development and maintenance of the service broker's generic interface.

Since object technology promises the greatest gains in productivity and adaptability, the state will ultimately transition software development to a fully object-oriented approach. Requests for service will be conveyed by an Object Request Broker. In the meantime, the state will use a service-oriented architecture, with requests conveyed by a Service Broker.

To assure their long-term contribution to the state, it is important that services developed to support the service-oriented architecture be designed in such a way that they can be accessed via either a Service Broker or an Object Request Broker.

Recommended Best Practices

The recommended best practices in this section pertain to application communication middleware brokers.

Best Practice 1: Manage a statewide broker as a strategic infrastructure component.

- The service broker is a critical part of the distributed computing environment because it allows the technical architecture to meet the three goals of efficiency, sharing of information and Department autonomy.
- Strategic infrastructure benefits all departments and should be centrally managed.

Best Practice 2: Be sure a statewide broker is independent of code development tools.

- The purpose of the service broker is to facilitate communication in a multi-platform, multilanguage environment. If the service broker is tied to a single vendor's product, then the goal of facilitating communication in a diverse environment has not been met.

- Implementing a service broker that supports multiple vendors' products helps protect the state from being negatively impacted by market forces.
- A best of breed approach should be taken when selecting the application communication middleware.

Best Practice 4: Use the state's inter-application middleware, the service broker interface, for inter-application communication between state-developed applications. For interfaces with other applications, such as purchased packages or applications owned by other entities, use the Interface Engine.

- State-developed applications gain performance and flexibility by using the service broker for inter-application communication.
- In-house or out-sourced custom-developed applications requiring inter-application
- communication should be capable of using a service broker. Applications sharing or requiring services from external application systems should provide the capability to use the standard inter-application communication middleware architecture.
- In instances where the application code cannot be modified, such as purchased applications where the state does not have rights to source code, use the interface engine. For more information about application integration, refer to the Integration Architecture chapter.
- For more information on the Interface Engine, see the Integration Architecture chapter.

Standards

The standards in this section pertain to the application communications middleware brokers.

Standard 1: Use of the service broker is required for inter-application communication.

- The service broker was put in place due to the lack of standards for inter-application communication types such as RPC, MOM, and TP monitors.
- While the lack of standards is not an issue for development of any single application, it poses problems for communication between applications. The broker is proposed as a standard communication paradigm for inter-application communication.

Integration Architecture

I. Definition

Integration Architecture specifies how various automated applications operating on different platforms can effectively work together. Inte-

gration techniques should be used when new application systems need to access existing application systems, while maximizing the investment in existing systems and platforms. This chapter includes an introduction of integration, an explanation of application integration, data access integration and XML along with recommendations and standards for each component.

II. Introduction

Integration is key to bridging the gap between heterogeneous operational application systems while still maximizing the investment in existing hardware and client platforms. Integrating new client/server, adaptive, and distributed systems with existing systems while still optimizing performance, minimizing maintenance and utilizing existing platforms is a major technical challenge. When new client/server systems are developed, they need the ability to access business processes and data from legacy and purchased systems developed under different technical architectures or built in features for future systems to access and interact with these systems.

III. Principles

The principles in this section are designed to provide guidelines for Integration Architecture components that will be used throughout the state.

Principle 1: An Integration Architecture addresses the correlating components of data interchange, business processing issues, and end-user presentation.

- The Integration Architecture encompasses the multiple layers of new and existing systems and the middleware in between.

Principle 2: An Integration Architecture meets the needs of linking heterogeneous operational application systems while protecting existing investments.

- The Integration Architecture should take into account the need to use existing workstations, peripherals and existing transports to access existing and new applications.

Principle 3: When making integration decisions, the life span of the solution is a key factor.

- A temporary solution may be engineered very differently than a long-term solution. Cost and effort need to be taken into consideration when providing a solution that is only needed on a temporary basis.
- Short-term solutions are often hard-wired and often have low performance. They are designed to be replaced or easily removed. Cost and effort should also be considered for a short-term solution.

- Long-term solutions must be standardized, adaptable, and engineered for high performance.

Principle 4: Integration Architecture relies on middle service tiers such as interface engines, database gateways, messaging, integration services, XML and third party tools.

- It is more cost effective and easier to maintain applications that use middle service tiers than to modify multiple legacy applications.
- New N-tier applications still need access to the legacy information stored throughout the enterprise.
- Principle 5: Minimize the impact to existing application systems.
- To the extent possible, the Integration Architecture should enable new applications to use existing resources with minimal disruption.
- Where possible, use non-invasive techniques for integration.
- Integration requires good communications infrastructure. If the basic network infrastructure is not in place, a single integrated network of application communication cannot be achieved.
  (Refer to the Network Architecture chapter.)

Principle 6: Use statewide technologies whenever possible.

- To the extent possible, use the same technologies in the Integration Architecture that are used in the Statewide Technical Architecture.
- Limit the heterogeneity of the technology used in order to simplify integration and enable migration to future technologies.
- Principle 7: Provide maximum flexibility to integrate heterogeneous systems when enhancing existing end-user functionality through the use of a middle service tier.
- Implement the middle tier with standards whenever possible.

IV. Technical Topics

Technical Topic 1: Application Integration

Introduction

      An approach to integrating independently developed applications, such as legacy applications, purchased applications, and new client/server systems is through application integration.

An application interface can provide the following services:

- Data translation and mapping. Translates the different communications and data interchanges between two applications.
- Transaction explosion. If configured properly, an application integration interface can take one client transaction and spawn multiple transactions in remote applications.

      Front-ending other applications. An interface can provide a single front end for integrating multiple application systems.

Recommended Best Practices

The recommended best practices in this section pertain to application integration.

Best Practice 1: Use application integration strategy for online transaction program (OLTP) application systems, not decision support systems (DSS).

- Data warehouses or other solutions should be used in decision support applications. (For more information on data warehouses, refer to the Information Architecture chapter)

Best Practice 2: Design an integration solution that does not write directly to an operational database

- Existing application logic or business rules should be used when updating an application database. An external user or application could inadvertently corrupt operational data.

Best Practice 3: Recommended priority of using components of application integration are interface engine first, middle ware systems second, direct program-to-program interface as third and last alternative.

- This will reduce integration effort substantially.
- ?The recommendation assumes that all three alternatives are applicable in a given situation.

Best Practice 4: Use direct program-to-program interfaces for high transaction volumes.

- Direct program-to-program interfaces pass only the required information between applications, so performance and throughput is at the optimal level.

Best Practice 5: When designing an application integration solution using an interface engine, give careful consideration to the design and planning of the application interfaces and connectivity.

- At the beginning of the design stage, involve application developers who are knowledgeable in the business rules and interfaces to each system that needs to be accessed.
- ?Some application systems may have multiple entry or exit points that can be used. If a noninvasive solution is selected, capitalize on using the entry or exit points that best apply to your application needs.

Standards

Standards in this section pertain to the application integration.

Standard 1: Clearly Define Application Interfaces

- To integrate applications for which the state has no source code rights, application interfaces must be clearly defined in order to allow reliable communication between applications.

- ?To facilitate purchase of best-of-breed software while easing application integration issues, the application interfaces must be clearly defined.

Standard 2: The message structure must be documented.

- A message or transaction is the mechanism for extracting data from an application or sending data to an application.
- Programmers integrating applications need to know record length and type (i.e., whether it is a variable or fixed length record, and if it's variable, the delimiting characters used to separate the fields), and know which fields are optional versus required.
- A description of the data for each field is also necessary.
- Explanations and examples of record formats and field descriptions are helpful and should be included.

Standard 3: The application must be able to transmit and receive messages using a client/server model.

- The client is the process that sends or originates the message. The server is the process that receives the message.
- Clients and servers may communicate using TCP/IP and sockets, or other communication protocols, such as Serial and FTP, as long as they perform the same transmit and receive functionality.
- Packetization characters, which identify the start and end block strings, and message acknowledgment format must also be provided.

Standard 4: Purchase line-of-business application software rather than custom developing it whenever possible.

- Purchasing line-of-business application software can permit the state to respond to business needs in a more timely manner than custom developing software.
- Published API's are insufficient because their use requires custom development of state applications and it may be impossible to interface two purchased applications. Use of an interface engine provides greater flexibility.

Technical Topic 2: Data Access Integration

Introduction

Data access is the accessing and sharing of data between legacy, new, and packaged applications. It can be accomplished through several types of data access including data extraction, data replication, and data sharing.

Recommended Best Practices

The best practices in this section pertain to data access integra-

tion.

Best Practice 1: Use as few middleware layers as possible when implementing a database gateway

- Additional layers of middleware in between an application and the database gateway could hinder performance of mission critical applications. For example, an application that needs to access a database gateway can implement an ODBC middleware layer that ultimately accesses the gateway middleware. Application performance can be increased if the application was written to make direct calls to the gateway middleware, omitting the ODBC layer.h

- If there are fewer middle conversion tiers, there are less operational layers to maintain in the event of maintenance or upgrades. For example, if there is a change to a application database location, or an upgrade or maintenance update to the middleware software, it can effect all end user workstations and servers that access that application.

Best Practice 2: Keep the integration strategy as simple as possible.

- The more complicated the strategy, the more difficult it is to maintain and change.

Best Practice 3: Code data integrity verification rules into the DBMS whenever possible, particularly when external users and programs will be writing data directly to the DBMS.

- Since most DBMS vendors can code triggers and rules into the database, it is recommended to use this technology wherever possible in order to ensure data integrity.

- For more information on databases, refer to the Data Architecture chapter.

Best Practice 4: Separate decision support systems (DSS) from online transaction processing (OLTP) databases whenever feasible.

- ?If this practice is feasible, it will reduce the impact of ad hoc and large queries from decision support systems onto production operational application databases that are used by online users for day-to-day operations.

Implementation Guidelines

Once the best method for data access has been selected, the following guidelines may apply:

Guideline 1: Implement a hub topology as opposed to distributed data access topology whenever possible.

The distributed data access topology is where each point-to-point

connection makes sense by itself, but the infrastructure as a whole is a "tangled" mass of connections.

- The star or hub technology is less complex and easy to maintain.

Guideline 2: Use a database gateway technology to combine queries of SQL data with non- SQL data.

- A gateway allows an application to query legacy data.

Guideline 3: Do not use any vendor specific extensions when using a database gateway that uses SQL calls.

Use the industry standard of ANSI Standard SQL

Guideline 4: Once the database gateway product is selected for use as an integration tool, use the gateway from the central IT location whenever possible, particularly in situations where the requirement is to access application data from the central systems/locations.

- Expertise is centralized so the application developers do not have to duplicate efforts and relearn the gateway technology in each department. The departments also do not have to retain personnel with gateway expertise in addition to hardware and software experts to maintain the system.
- Security is centralized and controlled in a unified manner for all departments. With centralized security administration, the effort to limit access to authenticated users of an application is reduced.
- Dedicated gateway servers can be used that are easily administered, monitored and controlled, which contributes to the state effort for performance monitoring, error recovery and disaster recovery.
- The state has to establish a central license agreement that would simplify the addition of users and allows the departments to share the cost of the gateway more economically.

Technical Topic 3: XML

Introduction

XML (Extensible Markup Language) has developed as the defacto standard for business-to-business exchange of data on the internet. It is extensible because it allows users to define their own data and document types. It is a markup language like HTML. A mark-up language is a mechanism used to identify structure. The language requires special markers called tags to be added to text documents to give some added meaning to the document.

Recommended Best Practices

Best Practice 1: Choose XML as a preferred mode for all application integration for new systems, wherever possible

- It is a global standard, meaning that tools and solutions to be used for

developing applications will either be complying with it already or will comply in their future releases.

- This will significantly reduce the cost and effort for building and maintaining interfaces between applications when compared with similar non-standards based tools.
- Apply the normal cost/benefit analysis criteria while using XML

Best Practice 2: Developing the DTD/schemas can be a top down as well as a bottom up approach

Some of the DTD/schema can be defined based on metadata, which have been already defined in the Data Architecture chapter. However, while developing and implementing other state applications, a number of DTD/schemas are likely to be defined and can be made available. These can be added to the standard DTD/schemas which the state can use.

Implementation Guidelines

Guideline 1: Check available/accepted schemas before developing them bottom up

Globally, a number of initiatives are have been underway towards defining DTD/Schemas. These are initiated by various industry groups and address industry specific need for exchange of information. Considerable effort can be saved if some of these schemas can be found to be deployable by the state, either as-is or with some modifications.

Guideline 2: Develop an organization and associated processes for developing and maintaining DTD/schemas, statewide

- Developing DTD/schemas and maintaining them, updating them in view of changing needs of the state will be an ongoing process that will require constant monitoring
- Compliance and enhancements can be enforced better if the responsibility is centralized by the creation of a repository and an organization to maintain it.

Guideline 3: Rely on the network other security infrastructure for building and enforcing necessary secure environment for exchange of data.

- The XML standard addresses data transformation only, hence it relies on other systems for security services.

Guideline 4: Monitor developments on the XML standards development forums.

A number of initiatives are underway on the standards development front. By closely monitoring them, it will be possible to incorporate expected changes into future plans of the state.

Standards

Standard 1: Clearly define and publish DTD/schemas
- This will facilitate their use and re-use
- Give reference to those DTD/schemas which have been developed based on any other globally defined schema, since this will allow incorporation of future changes
- Wherever the DTD/schemas apply for intra-state application, and are not expected to be shared in the public domain, adequate care needs to be taken in publishing them.

Related Information

www.oasis-open.org – Organisation for the Advancement of Structured Information Standards, that creates XML standards

www.xml.org and www.w3.org/xml – the source of information on XML standards, schemas, tools,etc.

www.w3.org/TR/XSL – information on XSL

www.xbrml.org – source for work on business reporting using xml

www.hr-xml.org – source of information on HR related XML schemas

Network Architecture

I. Definition

Network Architecture defines a common, uniform network infrastructure providing reliable and ubiquitous communication for the State's distributed information-processing environment.

II. Introduction and Background

The Network Architecture specifies how information-processing resources are interconnected, and documents the standards for protocols (for network access and communication), topology (design of how devices are connected together), and wiring (physical medium or wireless assignments). The Network Architecture defines a unified, high-speed statewide network based on open systems standards. The biggest benefit to a statewide network solution is the ability to efficiently share information processing resources across the enterprise. Sharing resources is a common theme in all aspects of the Statewide Technical Architecture because economies of scale and efficiencies in operation result from collaborative approaches to technology. When departments share common application services and data, they avoid duplicative efforts and costs. The key to successfully sharing these resources is a network connecting all state departments together in a way that reduces redundancy.

A statewide telecommunications network must be strategically planned, strongly backed, and expertly managed. This network must:
- Utilize standard communication protocols.
- Sustain and support high capacity and high performance

communication.

- Be scaleable, reliable, and extensible.
- Provide a variety of advanced telecommunications functions.
- Smoothly integrate with other private and public communication networks.

III. Principles

The following principles are provided to guide the planning, design, and selection of network technology and services:

Principle 1: A single integrated wide area network (WAN) is the backbone of an enterprise architecture and supports a variety of communication requirements including voice, data, image, and video.

- It allows access to a wide spectrum of information, application and system resources regardless of location or business unit. Thus, access to resources can be obtained in a timely and efficient manner by appropriate requesters when and where needed throughout the enterprise.
- It expands the scope of an organization domain by allowing them to reach out to customers and suppliers through access to the Internet and through the provision of dial-in/dial-out services.
- It acts as the delivery mechanism for the distributed computing services required by the fast paced, dynamic business.

Principle 2: Networks should be available seven days a week and twenty-four hours a day.

- Networks provide an increasingly important and necessary role in the execution of business functions and processes. The availability of the network seven days a week and twenty-four hours a day must be maintained in a consistent and complete manner.
- Networks consist of and rely on many interrelated and often highly complex components distributed across a wide geographic area. Failure of any single component can have severe adverse effects on one or more business applications or services.
- Reliable networks contain no single point of failure. Networks are comprised of many components, and are only as reliable as the weakest link. Reliability must be built-in, not added-on.
- Bandwidth must be sufficient to accommodate new and expanding applications, different types of data (e.g., voice, data, image, and video), and a variety of concurrent users.
- The network must support software distribution and installation to a widely dispersed user community.

- The network must be designed to minimize latency. Data must pass across the network in a timely manner so that business decisions can be based on up-to-date information.

Principle 3: A statewide network must be based on common, open, vendor neutral protocols.

- An open, vendor-neutral protocol provides the flexibility and consistency that allows departments to respond more quickly to changing business requirements.
- An open, vendor-neutral network allows the state to choose from a variety of sources and select the most economical network solution without impacting applications.
- This approach supports economic and implementation flexibility because technology components can be purchased from many vendors. This insulates the state from unexpected changes in vendor strategies and capabilities.
- Applications should be designed to be transport-independent.
- Principle 4: User access should be a function of authentication and authorization, not of location.
- All users must obtain authentication via a user identification method consistent with the standards and usage guidelines set by the enterprise.
- Authorization of users must be performed according to the security rules of the enterprise and the local business unit.
- In order to perform their job functions, users need to access services available from multiple sites within the enterprise, from a variety of public and private networks, and from the Internet.

IV. Technical Topics

Technical Topic 1: Local Area Network (LAN) Architecture

Recommended Best Practices

Recommended best practices assist department staff in the planning, design, implementation and expansion, administration, maintenance, and support of LANs. They are based on experience and proven results. They employ standards and practices designed to support a uniform LAN.

Best Practice 1: Networks must be positioned for future growth in traffic and expansion of services such as voice and video.

- The increasing investment of funds in network infrastructures dictates that the life span of each additional component or enhancement be as long as possible. This can be accomplished if the design supports current needs but includes an anticipated growth potential. For example, installing Category 5 cabling today to run a 10 Mbps network

positions a site to upgrade to a 100mbps speed in the future without replacing the cabling.

- As businesses expand, networks expand. A flexible, open network design will allow a business to minimize the costs and disruptions of configuration management while providing timely and responsive network changes when and where required.

Best Practice 2: Configure all servers supporting mission critical applications, including desktop applications, to minimize service interruption.

- Select a computer constructed to perform as a highly available, highly reliable, fault tolerant server with such features as redundant disk arrays, network cards, power supplies, and processors.
- Select a server with sufficient growth capacity to accommodate the anticipated increase in application requirements over time.
- Formalize security, disaster recovery, and backup procedures to ensure the integrity of both the server and the application. Test those practices on a regularly scheduled basis.

Implementation Guidelines

Guideline 1: Configure the topology (physical wiring) in a Star pattern

- Star topology uses a central hub/switch to which each network device is connected.
- Problems with a connection in a star network only affect that one device.
- A star topology provides the capability to easily add and remove devices as necessary.
- A star topology responds well to dynamic infrastructure changes in order to meet the growing demands of data movement. With ever increasing demands of information movement, more data, secure paths, new paths, and faster access, a star topology allows different, changeable, connections.

Guideline 2: Use switched multi-segment design with managed hubs.

- The hub is an ideal point for network management due to its central location and because all network traffic flows through it.
- Network switches provide the ability to break a network up into smaller sub-network segments.
- Switches can be used in conjunction with hubs. They improve LAN performance. With switching, network traffic is balanced across multiple segments thus reducing resource

> contention and increasing throughput capacity.

- Switching allows networks to assign increased speed or performance capability to particular segments in order to respond to heavy usage or application requirements.

Standards

The following standards have been established to assist departments in the implementation of LANs. The goal is to employ only open systems based on industry-approved standards, but a full complement of open standards does not yet exist for all components of LANs. Therefore, a combination of industry standards, de facto industry standards, mutually agreed upon product standards, and open standards are currently required to support the state's heterogeneous operating environment. All standards will be periodically reviewed.

Standard 1:

The standard for LAN cabling is Category 5, 6, or 7 Unshielded Twisted Pair (Cat 5 UTP, Cat 6 UTP, or Cat 7 UTP). Unless specific needs exist, such as high EMI or long distances, UTP should be considered for the horizontal runs in cable layouts.

- CAT 5/6/7 UTP can be certified to carry 10/100/1000 MBPS of data.
- It is an industry standard wiring plan and has the support of the IEEE.
- Wiring, cable, connector, and equipment vendors have standardized on this cabling.

Standard 2:

The standard for standard link layer access protocol is Ethernet, IEEE 802.3 Carrier Sense Multiple Access/Collision Detection Access Method (CSMA/CD).

- Widely accepted format.
- Reliable, the protocol has been used for years and is very stable.
- Scaleable, faster versions are currently emerging to help manage the increase of data flow.
- 1000BaseT Gigabit Ethernet has the bandwidth necessary to support the needs of future voice and video requirements.

Technical Topic 2: Wide Area Network (WAN) Architecture

Introduction

A WAN is used to connect distributed network sites via private or public telecommunication lines. It typically serves as a customized communication "backbone" interconnecting all of an organization's local networks with communications trunks that are appropriate based on antici-

pated communication rates and volumes between nodes.

Access to the Internet must be obtained from an Internet Service Provider (ISP). With the addition of Internet access, the local network or the enterprise Intranet obtains the ability to connect with other WANs and computer sites throughout the world. While this improves the enterprise's access to information and expanded customer bases, it also increases the enterprises need for security and improved management procedures.

Recommended Best Practices

These recommended best practices assist the state in the planning, design, implementation and expansion, administration, maintenance, and support of an interoperable statewide WAN architecture.

Best Practice 1: Develop one enterprise-wide network infrastructure that is centrally maintained and managed.

- A single uniform network infrastructure allows an enterprise to respond more efficiently when faced with requests by departments for WAN component upgrades and installation.
- A centrally developed and managed infrastructure provides a more cost effective use of infrastructure resources.
- Departments or business units should focus their WAN requirements on functional specifications such as level of service needed, throughput needed, and response time needed. The implementation of an appropriately responsive WAN should be a specialized function performed for the enterprise in its entirety.

Standards

In telecommunications, standards for products and services were created by the originating industry monopoly (i.e., the phone company). Therefore, even though the monopoly has been disbanded, the proven standards that were established have remained. With data communications, however, there have always been many companies offering individual products and services. Therefore, although interim product standards have emerged as one company's product gained market share, there has been a lack of industry level standards. Therefore, until industry standards are established, an enterprise must choose to implement product based standards in order to create a manageable solution to the maintenance and management of its data communications infrastructure.

The following standards have been established for the implementation of department-based components to connect with the statewide WAN. A combination of industry standards, de facto industry standards, and open standards are currently required to support a heterogeneous operating environment.

Standard 1: The standard protocol technology is TCP/IP.

- Open protocol.
- Allows Internet access.
- Allows creation of Intranets and VPNs.

Standard 2: The standard Internet access technology is Domain Name System (DNS) and IP address assignments are provided by the State for those departments participating in the Andhra Pradesh State Wide Area Network (APSWAN).

- State must assign IP addresses to allow LANs access to the AP State WAN.
- It allows a structured naming conviction and IP address allocation for the state's WAN and domain names.

Technical Topic 3: Network-Centric Applications

Recommended Best Practices

This section describes rules of thumb for planning, designing, and managing applications and application components in a networked environment.

Best Practice 1: Include network expertise on the requirements and design teams.

- Including network expertise ensures correct planning, documentation, and standard practices are followed.
- Requirements definition should include application performance, as well as capacity planning for network usage (based on the predicted number and size of transactions).
- Define any special networking requirements or constraints and perform the associated network design before development tools are selected. Otherwise, the tools used may not support the network architecture required to support the business.
- The network can be modified (upgraded) while applications are under development. Performance and the cost to move information should be balanced during application design. Multiple perspectives of a cross-functional group can ensure all viable options are considered.

Best Practice 2: Design network-neutral applications.

- Isolate the application code from the network specific code so business rules and data access code can be redeployed on a different platform, if necessary.
- Code to a middleware API, not to the network API.
- For a network to remain scaleable and portable, applications must be developed without regard to the type of network (i.e. WAN or LAN) they are to be deployed on.

- Network-specific design (e.g., wireless or guaranteed high-bandwidth) should only be performed when business requirements dictate.

Best Practice 3: Minimize data movement.

- When possible, schedule heavy network use for off-peak hours. For example, where requirements for data freshness permit, perform database synchronization at night.
- Data warehouses typically are used for decision support applications requiring large amounts of data to be transferred through the network.
- When replicating databases, consider partitioning and distributing subsets, rather than duplicating the entire master database.
- Decoupling the application layers provide the most efficient use of network resources by allowing the data access layer to be placed near the data.

Best Practice 4: Consider the impact of middleware on network utilization.

- Perform all transaction commits locally, between the resource manager and the queue. Asynchronous store and forward messaging can limit the scope of a transaction.
- Decouple transactions as allowed by business rules. Reconcile data at low-cost times. Using store and forward, work can occur at a site even if the network link is down.

Best Practice 5: When data has to be distributed to multiple points (e.g., software and content distribution), move it once and only once across each data link.

- Use push technology, rather than using client polling. It overloads servers and network links to servers.
- Use multicast, rather than broadcast, to distribute messages to multiple points.

Best Practice 6: When designing distributed applications, make no assumptions about the speed of the network on which the application will be deployed.

Since bandwidth is unpredictable at design time:

- Minimize the amount of data to be moved between components. This will enhance performance regardless of the speed of the network on which the application is deployed.
- Use asynchronous rather than synchronous communications between application components (except in cases where business rules require synchronous communications). This will prevent application components waiting for a response from a server.
- For users and application requests that may be intermittently con-

nected, use store-and forward messaging to communicate with application components.

- When multiple, independent units of work must be performed, initiate all so they can be performed in parallel, rather than waiting for the completion of one before initiating the next.

Best Practice 7: Perform performance measurement and load testing on distributed applications before deployment.

- Measure application performance often, especially before and after any component is moved to a different platform. This helps quantify the performance impact of the redeployment, and helps isolate any problems associated with a network link or platform.
- Use load-testing tools that simulate many users accessing the application. This testing method will provide information that will not surface during single user test scenarios.
- Load testing will identify network bottlenecks (and application bottlenecks) before the application is deployed in the production environment.

Best Practice 8: Deploy heavily used data sources "close" to the applications using them.

- "Close" does not imply physical proximity. It means deployed on platforms that have high-band width connections between them. Do not perform heavy data movement across the WAN during peak hours.
- One of the biggest cost factors in designing a network is the transmission of the data over the communications system.
- For applications requiring very large amounts of data movement, try scheduling the execution of these queries to run during off peak hours to minimize the impact on network performance.

Implementation Guidelines

Guideline-1: Use asynchronous rather than synchronous communications between application components (except in cases where business rules require synchronous communications).

- Asynchronous communications will allow faster application processing, because the application is not waiting on a server response.
- Will allow applications to be used on "slower" WAN links.
- Work can occur at the application site even if the network links is down.

Guideline 2: Where business rules allow, use off-peak hours for scheduled data transfers.

- Allows better utilization of network resources.

- Keeps large data transfers from impacting normal operations and WAN/LAN traffic.
- Will allow commits of a day's worth of work to be processed at one time increasing server response.

Guideline 3: Code applications to middleware APIs where there are no specific business requirements. (e.g., wireless)

- Makes the application network neutral.
- It isolates the application code from the network specific code so business rules and data access code can be redeployed on a different platforms, if necessary.
- Allows networks to remain scaleable and portable.

Platform Architecture

I. Definition

Platform Architecture identifies hardware platforms and associated operating systems supporting the state's business.

II. Introduction and Background

The Platform Architecture describes the platform requirements for building a client/server infrastructure as well as the storage architecture associated in maintaining the data generated. Technical topics to be discussed under platform architecture include client architecture and server architecture.

III. Principles

The principles listed below provide guidelines for the design and selection of platform technology components that will support distributed, client/server computing activities across the state.

Principle 1: Design servers with bias toward granularity in physical servers.

- Using multiple servers from the same vendor with the same operating system release is cost effective because a group of uniform servers is easier to manage and integrate across a wide geographic area and multiple departments.
- A highly granular, loosely-coupled server design supports modular application code sets in an N-tiered application architecture.
- Principle 2: Design mission critical systems without a single point of failure.
- Distributed systems can be designed to be extremely robust.
- Small granular servers make it easier to replicate services for increased availability.
- Systems should be designed to permit continued operations, albeit at reduced throughput, when a server fails in normal operations or in

the event of a disaster.

Principle 3: Design all servers implementing a particular application, application suite, or tier within an application with binary compatibility.

- With binary compatibility, there would be no need to recompile an application for different platforms. For example, if an application that is going to be deployed on servers located in registration department offices, all servers running that application should be binary compatible — this must be ensured even if the platforms are from the same manufacturer.
- The platforms must run the same version of the operating system and must not require any recompilation of the line of business application to deploy from one office to another.
- Total binary compatibility will support automated software distribution across servers and associated strategies which reduce support costs and provide stable computing platforms that can be reliably shared across departments.

Principle 4: Utilize open, vendor-neutral systems standards, wherever possible.

- Open, vendor-neutral systems standards provide flexibility and consistency that will allow departments to respond more quickly in an environment of changing business requirements.
- Vendor-neutral systems support economic and implementation flexibility.
- Vendor-neutral systems also protect the state against unexpected changes in vendor strategies and capabilities.
- Principle 5: Design servers to allow multi-tasking and multi-threading.
- Multi-tasking achieves better CPU utilization.
- Multi-threaded processing enables a server to respond to multiple user requests more efficiently.
- These features also facilitate session management. Fewer sessions to manage provide a more scaleable solution. Multi-threading usually provides capability to execute more sessions i.e., more users can run the same application simultaneously, or several threads of the same application can run simultaneously. The ability to run more sessions or threads would demonstrate a more scaleable solution.

Principle 6: Design servers to be field upgradeable.

- Rapid changes in business processes are enabled in part by implementing a platform technical infrastructure that exceeds the immediate application requirements. This means departments should purchase servers with larger chassis so they

are able to be expanded more easily and cost effectively.

- Field upgradeable servers provide maximum flexibility and adaptability for growth and new functionality.

IV. Technical Topics

Technical Topic 1: Server Platform Architecture

Introduction

In a distributed information-processing environment, there are many different types of servers that support unique activities across multiple platforms. Three key components of servers are file and print servers, application servers, and database servers.

Recommended Best Practices

Recommended practices that assist in the selection, maintenance and expansion of an interoperable statewide server platform architecture are listed below.

Best Practice 1: Run mid-range application and database servers on a 32-bit multi-tasking, multi-threaded operating system, at a minimum.

- Migration from 16-bit operating system platforms to 32- or 64-bit operating system platforms will support faster processing, access to more memory, and better memory and process management.
- In an N-tiered, client/server environment, speed, memory capacity, and memory and process management become increasingly important as processing is distributed across platforms.
- The 32-and 64-bit operating systems provide more stable, reliable platforms in an N-tiered, distributed client/server environment.

Best Practice 2: For reliability and ease of support, place each major application on a uniformly configured server. This may require that each major application be implemented on its own server.

- Use the same reference configuration on these servers. Important items to consider when planning for consistency include using the same versions of network software, using the same network hardware cards, etc.
- Tuning performance through configuration changes can make overall maintenance more difficult. In the long run, it may be less expensive to buy more powerful hardware than it is to spend time on individualized tuning and maintenance.
- The Network Operating System should be considered a major application and run on its own platform.

Best Practice 3: Consider normal anticipated future application growth when determining capacity requirements for server platforms.

- A server platform should be purchased that will accommodate the

current demand as well as support anticipated normal growth without requiring the purchase of a new server chassis.

- Rather than purchasing a fully configured server, purchase the next larger size platform to allow for expansion. This will permit upgrades to an existing platform to accommodate growth rather than forcing the purchase of another machine.

Best Practice 4: Balance business adaptability and ease of systems management with server platform choices. However, when there is a conflict between business adaptability and ease of systems management, the business requirement for providing adaptability should have the highest priority.

- These two goals will always be in conflict.
- The primary design point of the technical architecture is to provide for change in business operations and its supporting applications. Therefore, even though it is easier to manage a large server rather than multiple smaller servers, the business need to provide flexibility should take precedence over any marginal increases in operational costs.

Implementation Guidelines

The following implementation guidelines pertain to the server platform.

Guideline 1: Make server platform decisions after the business makes some basic determinations regarding growth, scalability, portability, and openness.

- Growth: Must the technology accommodate substantial growth beyond present data and transaction volumes?
- Scalability: In accommodating growth, must the technology be able to start small and grow by continuous small increments? Alternatively, is it acceptable for the technology to grow in major, discontinuous steps?
- Portability: Will it be necessary to move software across server platforms at some point in the future?
- Openness: What are the business implications if a proprietary system is used, thus eliminating the option to choose system components from many vendors?

Guideline 2: Consider several criteria when selecting a server platform.

- Packaged software availability.
- Ability to meet business needs.
- Adherence to state standards and direction.
- Cost.

- Availability of skill sets for development on the appropriate platform and for management following implementation.
- Availability of technical support.
- Availability of systems management tools for the platform.
- Service terms and conditions.

Standards

Standard 1: Run Distributed application servers on platforms supporting "open" operating systems.

- Open operating systems are available from multiple vendors, such as UNIX
- Open operating systems run on hardware available from multiple vendors, such as Windows NT.
- Open operating systems are in the public domain, but have significant industry support, such as Linux.

Standard 2: Make sure server platforms are POSIX compliant.

- POSIX is an IEEE standard designed to facilitate application portability and interoperability. This facilitates movement of applications from one platform to another if needed.

Standard 3: Make sure server platforms comply with third party certifications:

UNIX	Microcomputers
Manufacturer is ISO 9002 certified	Manufacturer is ISO 9220 certified
XPG4 Branded UNIX 93	Gartner Group Tier 1 or Tier 2 classified

Third Party Certifications for Client Platforms

This will assure quality of platform hardware and software components.

Standard 3: Avoid proprietary smart cards reader-side APIs.

No standards exist for smart card reader-side APIs for application and platform integration. Use reader-side APIs from established platform vendors, such as PC/SC for the windows environment or use APIs that strictly adhere to the ISO 7816/4 command set.

Technical Topic 3: Storage

Introduction

Platform choices also influence storage selection criteria such as capacity, transfer rate, and cost of ownership. The data transfer rate of a given technology is an important consideration, with users trying to

accommodate limited backup windows (the amount of time per day or per week that the site can take the system offline for backups). A small number of companies have implemented a triple redundancy disk solution so their systems never have to be taken offline for backup.

Standards

Standard 1: Use either SCSI or FC-AL technology for the disk drive interface.

Standard 2: Use RAID with fault-tolerance in the storage subsystems.

Standard 3: SAN based fibre channel technology for large-scale storage deployments running mission-critical applications to be the defacto standard.

Security and Directory Services Architecture

I. Definition

Security and Directory Services Architecture identifies criteria and techniques associated with protecting and providing access to the state's information resources. It facilitates identification, authentication, authorization, administration, audit, and naming services. The state's technological resources must be available to users across the enterprise regardless of location or platform. Therefore, the state must implement security and directory services in such a manner that its information infrastructure is protected and accessible while, at the same time, its functionality is unimpeded and its business services are readily available.

II. Introduction and Background

The purpose of security is to protect and secure the state's information resources in order to provide an environment in which the state's business can be safely transacted. A directory is a natural place to centralize management of security. It is the vault that contains the most trusted and critical components of an enterprise security strategy. This will require authorization and authentication services and a common enterprise repository of digital certificates that secures and supports E-commerce applications. Security services apply technologies to perform the functions needed to protect assets. Historically, such services have consisted of door locks, vaults, guards, sign-in/sign-out logs, etc. As the state performs more business functions electronically, it must transition to security services designed to protect the electronic environment. For example, the use of face-to-face identification must be superseded by an equivalent electronic method that does not require the physical presence of the person.

III. Principles

Principle 1: Apply a level of security to resources commensurate to its

value to the organization and sufficient to contain risk to an acceptable level.

- Security is a business enabler with associated costs. Security costs should be rationalized to the intended benefits.
- Requirements for security vary depending on the information system, connection to other systems, sensitivity of data, and probability of harm.
- Each transaction type will have individual security requirements.
- Security costs potentially increase beyond the value of the assets protected. Don't use more security than is required.

Principle 2: Resetting security assurance levels should not require modification of the architecture.

- Requirements for security vary depending on nature of communication, sensitivity of data, risks to the enterprise.
- Security services should be granular enough to accommodate assurance levels required.

Principle 3: Provide infrastructure security services to enable the enterprise to conduct business electronically.

- An architecture that defines an integrated set of security services permits state departments to focus on the business goals rather than on the implementation of security.
- Integration of security services will enable interoperability and provide flexibility in conducting electronic business across and beyond the enterprise.
- Integration will reduce the costs of protecting the state's resources.
- Integration will increase the reliability of security solutions.
- Centralized Directory services

Principle 4: An accurate system date and time are essential to all security functions and accountability and must be maintained.

- The validity of digital signatures and electronic transactions depends on precise, reliable date and time information.
- Audit accountability relies on placing events sequentially according to date and time.

Principle 5: Base application security on open standards.

- Security services will be provided as infrastructure services. In order to take advantage of security services, application security must be designed for open standards. A clear migration path should be defined for products not yet capable of integrating with the infrastructure security services.
- Products from vendors are often implemented in ways that make it

difficult to integrate these products into an overall security architecture.
- Clear identification of integration issues should be part of the design process. If necessary, a migration path should be defined. When selecting software requiring security, selection criteria must include:
- Strict Adherence to open standards, such as X.509v3 Certificates, SSL, S/MIME, LDAP, and SASL.
- Avoiding platform-specific implementations that inhibit integration.

Principle 6: Locate security in the appropriate layer of a communications protocol to ensure maximum usability with minimum future modification.
- Whenever security is required, the location in a communications protocol will have an impact. The impact may be on performance, reliance on an underlying network protocol, and on developers. Choosing the appropriate layer in a communications protocol will maximize usability and minimize future changes.
- Security services can have an impact on performance. The impact is minimized when security services are located at lower layers of a communications protocol.
- Security services can have an impact on developers. For example, services provided at the transport layer have less impact on application programmers than services that run above that layer.
- Security services can increase reliance on a network protocol. An appropriate choice depends on the communication requirements of the business system.

IV. Technical Topics
Technical Topic 1: Identification
Introduction
Identification is used to distinguish one user from all others. Identification techniques provide a means of gaining entry to the state's resources such as workstations, networks and applications. Identification is closely linked to authentication. Authentication is the process of verifying the identity of a user and is covered in the following section.
Recommended Best Practices
The recommended best practices in this section pertain to security identification.

Best Practice 1: Use risk management techniques when considering biometrics identification.
- Biometrics is an emerging technology.
- Biometrics techniques may vary in success in a real environment. Testing under real conditions may be necessary to determine effec-

tiveness.

- Application integration with biometrics is hampered by a lack of standard APIs.
- Biometrics identification complements and can be integrated with other security techniques such as digital signatures, smart cards and encryption.

Standards

The standards in this section apply to security identification.

Standard 1: ISO 7816 Smart Card standards for contact smart cards.

- ISO 7816/1-4 standards define the electrical resistance, positioning of electrical contacts, communication protocol between card and card reader, and command set recognized by smart cards.
- They correspond roughly to the OSI layered model.
- The command set defined by the ISO 7816-4 standard are included in whole or in part by most smart cards on the market.

Standard 2: ISO 14443A and Mifare Smart Card standards for contactless smart cards.

- ISO 14443A standards for contactless smart cards define the characteristics and communication protocols between contactless cards and card reader. These standards are still in development.
- The Mifare architecture is the de facto global interface standard for contactless and is based on ISO 1443A.
- Contactless cards under this standard use RF power and frequency protocols and cover read/write distances up to 10cms of the reader.

Standard 3: Use PKCS #11 or PC/SC for integration of smart cards and host/reader-side applications.

- PKCS #11 from RSA is a widely accepted standard for integrating smart cards to applications supported by many vendors.
- PC/SC is widely accepted for integration of smart cards on Intel platforms.

Standard 4: Speaker Verification API (SVAPI).

- SVAPI is an API used for incorporating speaker-recognition technology into desktop and network applications.
- A consortium of vendors, technology developers, researchers VARS and end-users developed the SVAPI.
- The SVAPI offers interoperability over distributed environments with related APIs.
- They include SAPI, the telecom industry's S100, a standard architecture for developing computer-telephony applications, and JavaSpeech, a standard for speech recognition using Java.

Standard 5: Human Authentication API version 2.0 (HA-API).

- The Human Authentication API (HA-API) is a generic API designed to allow a common set of instructions to integrate biometrics into applications requiring identification.
- ?It supports the enrollment sampling, processing and verification of biometrics.
- The API supports multiple biometric template types and multiple vendor technologies for each biometric type in one database. This permits an enterprise wide approach to biometric identification while allowing different application-specific biometrics to be used. A single database also facilitates the use of multiple biometrics in a single application.
- The API permits changing the biometric used without requiring application code changes.

Standard 6: Use open standards for smart card masks such as MULTOS.

- Highly secure procedures from manufacturing to card issuer
- Allows multiple applications on the same card, addition and deletion at any point of time during the life of the card
- High application level security
- Manufacturer independent mask supported by several card and chip manufacturers

Technical Topic 2: Authentication

Introduction

Authentication is the act of verifying the identity of a user or process. Authentication answers the question: "Are you who you say you are?" The most common method used to authenticate a user is a password. A password is a secret series of characters and numbers associated with an individual user id by the owner/user.

Recommended Best Practices

The recommended best practices in this section pertain to security authentication.

Best Practice 1: Authenticate users prior to accessing services.

- Allowing only authenticated users to access system resources protects those resources from inappropriate access.
- ?Authenticating users is the basis for providing accountability.

Best Practice 2: Use Public Key/Private Key technology for authentication when digital signatures are required.

- Public Key / Private key technology is the most widely accepted form of digital signatures.

- Digital signatures are central for most electronic business.

Best Practice 3: Use token-based or strong password based authentication where public key certificates are not feasible.

- Token-based systems are an improvement over passwords.
- ?Where token-based identification and authentication is not possible, a password policy based on best practices can provide an acceptable level of security.

Best Practice 4: Use an enterprise-wide public key infrastructure.

- Collaboration and co-operation will be required to support security services across the enterprise.
- ?A unified approach to a Public Key infrastructure enables the state to respond to changing requirements and conditions.
- ?A fragmented approach to a public key infrastructure will complicate administration and management of security across the enterprise.

Standards

The standards in this section pertain to security authentication.

Standard 1: Public Key Certificates (X.509v3)

- Public Key authentication must be based on Public Key Certificates.
- Public Key Certificates must be based on the X.509v3 standard.
- Despite the widespread acceptance of this standard, care must be taken when dealing with vendors. Projects should require proof of interoperability with existing or proposed enterprise implementations using X.509v3 certificates. Proprietary extensions to certificates could inhibit interoperability and should be avoided.

Technical Topic 3: Authorization & Access Control

Introduction

Authorization answers the question: "Are you allowed to do what you are asking or trying to do?" Access to applications, the data they process and database modifications must be carefully controlled. Authorization is the permission to use a computer resource. Access is the ability to do something with a computer resource. Access controls are the technical means to enforce permissions. They allow control over what information a user can use, the applications they can run and the modifications they can make. Access controls may be built into the operating system, may be incorporated into application programs or major utilities, or may be implemented in add on security packages that are installed into an operating system. Access controls may also be present in components that control communications between computers.

Recommended Best Practices

The recommended best practices in this section pertain to autho-

rizatior and access control.

Best Practice 1: Authorize users based on least privilege.
- Authorize users to the minimum set of resources appropriate to their role.
- Authorizing users on least privilege minimizes the impact of security violations.
- Authorizing users to a minimum set of resources necessary to theirfunction makes it easier to establish accountability.

Best Practice 2: Use appropriate security service levels for each part of the technical infrastructure according to enterprise-wide standards.
- Identifying the necessary security service levels allows appropriate choice of a security mechanism.
- A subdivision of infrastructure along security requirements will minimize security management and response to changes.
- A basic level of communication security will reduce the number of applications that must be security-aware.

Best Practice 3: Use open standards-based security solutions.
- Security implementations vary widely. Use of proprietary solutions may make it difficult to adapt to advances in security and standards development.
- Security management across the enterprise requires a consistent and open standards based implementation of security solutions.

Implementation Guidelines

The implementation guidelines in this section pertain to authorization and access control.

Guideline 1: Secure transmission of data where appropriate.
- Data in transit to and from the enterprise must be protected in compliance with legal requirements for confidentiality and privacy.
- Web-enabled applications must protect confidential or critical data from unauthorized access.
- Use secure server-to-server communication to protect confidential or critical data transmission.

Guideline 2: Avoid Virtual Private Network (VPN) solutions for connecting trading partners outside the enterprise that are not IPSec compliant.
- VPN solutions today are proprietary. All outside trading partners are unlikely to use the same or similar technology.
- Most transactions can be done with SSL.
- VPN solutions should be chosen on compliance with IPSec and interoperability among IPSec compliant VPNs.

Guideline 3: Web-enabled applications that require user authentication

should use SSLv3 with client authentication and client public key certificates where appropriate.

- For certain payments over the Web, for example credit card purchases, SSLv3 without client authentication is sufficient protection for client and server confidentiality.
- For purchases or changes to state data, which mandate user authentication, SSLv3 with client authentication should be used.

Guideline 4: Use encryption for stored data or email only when appropriate.

- Encrypted data or email incurs management and performance overhead.
- Encrypted data incurs high overhead to encrypt and decrypt.
- Managing encrypted or archived encrypted data requires effective key recovery and escrow schemes.

Standards

The standards in this section pertain to authorization and access control.

Standard 1: Secure Sockets Layer version 3 (SSLv3)

- SSLv3 is the most commonly supported protocol for communication between Web Server and browser.
- It authenticates the Web Server and optionally authenticates the user browser.
- Current implementations allow for client authentication support using the services provided by Certificate Authorities.

Standard 2: IP Protocol security extension (IPSec)

- IPSec is an extension to the IP communications protocol, designed to provide end-to-end confidentiality for packets traveling over the Internet.
- IPSec works with both the current version of IPv4 and the new IPv6 protocol. IPSec has two modes: sender authentication and integrity but not confidentiality through the use of an Authenticating Header (AH), and sender authentication and integrity with confidentiality through the use of an Encapsulating Payload (ESP).

Standard 3: Cryptography must be based on open standards

- Cryptographic services identified in this document are based on open, industry accepted, standards.

The following business requirements and associated cryptographic standards have received wide acceptability and can be found in most products. Only full strength cryptography should be used. For example browsers are often supplied with weakened versions such as 40 bit DES, RC2 and RC4. Only browsers with full strength keys should be

used for transactions involving the state. Cryptography with variable length keys should use a minimum key length equivalent to 56 bit DES.

Cryptography Algorithm	Standards
Public Key / Private Key	RSA (1024 bit keys), ECC (160 bit keys)
Secret Key	DES, 3-DES, RC2, RC4, IDEA, CAST (minimum DES equivalent or full-length keys)
Message Digest	MD5, SHA-1

Standard 4: Use S/MIME version 3 for securing email communications.
- S/MIMEv3 provides a consistent way to send and receive secure email including MIME data.
- S/MIME defines a protocol for encryption services and digital signatures.
- Email clients should be evaluated for support of the standard and for interoperability.

Standard 5: Services provided through the Internet (Web-enabled applications, FTP, Mail, News, DNS, etc.,) must be placed on the DMZ or proxied from the DMZ.
- Application services must be protected from unwanted external access and must be located on a DMZ or proxied from the DMZ.
- All communication from servers on the DMZ to internal applications and services must be controlled.
- Remote or dial-in access to the enterprise must be authenticated at the firewall or through authentication services placed on the DMZ.

Technical Topic 4: Administration
Introduction

All organizations experience change. Keeping security systems synchronized with that change is essential. For example, employee additions, transfers and resignations must be reflected rapidly. Administration of security in a distributed environment is a complex task. This task includes the means to administer user accounts, privileges, authentication and security policy implementation.

Recommended Best Practices

The recommended best practices in this section pertain to secu-

rity administration.

Best Practice 1: Because security control impacts the entire enterprise, its implementation must be easy to administer, verify, and sustain.

- Administration of user identification, authentication and authorization is required to protect the enterprise.
- In order to sustain security it must be easy to administer.
- The security implementation must be verifiable to ensure continued reliability of the state's IT infrastructure.

Best Practice 2: Identify security policy domains.

- The enterprise is one security policy domain with a specific security policy that must be implemented. Other domains may be executive departments or county and local government.
- Establishing security domains simplifies the analysis of security requirements and focuses attention on security policy requirements.
- Identifying security domains allows policies to be applied at the appropriate locations in the architecture.
- Security policies may vary between domains requiring protective measures or gateways to traverse differences in policies.

Implementation Guidelines

The implementation guidelines in this section pertain to security administration.

Guideline 1: Use role-based administration and multiple security domains.

Role-based administration and multiple security domains are easier to administer and maintain than user-based privileges and single enterprise security domains.

Technical Topic 5: Directory Services
Introduction

The business of the state is becoming more distributed. The state is developing closer electronic partnerships with businesses outside of state government, some employees are mobile users, some employees are working from their homes, and state services are being brought closer to the citizen electronically. This will require authentication services and a common enterprise repository of digital certificates that secures and supports E-commerce applications. Additionally, the state's technological resources must be available to users across the enterprise regardless of location or platform. To meet these goals, an enterprise directory services infrastructure must be in place. The state's technological resources and users are defined to the enterprise directory and appropriate access controls are applied. A directory is a natural place to provide security and it is the most important function it offers. It is the vault that contains the most

trusted and critical components of an enterprise security strategy.
Recommended Best Practices

It is necessary to implement an enterprise directory services strategy in order to improve communications between disparate systems. When planning a project that includes directory services, the strategy must be based on the following best practices to assure its success:

Best Practice 1: Implement a fault tolerant solution to provide 24-hour, 7-day availability to the enterprise directory.

If the directory becomes inaccessible, the resources to which a user has rights become unavailable. Therefore, a directory must be available at all times to accept authentication requests. This can be accomplished with a planned fail-over strategy to ensure that, if one server fails, another backup server can pick up the requests. This should include a replication strategy with hardware solutions that include disk or system duplexing, disk or system mirroring, disk arrays, and UPSs.

Best Practice 2: Purchased applications and operating systems should be directory-enabled.

• Securing applications and their operating environments is a significant challenge. Security is a natural environment for the use of a directory. Applications can authenticate users to an external source by being directory enabled. The directory is better suited to provide information on the level of security necessary. Applications can be further enhanced when they are enabled to obtain an expanded set of information from the directory as appropriate. Thus making applications more modular and consolidating administration to a central location. For example, an application can gather employee information from the user object in the directory. This facilitates user authentication and authorization by making the resources on that platform available to the enterprise, when the appropriate rights are in place.

Standards

Standard 1: Use the statewide directory services infrastructure.
Using the statewide directory services has several benefits:

- The infrastructure is simplified by providing a common interface to view and manage all available resources.
- Directory services are a critical component to statewide initiatives like E-mail and Electronic Commerce. The current enterprise directory is fault tolerant and highly available from any location that participates. Time, distance, and location do not restrict access to the information contained within the services.
- Coordinated directory services will improve communication between

our applications, databases, and network operating systems by providing consistent, reliable information in an efficient and effective manner.

Standard 2: Integrate homogeneous directories into a single tree.

- It is more efficient to link "like" directories into a single tree. Most vendors of directories have implemented either the standards that currently exist or standards that have been proposed. These standards include a mechanism to connect their directories together to build a single tree. This provides the optimum integration of Public Department resources and people without regard to location. A single tree minimizes infrastructure costs while maximizing the potential for departments to choose how they share resources with other departments including local governments. The singletree approach also allows for improved fault tolerance and better performance especially for departments with geographically dispersed operations. Joining a tree, regardless of manufacturer, must be coordinated with Information Technology Services.

- It is necessary to tie these single trees from various manufacturers to the authoritative enterprise directory in order to provide authentication services to the authoritative enterprise directory. However, achieving connectivity from one manufacturer's directory to another is complex and difficult. For example, tying one Netscape directory to Novell's NDS can be done but is difficult to implement and maintain. The state currently has dozens of Netscape directories in place. The process would then need to be performed for each of them. However, tying all Netscape directories together into a single tree is fairly straightforward and facilitated through their product. Then the one Netscape tree can be tied to the one NDS tree. It is a complicated task but it is performed once. Through the Enterprise Directory Services Initiative, this interoperability between dissimilar directories will be implemented. This will be accomplished through the use of meta-directory technologies.

Standard 3: Use the Andhra Pradesh Service Broker (APSB) services for directory functions.

- As in-house applications are developed, we must make use of the services that are already available rather than to constantly build new ones. An enterprise directory services infrastructure provides an addressable security service for authentication and authorization as well as a repository for digital certificates.

- These services are addressable directly from the enterprise directory

or through a service via the Andhra Pradesh Service Broker. For more information about the Andhra Pradesh Service Broker, refer to the Componentware Architecture chapter.

Standard 4: Use the Centralized Metadata Repository directory schema attributes and object classes.

- A directory is basically a database that has been tuned to perform massive reads and infrequent writes. Like other databases in our enterprise, directories and their elements must be centralised. For example, where a person object class may have an attribute of "Pager Number", "Pager Number" should be registered in the Centralised Metadata Repository and populated according to that definition. Therefore, when the directory is queried for that information, the data returned will be as expected. In the past there has been a tendency to populate currently unused directory attributes with data that is not consistent with that attribute. For example, there may be a requirement to enter a pager number in the directory for a user. If there is no attribute for "Pager Number", there may be a tendency to select an attribute that is unused such as "Title". Instead, extend the schema to include a new attribute that precisely defines the data that will be placed there and register it with the Centralised Metadata Repository. Do not store inconsistent information in an unused attribute.

Standard 5: Populate directory objects according to the minimum attributes defined in Distributed Computing Standards and Guidelines.

- Any data source is only as good as the data it contains. If that data is missing, incorrect, or incomplete, the data source cannot be depended upon as an authoritative source for that type of information. A directory is no different. Directories have become much more than an authentication point for network users. In order to supply information on our users, network devices, and organizations, directories must be built in as complete and reliable manner as possible.

Standard 6: Use Lightweight Directory Access Protocol version 3 (LDAPv3) for directory access where strong security is not required.

LDAPv3 is the industry standard lightweight access protocol and does not offer strong authentication or access controls. However, LDAPv3 can provide standards based access to directories for lookups, as a communication mechanism for synchronization tools, public key retrieval, and others. Commercial off-the-shelf (COTS) applications often require their own directories. Access to the application directory from outside or for the application to communicate with an external directory will require a standards based approach. Therefore, when purchasing COTS applications,

LDAPv3 compatibility is required. LDAPv3 also provides a standards based access to the directory for lookups, as a communication mechanism for synchronization tools, public key retrieval, and others.

Systems Management Architecture

I. Definition

Systems Management Architecture defines the framework for efficient and effective management of the state's distributed information processing environment in order to support and enhance the productivity of its automated business systems.

II. Introduction

The state's Systems Management Architecture is the framework that identifies the requirements for managing and supporting the enterprise-wide technical architecture with primary emphasis on centrally managing distributed systems at geographically disbursed sites. Resources managed include the systems, databases, applications, networks, and Internet components necessary to conduct the automated business functions of the state.

III. Principles

Principle 1: Business needs should have priority when making systems management decisions.

- System management must facilitate the business process. Business unit needs should play a primary role when identifying requirements and selecting technology and applications. Business units are assuming a larger role in driving technology selection and its application. ??Whenever a business need conflicts with a systems management need, the business need must take priority.
- Business units should have as much autonomy as possible to select applications that meet their needs. As long as the business functionality justifies the cost and the business unit is willing to pay the price, then the selected application is acceptable. Support costs should be considered by the business unit.
- To support business processes, systems management must focus on increasing system stability and availability while reducing costs. It can achieve these goals by setting standards, establishing guidelines and centralizing systems management functions along business functional lines.
- Centralization/standardization should occur within a business function. However, a single standard does not apply to all lines of business. For example, all operators using the same system should have a minimum standard hardware and software configuration to meet

their needs. Operators using other systems may require different tool sets to meet the needs of their unique business applications. Configurations can be different, however all configurations can be based on the same architectural components.

Principle 3: Limit the amount of "unique" performance tuning to existing individual network components, particularly servers and desktops.

- Performance tuning for unique/non-standard components is not worth the increased maintenance costs of multiple configurations.
- Performance tuning can inhibit change by encouraging comfort with the status quo.
- It may be cheaper to increase performance by upgrading to an architecturally compliant hardware configuration than to spend time tuning an application.

Principle 4: Increase capital investment when it offsets long-term support costs.

- Identical configurations are easier to support. In the long term it may be much more expensive to support multiple types of configurations than it is to invest in replacing them with consistent configurations.
- Purchasing hardware that exceeds the immediate need often saves money in the long run, as it promotes expandable systems and reduces the need for tuning and support.
- It is more cost effective to use capital dollars to improve operations than to spend support dollars on outmoded technology. The cost of continuing to support an aged configuration is often higher than the cost of new equipment that will improve performance and reduce support costs.
- The practice of using "hand-me-down" equipment perpetuates obsolete technology and can greatly increase the support burden by increasing the number and kind of devices requiring support and its associated costs.
- Principle 5: Utilize open, vendor-neutral standards whenever possible.
- Open, vendor-neutral systems standards provide flexibility and consistency that will allow departments to respond more quickly to changing business requirements.
- Vendor-neutral systems support economic and implementation flexibility.
- Vendor-neutral systems also protect the state against unexpected changes in vendor strategies and capabilities.

IV. Technical Topics

Technical Topic 1: Help Desk

Recommended Best Practices

The following practices are recommended to develop a service-oriented help desk.

Best Practice 1: The help desk and user support functions must be re-engineered to provide an integrated support services environment.

- The central help desk provides the focal point to mediate problems.
- Support tools should empower both the help desk analyst and the end user with self-help capabilities.

Best Practice 2: A single consolidated help desk design supports an enterprise model.

- A consolidated help desk does not have to be physically located in one place. However, it should have one constituency, one phone number, one set of procedures, one set of defined services, and one set of integrated network systems management (NSM) platforms and applications.
- The implementation of the virtual data center (VDC), where many remote LANs are managed as a single entity, supports the corresponding development of consolidated help desk services.

Best Practice 3: Each centralized help desk unit must provide a single point of contact (SPOC).

- A SPOC minimizes user inconvenience and confusion. In its broadest sense, SPOC means that the end user makes one attempt at contact and the help desk request is channeled by some automated means to the organization that can best service the request.
- The help desk should mediate all problems.

Best Practice 4: In order to leverage support resources and provide effective client support, multiple tiers or levels of client support are required.

- Tier/Level 1 client support should have end-to-end responsibility for each client request. The help desk analyst should be empowered to resolve as many requests as possible. Tier 1 provides the client contact point (CCP) or call ownership, which is the single point of contact for the end user to request a service. Organizations should retain control of the Tier 1 help desk in order to ensure the quality of the customer relationship.
- Tier/Level 2 client support provides advanced technical expertise to the tier/level 1 client contact points. Their responsibility is to analyze the requests routed to them and resolve the problems. Resources at this level can be composed of staff specialists and/or third party providers/vendors.

- Tier/Level 3 support is composed of highly specialized technical experts. Calls which cannot be solved at tiers/levels 1 and 2 are routed to this level. Resources at this level can be composed of staff specialists and/or third-party providers/vendors.

Best Practice 5: Geographically dispersed help desk units must interoperate and share information.

- All requests for service should reside in a database that is shared by technology and application-based help desk units serving specific constituencies throughout the state. This process shares information and makes it possible for one help desk to electronically pass a service request to another help desk without forcing the user to make another contact attempt.
- The use of technological advances, such as distributed processing, dynamic control of users desktop, improved telephony, and client support software, make it possible for geographically dispersed help desk groups to function as a cohesive support unit.

Best Practice 6: Resolution databases that contain solutions to recurring problems should be built to improve service quality and contain costs.

- Building and using a knowledge base of prior resolutions to solve problems improves the quality of resolutions.
- Help desk operations should include problem resolution links to external systems.

Implementation Guidelines

Guideline 1: Consolidate help desk services when common functions are being supported across business units

- Support resources can be leveraged more effectively when support for common functions are consolidated.

Guideline 2: Link support functions together electronically

- Service requests or problems often begin with one help desk and require the services of another help desk. Support hand-offs and tracking are made more effective when linked electronically.

Guideline 3: Provide a single point of entry per constituency.

- A single point of entry function, responsible for resolving customer needs and routing cases to the appropriate function, reduces customer issues associated with locating and obtaining support.

Guideline 4: Identify common data elements. Enable electronic interchange of problem and solution information.

Common data elements facilitate the electronic interchange of problem and solution information because translation of data definitions is not required and information can be more easily re-used.

Technical Topic 2: Operations Management

Introduction

Encompasses the coordination of system and network resources throughout the enterprise. Its goal is to provide reliable availability for mission critical systems. It includes job scheduling to coordinate jobs and processes in the distributed environment, fault/event management, configuration management, backup and recovery and automated software distribution.

Recommended Best Practices

The following practices are recommended for successful operations management.

Best Practices 1: Equipment deployed in virtual data centers must be configured to facilitate remote management and support.

- The VDC should be configured to prevent a single point of failure.
- Identical configurations of rack-mounted servers are placed in secure locations (closets).
- For reliability and ease of support, each major application should be placed on a uniformly configured server. This may require that each major application be implemented on its own server.
- Use the same reference configuration on these servers. Important items to consider when planning for consistency include using the same versions of network software, using the same network hardware cards, etc.
- Systems management tools, consistently applied, allow management of multiple instances of the identical network configurations at remote sites as if they were on the data center floor.
- The VDC should support mission critical applications.

Best Practice 2: Systems management functions for the virtual data centers should be remotely performed.

Some examples of remote systems management services include:

- Backup, archiving and recovery
- System, database and application monitoring
- Software distribution to the server and/or desktop

Best Practices 3: Under the Virtual Data Center concept, responsibilities of customers for systems management are limited.

- Even though the equipment is located close to the customer community, for the most part, local user efforts should be concentrated on performing their business functions rather than on system management tasks such as system configuration, debugging and/or backup.

Best Practices 4: System components should proactively alert in advance of failure including predictive capability.

System generated alarms and alerts should be automatically routed to the appropriate systems management resource. For example:
- Database problems should be routed to the database support group.
- PC hardware problems should be routed to PC support.
- Agents should be able to issue alerts for both hardware and applications.

Best Practices 5: Inventories of hardware and software configurations should be maintained real-time.
- Inventories of configurations are critical to support functions
- Inventory capability requires 'agents' on workstations and servers.

Implementation Guidelines

Guideline 1: Centralize remote systems management for mission critical applications
- Systems management components are infrastructure and can be leveraged to provide common functionality to multiple business functions.

Guideline 2: Implement products that use standard protocols and interfaces.
- Use of standard protocols and interfaces promotes interoperability among management products and can reduce required core management infrastructure e.g., management consoles and products.

Guideline 3: Use integrated management suites. Use best-of-breed point products when the integrated management suite cannot substantially meet the business requirements.

Use of integrated tools reduces the costs associated with implementation and support. Common methods and procedures are used for bringing managed objects into the management framework and for ongoing management of these objects.

Guideline 4: Use a Relational Database Management System (RDBMS) as the underlying store for managed objects, policies, events, and alerts.
- Use of an RDBMS facilitates access to management data for functions beyond those provided by the management framework e.g., query and reporting tools.

Standards

The following standards have been established to support operational systems management for the enterprise.

Standard 1: Use SNMPv1 (simply called SNMP) protocols.

- The Simple Network Management Protocol (SNMP) is a group of internet protocols that is the standard for managing TCP/IP based networks.
- It is built into the devices (e.g., concentrators, routers) in the network and in the network operating systems of the servers and workstations.
- The network management system uses SNMP to collect statistics and other information on network devices.
- SNMP is also used to send commands that control the state of network devices.

Standard 2: Use Remote Monitoring (RMON) products.

- RMON products are predicted to become increasingly used in most enterprise networks.
- RMON products provide packet collection, decoding and analysis to the MAC layer of the Operating Systems Interconnection (OSI) stack using a combination of consoles and hardware and software probes that relied on SNMP MIB data collections.
- In 1992, the Internet Engineering Task Force, IETF, specified the RMON1 standard in RCF 1271. The RMON1 MIB extends SNMP capability by monitoring sub-network operation and reducing the data collection burden on management consoles and network agents.
- The RMON2 standard was approved by the IETF in January 1997 in RCF2021. RMON2 includes a new MIB to extend network monitoring into the application-monitoring layer.
- RMON functionality is growing to include functions like applications monitoring, report generation and bandwidth allocation.
- All major network device vendors have added RMON MIB collection capability to their products, although the depth of implementation relative to the full RMON specification varies among vendors and products.

Standard 3: Conform to the Desktop Management Interface (DMI) standard.

- The DMI standard was developed by the Desk Top Management Task Force (DMTF), which sets specifications for the management of the desktop environment.
- The DMI is a set of API's that allow different vendor applications to consistently share the desktop.
- It sets the standard for a management platform that enables a common standardized mechanism for systems management of the desktop while permitting vendor differentiation.

- As vendors build desktops with embedded DMI standards, important desktop management information will become available from the newer desktop units.

Technical Topic 3: Storage Management
Introduction:

The use of storage management to control the costs of expensive hardware resources has been in place on host systems for many years. In these situations, a strong approach to storage management has allowed IT departments to maintain a minimal amount of hardware expense and best utilize the storage space available for more immediate uses. IT departments have taken advantage of other less expense alternatives (ie. Tape, Fiche, etc.) for storing older data that is not accessed as often. In many cases, the process for retention and storage is automated to the point of being able to access Terabytes of data quickly without having the high cost of storage to maintain it.

Recommended Best Practices

The following practices are recommended as guidelines for developing a storage management process within distributed systems.

Recommended Best Practice 1: Structure for audit and policy management

Systems and tools selected for distributed systems should be deployed with tools for auditing and managing storage processes. This would include the following areas:

- Auditing and Reporting on space usage, aging of data/files, and ownership of data
- Trend reporting for space usage to plan ahead for future needs
- Set policy guidelines and auditing for user retention of data

Recommended Best Practice 2: Implement Archival routines for aging of data

Leveraging archival of old data will reduce search and fine of current information, along with maintaining cost effective storage. This is appropriate for both user and system data.

- Implement consistent routines for removal of backup (.BAK, etc.) and log files
- Structure appropriate rights and expectations regarding public stores
- Outlines archival rules for old data, communicating the aging process and where backups of the data would be stored
- Verify the archival process maintains a minimum of 2 backups (separate media) of files before deleting these items. This will

protect faulty recovery or failure of the media (ie., Tape break, etc.)

Recommended Best Practice 3: Design an accounting process around data

Future requirements for allocating costs and tracking against users/departments will require the use of an "accounting" tool for storage costs. This can then be used to "charge" for space in the future should business needs require this internal accounting.

- Initially, setup rules and processes for accounting of space usage (automated)
- In the future, design accounting process by user/group/business unit and leverage reporting to track costs of the systems towards their proper owner
- Leverage this information on the short-run for identifying high-cost owners and abusers of space requirements

Technical Topic 4: Performance Monitoring and Tuning
Introduction:

Performance tuning in the host environments has been a very important requirement, as IT departments attempt to manage the high-cost devices put into their environments to keep users functioning at top speeds and capture issues early in their development.

Recommended Best Practices

The following practices are recommended as guidelines for the process of performance monitoring and tuning.

Recommended Best Practice 1: Develop and maintain simple designs

An attempt at tuning can often generate worse results when engineers try to make changes that are unproven. The focus of IT should be to minimize changes from the industry defaults/standards unless such change is warranted and proven as appropriate. Changes in defaults are often of little value and always result in future work to keep the standard in place. Some issues to remember:

- Maintain default values unless tested and proven, or instructed from appropriate resources within the product vendor
- Document changes from defaults and reasoning for changes in a Change Log Manual
- Review changes semi-annually and determine if additional issues should be reviewed or updated

Recommended Best Practice 2: Structure an automated Report Card/

'

Dashboard

To track performance and/or tuning results, interface all areas toward a central repository and owner, with appropriate authority granted to the person.

- Outline a common report cared for monitoring performance results, and provide online via Web-services
- Determine method of tracking a "dashboard" for current values and issues within the system.
- This can coincide with the report card but should be managed and implemented differently due to the timeliness of data from these mechanisms
- Publish SLAs for both expected results and actuals, and educate the staff on their meanings

Recommended Best Practice 3: Outline and Communicate the Maintenance Schedule/Process

All systems require periodic maintenance, enhancements and changes. Distributed systems required consistent maintenance also, which involves scheduled downtime. It should be communicated to the user community and followed appropriately to ensure the maximum availability for users and mobile staff.

- Outline the expectations and schedule for maintenance and communicate to the users
- Provide a change management process for testing and implementing maintenance that does not impact the users negatively and reduces risk of a poorly implemented change

Recommended Best Practice 4: Leverage the central console/control center

Performance monitoring is a 24x7 operation that requires skill development and significant investment to the structure. The control center must be staffed and equipped to do this analysis periodically. This would include:

- Performance trending, paying close attention to affects of spikes in activities
- Monitoring different activity impacts, based on hardware (diagnostic), wire (performance), Internet (activity), and desktop (application) needs. These needs will vary and change based on user requirements
- Outline audit and security measures that identify proper processes for ill-advised activities and breaches of secure solutions
- Quarterly reviews of these trends, and a review of the analysis topics to identify new areas that should be monitored

Conclusion

IT Architecture is the framework and the basic facilitating foundation to implement all kinds of software technology and in this respect one could see the relevant and enormous IT Architecture that has been established in the State. It functions as arteries for introduction and use of software technology. One could see the enormous effort made by the state as one of the principal factors in realizing VISION 2020.
(Source:- http://www.ap-it.com/adoptitarchitecture.html)

8
INFRASTRUCTURE PROJECTS IN AP (HITEC City, APSWAN, TELEMEDICINE, COMPUTER LITERACY)

HITEC CITY
Concept
To Provide World Class Infrastructure Facilities for the IT industry under one roof.
HIGHLIGHTS
HITEC City is a state-of-the-art Information Technology Park - Spread over 151 acres - 5 million sq.ft. of office space and world-class infrastructure:
- Being built in a phased manner at a cost of US $ 375 million
- 50% on built up space (i.e., ready to occupy and multi-tenanted buildings)
- 50% as independent campuses to customer specification

Scope for continuous expansion-with the developed taking place in a phased manner, office space will be continuously made available for the next 6-8 years, facilitating companies to expand within HITEC city.

Seamless data and voice communication - through multiple service providers

Uninterrupted power - high quality and dedicated power through redundant feeders, with Diesel Generator back up

A home next door - Residential Township of independent bungalows and apartment complexes proposed to be laid out across adjacent 87 acres of land.

Single - window clearance - Dedicated STPI cell for accelerated software exports and streamlined hardware imports

Host of incentives - by state and central governments
FACILITIES
HITEC City spread across 151 acres of land for commercial development, has the best facilities and amenities, enabling hassle free operations
Infrastructure
Power - quality uninterrupted power
- Dedicated 132 KV sub-station for the entire project. Incoming redundant feeders ensuring uninterrupted supply.

- Diesel Generator back up in all multi - tenanted buildings for 100% backup
- Whole of HITEC City networked through underground power cables
- HITEC City exempted from statutory power cuts
- 24 hour maintenance services

Communications - seamless connectivity - Entire HITEC City networked through optic fibre backbone - VSNL communication center is on the 6th floor of CyberTowers, of HITEC City,providing satellite connectivity via roof top standard station for direct international access.	Software Technology Parks of India STPI, Hyderabad provides high-speed data communication links to USA, Europe and Asia.
VSNL's gateway building for Hyderabad region is located just opposite to CyberGateway building.	It provides free internet services through the international gateway (IBS Satellite Station) and point to multipoint access radio system (For local loops) located at Jubilee Hills, near HITEC City.
VSNL also provides dedicated OFC leased lines upto VSNL Mumbai and further links to international destinations via sub-marine optical fiber links.	STPI also has a communication center on the 6th floor of CyberTowers, providing data communication services through roof top earth station.
VSNL Hyderabad Gateway and earth station in CyberTowers are connected by 140 MB OFC link	
Services - Point to point line circuits, Internet leased lines,Video conferencing facilities, etc.,	Services - Point to point line circuits, Internet leased lines, Video conferencing facilities, etc.,

Bharat Sanchar Nigam Limited - 4000 lines exchange in HITEC City
Services - Basic telephony (on demand), ISDN, Data Services, Point-to-point lines, Dial-up Internet services, Centrex, etc.

BUILT UP SPACES

HITEC City offers multi-tenanted ultra modern corporate complexes, which are tailored to meet the requirements of IT and IT enabled services companies. These facilities are totally self-contained with state-of-the-art infrastructure and amenities,

HITEC City has two complexes as on date,

- **Cyber Towers** with 580,000 sq.ft of office space, spread across 6 acres of land and
- **Cyber Gateway**, a trapezoidal structure with 866,000 sq.ft of office space, spread across 8 acres of land
- Other future multi-tenanted buildings will follow

Built to suit facilities

An ideal choice for IT companies which require independent campuses. A total of 67 acres of land is reserved for corporates seeking to develop independent, customized facilities. The plot sizes range from 1 - 5 acres, which come with built-in infrastructure.

- Underground power supply
- Data & Voice connectivity from respective service providers to each plot
- Roads and street lighting
- Water and sewerage network
- Parks & landscaped gardens

All that the companies have to do is select the plot of their choice, give their specifications & design requirements and leave the rest to L&T Infocity

ADVANTAGES

- Assured quality of construction by L&T, a company reputed for some of the finest landmarks in the country
- Option to have L&T Infocity as Operation & Maintenance (O&M) Manager for the independent facility
- Access to world-class amenities in HITEC City - star hotel, club house, convention center, shopping areas, gardens & parks, medical center, fuel station, etc.
- Option to expand as the company grows, as L&T can take up construction in different schedules, meeting the company's space requirements

RESIDENTIAL FACILITIES

- Proposed in adjacent 87 acres of land comprising of apartment complexes, independent bungalows, condominiums, service / studio apartments, etc., with all the facilities and amenities for comfortable living.
- Residential Township can be fully wired (LAN) and integrated with office complexes in HITEC City.

MAN POWER

Abundant IT Talent: 13000 IT engineering students, equal number of Master of Computer Application (MCA)'s graduates and under-graduates with computer programming skills pass out of premier institutes in Andhra Pradesh every year. Equally notable is the fact that manpower costs are the lowest in the country.

Thrust on training Indian Institute of Information Technology (IIIT) incorporating schools of IBM, Oracle, Motorola.., Indian School of Business (ISB) incorporating. Walton, Kellogg's and London School of Business are examples of availability of quality training facilities in Hyderabad.

Thrust of research Hyderabad is an established research and development center in areas of Aviation Industry, Missile Technology, Information Technology, Remote sensing, Crop Research, Biotechnology, Metallurgy, Electronics, Heavy Engineering, etc. some of the prestigious organizations with base in Hyderabad are Defense Research Labs, Nuclear Fuel Corporation, National Remote Sensing Agency, Hindustan Aeronautics, Electronics Corporation of India, International Crop Research Institute Semi-Arid Tropics, Indian Immunology, Mishra Dhatu Nigam, Bharat Heavy Engineering, Dr. Reddy's Labs, Santha Biotech, Bharat Dynamics, Indian Drugs & Pharmaceuticals, Central Institute of Tool Design, Hindustan Machine Tools, Microsoft India R&D, etc.

Statistics - Institutions and annual intake (for entire Andhra Pradesh state)

CITY INFRASTRUCTURE

The district of Hyderabad, comprising of the tri-cities Hyderabad, Secunderabad and Cyberabad, is

- Spread over an area of 224 Sq. Kms, has 3000 Kms of road network including arterial roads, sub-arterial roads and local streets, 21 flyovers... for a population over 5 million
- Has more than 28 flights, 160 trains and nearly 2000 buses connecting Hyderabad every day with other parts of the country.
- Around 2500 city busses, 4500 taxicabs and nearly 50000 three-wheeler autos.

- Tourist arrivals in Hyderabad - 1,755,057 (Indians) and 43,526 (Foreigners) per years
- Optic fiber linked telephone exchanges with Telephone density of 11.8 per 100 people, · 3000 Mega watts installed capacity of electric supply
- Water supply from perennial river Manjira, flowing 50 Kms away from the city. Alternative water supply from Himayat Sagar and Osman Sagar reservoirs.
- Abundant tourist and recreational facilities like Ramoji Film city on 2000 acres, Salarjung Museum & State Museum, Golconda fort, Shilparamam, Ocean park, etc., above all 120 cinema halls, hundreds of Restaurants, fastfood joints, pubs etc, make Hyderabad an ideal location with comforts.
- 60 multi-specialty Hospitals - Osmania General Hospital, Gandhi Hospital, CARE, Mediciti, Apollo, L.V. Prasad Eye Institute, Nizams Institute of Medical Science (NIMS) etc.,
- Hyderabad is also successful in bagging the "CLEAN AND GREEN CITY OF INDIA" award for the three consecutive years beginning 1997.

An International Airport is coming up on 5000 acres of land in "Greenfields" near Shamshabad, 25 kms from the central business districts.

Category	Computer Related Courses		Non-Computer Courses		Total	
	No. of colleges	No. of Seats	No. of colleges	No. of Seats	No. of colleges	No. of Seats
Engineering	96	10900	105	19225	201	30125
M.B.A	117	6710			117	6710
M.C.A	161	6440			161	6440
P.G.courses	93	3720	172	17565	265	21285
B.C.A	469	18740			496	18740
U.G.Courses	520	45360	986	214820	1506	260180
B.A	62	2280	892	65736		68016
B.Com	184	7360	880	68952		76312
B.Sc	474	35720	846	80132		115852

Master of Business Administration-MBA
Master of Computer Applications-MCA
Bachelor of Computer Applications –BCA
Bachelor of Commerce-B.Com
Bachelor of Science-B.Sc
Bachelor of Arts-B.A

Hi-Tech City Phase-II

An Integrated Techno Township - A Concept that provides World Class Infrastructure Facilities for the IT Industry under one roof

- Cyber Gateway
- Independent Developed Plots
- Major Incentives by Govt. of A.P.
- Private IT Park

Encouraged by the success of the first phase, the development of the Phase II is proceeding at an even faster pace. One hundred and forty-five acres of land has been taken for the Cyber Gateway and developed plots (for customized facilities)

Cyber Gateway, the next building in HITEC City, will offer 0.87 million sq. ft. of built-up space developed on 8 acres of land and comprising four blocks. The first block of 0.23 million sq. ft. was made available for occupation in February 2001 with a subsequent block being added by Aug 2001. The building shall have all the required facilities such as assured power supply, centralized air-conditioning, data and voice connectivity and building automation. Substantial space in the first two blocks has been committed to GE Capital International Services, GE Software Services, Oracle Corp., Indian National Centre for Ocean Information Services, FVC. Com, LT Solutions, Shonkh Technologies, Snaz Technologies, Software Development Technologies, etc. and bookings are on for the balance space in the facility, on first-come-first-serve basis.

Independent Developed Plots

- Total Area of 67 Acres
- Independent Plots of sizes ranging from 1 - 5 acres· Basic Infrastructure provided for each Plot
- Development of Land By L&T Infocity Ltd
- Construction of independent facility by L&T Infocity as per design and specifications of Client

Major Incentives by Govt. of A.P.

- Rebate on Land Price linked to Employment Generation
- 100% Exemption of Stamp Duty on Built up space
- 25% Rebate on Power tariff for new facilities

- 20% Investment subsidy· General Permission to run 3 Shifts
- Self Certification for various industrial acts

HITEC City, because of its magnitude and flexible options, offers a matrix of choices to companies and takes care of their growing business needs, better than any other IT park. The entire township of HITEC City will be maintained by L&T Infocity Limited to international standards.

CYBER PEARL - HI-TECH CITY PHASE-III

L&T Infocity and Ascendas Pvt. Ltd. a subsidiary of JTC Corporation are developing a new multi-storey IT complex called Cyber Pearl at HITEC City to meet the brisk demand for IT-related space in Hyderabad.

Cyber Pearl will be developed in two phases to offer a total of 500,000 sq ft of business space on a 5-acre plot. The total project cost is about S$45 million. The first phase, offering 250,000 sq ft of space, is scheduled for completion by the first quarter of 2004. The next phase will commence soon after, with the anticipated high demand for Grade A business space.

Cyber Pearl is being developed under a 50:50 joint-venture partnership with L&T Infocity Ltd, the developer of the 151-acre HITEC City. To date, HITEC City already has a community of over 8,000 people working for a mix of multinational corporations and Indian corporations residing in the business park.

Cyber Pearl will come fully equipped with infrastructure such as uninterrupted power and water supply. Telecommunication and fibre optic networks will also be provided to ensure connectivity round-the-clock. When fully operational, Cyber Pearl is expected to house a workforce of about 5,000 people employed by software design houses, call centres and other IT-enabled service (ITES) companies.

Reflecting the brisk uptake in India's fifth largest metropolis, 18 new companies were registered under STPI (Software Technology Parks of India) Hyderabad in the three months between April and June 2002. Today, Hyderabad is already a base for industry leaders such as Microsoft, Oracle, GE Capital, Ericsson and Baan.

Cyber Pearl is a joint-venture agreement signed between Ascendas and LT Infocity. Ascendas will provide its full range of expertise in development and project management, as well as the operation and maintenance of the development. LTIL Infocity will contribute through its strong customer base and also draw upon its strengths in detailed architectural and engineering design and turnkey construction.

Building facts:

Type of Building: 7-storey building with basement and surface

car park: well landscape with water features cooling the internal courtyard and lush planting providing a contrast to the surrounding dry and arid terrain.

Type of Premise: ITES and IT Office Space? Bare units for tenants to fit out to their requirements- ideal for call centres and software offices.

Total Lettable Floor Area: Approximately 17,660sq m or 190,1000   sqft.

Car parking: 148 nos of basement car park lots and about 100nos of surface car park lots.

Expected Completion: 1st Quarter 2004

Building Specifications:

Floor-to-Floor Height: Ground Lobby- 5.0m 1st to 6th Floor? 4.25m

Floor to Ceiling Height: Ground Lobby -3.5m

Typical Column-to-Column Width 1st to 6th Floor? 2.7m 11m x 11m

Amenities: Cafeteria and retail Shop

Facilities for Units: Centralized air-conditioning, automatic fire sprinklers, ready to fit-out units

Telecommunications: Each floor to be provided with 200 pairs cables (Total4800 telecom lines from DoT) for Voice/ Fax, Email ISDN, Video Conferencing, STD /ISD

Data Communications: VSNL / Other ISP's, backbone cabling with 2-core single mode, optical fibre cable to the building

Power: Dedicated 33 KV/11Kv , 6/8 MVA Capacity. 100 % DG Power backup

Lifts: 3 Passenger Lifts? Capacity for 20 persons 1 service lifts -2000Kg (Source:- http://www.ltinfocity.com/html/hitec.htm)

FAST TRACK - MEGA PROJECTS

There are several new projects going on in IT arena which are contributing to the progress of IT in Andhra Pradesh.
To view the details click on the respective projects

Sl. No.	Name of the Project	Project Details	Project Cost(Rs in crores	Promot-ers Name	Regis-tered Address	Fact Address
1	I-Labs	Software Development center in the area 6 acres in Madhapur, with potential to provide employment to 3000 persons by 2003 in the field of Com-munication, e-business Solutions, Interactive Voice, bio-Informatics health Science	500	Mr C.Srinivas Raju	Plot No.97, Road No.3, Banjara Hills, Hyderabad Tel:+91-40-3352900 info.hyd@i-labs.ws	Plot No.97, Road No.3, Banjara Hills, Hyderabad Tel:+91-40-3352900 info.hyd@i-labs.ws

2	Sanali IT parks Pvt. Ltd.	Construction of Software Park in the area of half a million Sq.ft in Banjara Hills/RTC Cross Roads	153	Mr. Md.Nooral Haq	D.no 8-2-120/113 Road #2 Banjara Hills, Hyderabad Tel+91(040)-3226959	D.no 8-2-120/113 Road #2, Banjara Hills, Hyderabad Tel+91(040)-3226959
3	Co-options Technolo-gies Ltd.	Implementation of PACT 2000 product in the state in coop-erative depart-ments	80	Mr. Yedavalli Subrah mayam	Plot # 94 Mithila Nagar Colony, Road#12 Banjara Hills Hyderabad Tel:+91-(040)-6576717 csridhar@ cooption stech .com	Plot # 94 Mithila Nagar Colony, Road#12 Banjara Hills Hyderabad
4	Teamasia Lakhi Semicon-ductors Ltd.	A manufacturer of Semiconduc-tor Products, Proposes to Manufacture 6" wafer fab, employing Manpower of 650 people	200	Mr. P.Subba Rao	3rd Floor, Munawar Cham-bers, Somajiguda, Hyderabad	IDA Pathan Cheru, Medak Dist-AP Tel +91-(08455)-42032 cvivek@ tamasia. co.in

5	Infosys Technologies Ltd	Software Development Centre in an area of 30 acres at Manikonda with potential to provide employment to 2500 persons by 2003 in the field of software development.	350	Mr. Narayan Murthy	Plot No. 44 & 97A, Electronics City Hosur Road, Bangalore Tel +91-(080) 8520878 info@infy.com	Sr No 210 Manikonda Village, Lingampally, Rangareddy (Dist) Hyderabad-500019 Tel:+91-(040)-3005222 dassgunalan@infy.com
6	CyberPark	I T Park being developed by Hyderabad Software Exporter Association	1000	HYSEA	501, Matrivanam HUDA Hyderabad Tel:+91-(040)-hysea@kernex.stph.net	Manikonda Village, Hyderabad
7	Satyam GESoftware Services Ltd	Software Development and IT Enabled services	25	Mr. Ramalinga Raju	Level 4&5 Lakeshore Towers Rajbhavan Road, Somajiguda Hyderabad Tel: +91-(040)-3306767	Level 4&5 Lakeshore Towers Rajbhavan Road, somajiguda Hyderabad Tel: +91-(040)-3306767

8	STPI Center (Vishaka patnam Tirupati, Warangal)	Opening of STPI Centers at Vizag, Tirupathy and Warangal to Provide Communication Infra	10	Col.M. Vijay kumar, Director, STPI	STPI, 6th Floor, Q3 Cybertowers Madhapur Hyderabad Tel: +91 - (040)- 3100502 info@stpnai stph.net	Vizag, Vijayawada, Tirupathi, Warangal
9	Reliance Infocomm	Laying of Fibre optic Network in AP which connects all district H.Q and Mandals	1200	Mr Mukesh Ambani, Chair- man	Lakeshore Towers, Somajiguda, Hyderabad Tel:+91- (040) -6564636 pvi_madha varao @ril.com	Lakeshore Towers, Somajiguda, Hyderabad Tel:+91- (040) -6564636
10	MEASAT	Jointventure with the Govt of AP for Develop- ment of High Bandwidth Transmission Infrastructure based on Submarine cable that will connect Hyderabad via Vizag to Singapore/ KualaLumpur	2000	Mr. Raghuvendra Madhav, Regional Director, Malay- sia .JP Singh, India	C-763, New Friends Colony NewDelhi Tel:+91- (011) -6929459 jp.measat.in @indiat imes.com	Level 39, Menara Maxis, Kuala Lampur CityCenter, Kuala Lampur Malaysia

11	Pradeep Construc-tions	Development of IT Park for housing Software Companies at Banjara Hills in an area of 150,000 Sq ft to be operational by Apr 2003	30	Mr.Srinvas Reddy	Road # 2 Banjara Hills, Hyderabad Tel: +91-(040)-3736400 wwwpradeep construc-tions. com	Road # 2 Banjara Hills, Hyderabad Tel: +91-(040)-3736400 www. pradeep construc tions.com
12	SDE Tecnopark	Software Development Center in an area of 420,000 Sq ft with 8 floor office space and 4 Parking Floors. To be opera-tional by Apr 2003	325	Mr. K.S.Rao	Hitec City Hyderabad Tel: +91-(040)-651040 sde@ meenakshi group.com	Hitec City Hyderabad Tel: +91-(040)-651040 sde@ meenakshi group.com

(Source:- http://www.ap-it.com/megaprojects.html#I-Labs)

APSWAN

APSWAN is the backbone network for voice, data, and video com-munication throughout the state of AP. This network became operational on 1st November, 1999 with 2 MBPS fiber optic links connecting the State Secretariat with 25 centres including all the District Headquarters towns.

APSWAN - Andhra Pradesh Wide Area Network

The following areas are ideally suited to exploit the data connec-tivity feature of APSWAN:

- Provision of online citizen services on any-where, any time basis
- MIS requirements of departments
- E-mail between HOD & Dt offices
- Internet facility to Dt offices
- Access to data banks at Hyderabad

Guidelines for the government departments to get connected to APSWAN:

Scope of User Group: APSWAN can be used by all Government Departments, Government Corporations, Statutory Bodies and Local Bodies.

Connectivity Options: It is proposed to provide two options to the user groups eventually, viz., Scheme-A and Scheme-B. Scheme-A is based on leased line connectivity and Scheme-B is based on dial-up connectivity.

A schematic diagram and the technical details of Scheme A are shown in Annexure-I. It also gives list of equipment and approximate capital and recurring cost required at each site under Scheme-A.

Scheme-B is suitable for low data intensive applications and is based on dial-up connectivity. The schematic diagram and technical details are given in Annexure-II, indicating list of equipment and approximate capital and recurring cost.

SCHEME 'A'

Leased Line option for APSWAN connectivity

For users with high level of data transmission:

This scheme is suitable for district offices, it is most appropriate also for online applications and to transmit heavy data with high data frequency. The users are connected to APSWAN through the SYNC port of DNC / SNC router, 64Kbps bandwidth will be allotted to each user on a dedicated basis. The data communication is shown in Fig 1 below:
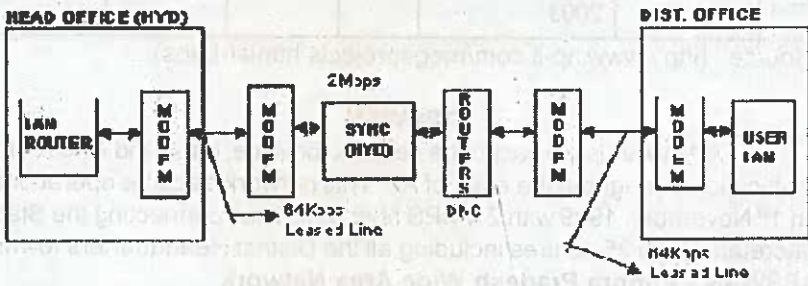
Cost:
Capital Cost:

	At District Offices	**At Head Office (Hyderabad)**
64Kbps Modems	2Nos: 1,00,000	2Nos: 1,00,000
Router	1No.: 50,000 (Data only)	Router - 1No: 50,000 (data only)

Recurring Cost:
  1) 10% of (a) for maintenance / annum
  2) 64Kbps leased lines Rs: 30,000 / Per line / annum (to be paid to
     DoT) *2 Modems are required if the distance of office is within
     4Km from the nearest DoT exchange. If the distance is more, 2
     additional modems will be required.

MANA TV

In collaboration with the Indian Space Research Organization
(ISRO), the Government of Andhra Pradesh is establishing a satellite based
communication network utilizing Ku band based transponder to take the
benefits of space technology to Schools, Colleges, Health Care Institu-
tions and local Government Institutions apart from strengthening HRD pro-
grams for government employees.

PROJECT OBJECTIVES:

The objectives of network are to strengthen:
  • Distance Education
  • Telemedicine
  • Human Resource Development
  • E-Governance
  • Awareness-building among self-help groups

OVERVIEW:

The satellite based network infrastructure is proposed to be cre-
ated in a phased manner in collaboration with Indian Space Research
Organization (ISRO). Initially a pilot project has been taken up in Ku-band
through a transponder of INSAT 3B.

Eventually it is proposed to launch 6 channels by completing an
earth station and studio in the premises of Dr. B.R. Ambedkar Open Uni-
versity, Jubilee Hills, Hyderabad. Once the earth station is established, it
is possible to provide interactive communication capabilities in the imple-
mentation of the various development programmes.

PROJECT STATUS:

The pilot project is under implementation in 250 sites. BEL has
been entrusted with establishment of the earth station and receiving sta-
tion at 161 locations.

SAPNET PROJECT

Introduction

SAPNET Project (MANA TV) is a Ku-Band Project for Distance
Education learning, first time implemented in INDIA. Satellite Communi-
cation is playing a vital role in day-to-day life of people in this modern age.
AP Govt. in view of utilizes the high-tech digital technologies for the rural

areas. Indian Space Research Organization (ISRO) assured its assistance to Government of Andhra Pradesh to set up an integrated satellite network for the purpose of Distance Education, Health care and rural development. The network will extend Internet facilities for the purpose of e-governance and also to all the villages in Andhra Pradesh. This project will utilize Digital Transmission Technologies and DVB techniques in this Project. The network will support Digital Data broadcast, Interactive Distance Learning, IP based voice, queries and Internet/Intranet applications. The network is an integrated one, supporting distance education for schools, colleges, professional courses, and institutions of high importance in addition to Tele-medicine through super specialty hospitals.

Features

The Government of Andhra Pradesh has been making pioneering efforts for promoting the use of Information Technology for the development of the State. The broad objectives of the IT policy of the State are to use IT for Economic development of the State, Improving the quality of life of the citizen and providing a good governance. The Government has recognized that development of IT infrastructure is key to the successful achievement of the above objectives and all the efforts essentially need availability of robust telecommunication infrastructure with adequate bandwidth across the length and breadth of the State. It is in this background the GOAP has signed MOU with ISRO for effective and efficient utilization of the satellite resources. The satellite based communication network will be utilized in the following areas with mutual cooperation.

- Distance Education: To provide distance education for schools, colleges, professional courses, institutions of high importance across the state.
- Tele-medicine: To Provide Health care & Tele-medicine
- Agricultural Extension: To provide agricultural and rural development extension services
- E-Governance
- Awareness-building among Self-help groups
- Agricultural Marketing
- Human Resource Development
- Community Internet Infrastructure: The network will also extend Internet facilities, IP based voice and Internet/ intranet applications to villages in Andhra Pradesh.
- SAPNET project is based on Digital Transmission Technologies DVB Techniques
- Network operates, using the Ku2 transponder of the INSAT - 3B

Satellite; in star configuration.
- Network consists of a central hub station (Earth Station) located at:
Dr. B R Ambedkar Open University Campus, Road No. 46, Jubilee Hills, Hyderabad.
- Network consists of 5 types of remote terminals located at various places across the state
- TYPE 1   - 46 No.s
- TYPE 2A - 23 No.s
- TYPE 2B - 23 No.s
- TYPE 3A - 46 No.s
- TYPE 3B - 23 No.s
        Total   - 161 No.s
- Television signal broadcasting (5 channels of DVB)
- High speed data transfer
- Voice Communication
- Video Conference
- Type 1   - Direct Reception of Television Signals.
- Type 2A - Direct Reception of Television Signals
                    - Voice Interactivity Over PSTN line
- Type 2B - Direct Reception of Television Signals
    - Voice Interactivity Over PSTN line
    - Intranet Connectivity (with return channel on PSTN line) for Data Transfer
- Type 3A - Direct Reception of Television Signals
    - Intranet connectivity (with return channel on satellite) for Data Transfer
    - Voice interactivity over satellite link
- Type 3B - Direct Reception of Television Signals
    - Intranet connectivity (with return channel on satellite) for Data Transfer
    - Voice interactivity over satellite link
    - Video conference

(Source:- http://www.ap-it.com/manachannel1.html)

TELEMEDICINE

Government is launching the Telemedicine Project with the purpose of creating advanced diagnostic facilities through the State-of-art equipment that is not available to the people in the District hospitals.

OVERVIEW:

It is planned to install telemedicine compatible diagnostic medical equipment such as CT scan, Ultra Sound Scanner, Colour doppler, ECG, Digital X-ray etc. The communication equipment such as antennae, sensors, data processors, computers etc at the District hospital at no cost to the A.P. Vaidya Vidhana Parishad that will be operated, maintained and serviced by the operating agency through its own resources.

The Operating Agency will provide services to the patients registered in the hospital at subsidized rates fixed by APVVP. The Operating Agency will not charge any money from white cardholders (except in the services which require high cost equipment like CT Scan and Colour Doppler). Here also only nominal charges will be collected from the white cardholders. No additional charges will be collected from the patients for telemedicine consultation during the pilot phase of the project (12months).

LOCATIONS:

A joint consortium of the Care Foundation, Hughes Escort Communication Limited (HECL), Siemens Limited and Karishma Software Limited has come forward to take up this project in District Hospital, Mahabubnagar, and District Hospital, Nellore, connecting these hospitals to Care Hospital at Hyderabad.

Apollo Telemedicine Enterprises Limited has come forward to take up this project at District Hospital, Eluru and District Hospital, Karimnagar, connected to Telemedicine specialty centre, Osmania General Hospital and Apollo Hospital at Hyderabad.

A.P. Vaidya Vidhana Parishad will take up the project with APTS and APSWAN connectivity from District hospital Khammam and District Hospital, Sangareddy connected to Osmania General Hospital.

CURRENT STATUS:

Computerization has taken place at District Hospital, Mahaboobnagar. Project reports have been received from Care Foundation and Apollo Hospital. Project is expected to be launched shortly. (Source:-http://www.ap-it.com/telemedicine.html)

COMPUTER LITERACY

India is on the map of Information Highway as one of the leading nations with its technical potential. Government of Andhra Pradesh is the forerunner in building the world-class manpower in Information Technology and leveraging the technology to the advantage of secondary school education. Smart Schools is one of those efforts to catch the students at a younger age for creating interest in learning and using Information Tech-

nology. The selected schools in the scheme of Smart Schools will be equipped with hardware, software and know-how to accelerate the process of building the technical manpower.

OVERVIEW:

The main objective of the project is to cover students studying in class VI to X. It aims to provide basic computer literacy at this level. Subsequently it is proposed to enhance the scope of the project by providing computer-based education in other areas of the school curriculum.

The project also aims to provide access to Internet and create school communities interlinked through Web based communication systems. With the optic fibre backbone likely to reach upto mandal level in the next 18 months, it is expected that these centres at the school level will play a major part in introducing computers to the community as a whole. These centres will also serve as training centres for teachers from other schools as well.

CURRENT STATUS:

With this objective in view a pilot project was initiated in the year 2000-2001 where one school was identified in each of the 23 districts, for setting up computer training facilities in Government schools. Based on this experience, the project is now being expanded to cover 1000 high schools including around 300 residential schools.

E-LEARNING

The State has also launched a significant new MSIT Programme (www.msitprogram.net) to provide interdisciplinary postgraduate education through a consortium of universities, using sophisticated e-Learning technologies. Efforts are on to provide high bandwidth connectivity to all the universities and major educational institutions to enable them to share curriculum ideas, academic and faculty resources, course materials etc by networking closely with each other.

More than 100 Engineering Colleges and technical education institutions have joined hands to form SoNET (Society for Networking) to explore use of various technologies and source high quality digitized academic courses and content to be shared across institutions. The APNet project that uses a KU band transponder on INSAT 3B will also provide specialized educational channels to reach out to universities, educational institutions and schools with well-designed video content.

The receiving centres in APNet have an option to install receiving sets with full audio and video return path or just an audio return path or simple receive terminals.

MSIT is an innovative multi-university interdisciplinary post-graduate programme that uses sophisticated educational technologies and is

delivered through well-equipped electronic classrooms housed in the finest IT and engineering institutions.

This is a glimpse of the leading institutions involved in this programme:

- Andhra University
- Carnegie Mellon University
- IIIT Hyderabad
- JNTU Hyderabad
- Osmania University
- NIT Warangal
- Sri Venkateswara University
- Nagarjuna University

Recognizing the need for high quality education in IT and its application in various knowledge domains; recognizing the importance of fostering close networking among various universities and educational institutions, within the state and the country as well as with the finest institutions anywhere in the world, the Universities and Institutes in the State of AP have come together to form a Consortium of Institutions of Higher Learning (CIHL).

The Centre for Distributed Learning (CDL) is the body within CIHL that handles the key functions. It is located at IIIT Hyderabad and manages the many-to-many relationships between universities. It co-ordinates creation and distribution of the content, quality control of the delivery, assessment & certification and continuous improvement. It will also develop new tracks and courses based on emerging technologies.

Courses are sourced from the finest institutions in the respective domains and combined with an excellent set of IT courses and soft skills. Mixed in the right proportion, these courses enable the students to integrate their knowledge across fields to solve complex problems, communicate well and work in multi-cultural teams. With high emphasis on project work, they are geared up for facing real world situations.

Source:- http://www.ap-it.com/msit.html

PROFILE AND STATUS OF IT PROJECTS IN AP

While the eGovernance initiatives of AP have received extensive recognition and several awards, it is notable that recently in November 2003, Andhra Pradesh has bagged the No. 1 position in the "National Awards for Exemplary eGovernance initiatives" awarded by Department of Administrative Reforms, Government of India and has been awarded the **Golden Icon award for eProcurement, Silver Icon award for eSeva, Bronze Icon award for eCOPS** and in all, **8 out of 36 awards and certificates.**

Details of the following eGovernance projects implemented and initiated by the Government of AP are discussed in details in this chapter.

- CARD
- CFST/FAST
- e-Cops
- e-Procurement
- e-Seva,
- MPHS,
- Saukaryam,
- SBMS,
- Voice,
- AP Portal,
- OLTP,
- SmartGov,
- Trained Manpower,
- IFIS, & HRMS

CARD - COMPUTER AIDED ADMINISTRATION OF REGISTRATION DEPARTMENT

The age-old manual system of registering legal deeds like sale deeds, mortgage deeds, gift deeds and 44 other instruments - has been replaced by a simple, transparent and convenient system.

CARD Stands for Computer Aided Administration of Registration Department. Implemented from 4 November 1998 and extended to 387 offices of the sub-registrars in the State, over 4.5 million documents have been digitally registered till December 2003 under the CARD system.

OVERVIEW:

The system has over 300 features providing an end-to-end solution to the automation of registration process - notable being valuation of immovable properties and conducting title search over the last 20 years in less than 15 minutes.

The various functions of the Department are as follows: -

- Registration of Documents.
- Valuation of immovable Properties.
- Collection of Revenue Stamp Duty.
- Transfer Duty and Registration Fee.
- Preservation of Copies of Documents.
- Issue of Certified copies of Documents.
- Issue of Encumbrance certificates.
- Registration Societies, Firms, Chit Funds, Non-Trading Companies, Marriages.

SERVICE LEVELS OF CARD ARE AS FOLLOWS:-

Sl.No.	Service Provided	CARD Office	Non-CARD Offices
1	Sale of stamp paper	15min	30-60min
2	Documents writing	30 min	NA
3	Market Value Check slip	10min	60min
4	Cash receipt	10min	30min
5	Registration of Documents	60 min	3 days
6	Certifies copies	15 min	3 days
7	Encumbrance Certificates	10 min	1-5 days

Web Services:

Land rates of agriculture and non-agriculture properties of all computerized offices of the state are available on the web. They are available at igrs.ap.gov.in Encumbrance information of all sub-registrar office of Hyderabad City is centralised at Inspector General Of Registration. This is online updation the information is available over Internet at igrs.ap.gov.in

CARD is a catchy name given to the comprehensive project of computerizing one of the oldest wings of the Government "The Registration & Stamps Department". The project was originally conceived in August 1996 and implemented at two test sites in August / September, 1997. Judging the project by its initial success and the immense potential it has in transforming the concept of public service, the Government decided to replicate it all over the state. Thus began an intensive and dedicated effort which is now the watchword of the Department... CARD.

Salient Features

A highly complex but user-friendly CARD software developed by a team of National Informatics Centre, Hyderabad under the guidance of the Commissioner & IG Registration & Stamps.

CARD was implemented at two offices on a pilot basis during Aug – Sept, 1997. Subsequently 212 more Sub-registrar offices were operationalized from 4-11-98. Project Management techniques employed to meet demanding deadlines. Imaging software has been customized to meet the document management needs. Entire project was implemented with a sanctioned budget outlay of Rs.18 crores. Hardware was procured by A.P. Technology Services Ltd., Hyderabad. The project consists of about 2000 computers and peripherals. 214 SROs were provided with Uninterrupted Power Supply (UPS).

Categorization of CARD Offices:

Category	No. of Offices	Documents Registered Per Annum
A	41	5000
B	95	2500-5000
C	78	1500-2500
D	25	1200-1500
E&F	148	Below 1200

*The manual system has been continued parallel to the CARD system from 4-11-98 to 5-2-99 to provide for stabilization of the systems and awaiting statutory amendments. The statutory effect has been given to the registrations done using the electronic process under the CARD project from 5-2-99.

Need & Usefulness

The Registration & Stamps Department is characterized by its age-old procedures and work culture which bring in a host of attendant problems like:

Lack of a high degree of transparency in valuation of properties and calculation of stamp duties. Delays associated with the manual systems of copying, indexing and accounting. Tedious methods of document management involving preservation of manual volumes. The system, on the whole, is not user-friendly to the desired level. The net result is a highly rigid and complex system which is difficult for the common man to wrestle with. The situation called for a radical reform.

HOW DOES CARD HELP THE SITUATION?
The CARD project has been conceived as a comprehensive solution to the problems discussed above.
The Project
- Provides a transparent method of valuation of property and calculation of stamp duties.
- Simplifies registration procedures.
- Enhances speed, reliability and consistency of the system.
- Cuts delays by replacing the manual systems of copying, indexing and accounting with computerized operations.
- Introduces state-of the-art document management system.
- Scanning of documents replaces manual copying.
- Images of documents are preserved on CD's.
- Retrieval of the documents and obtaining copies is made instantaneous.
- The overall effect is a smooth public interface.

Technical Details
Software
- Client – Server architecture
- SCO UNIX server for stable, virus–free environment
- A powerful RDBMS for storage and processing of data
- A GUI based user–friendly menu driven front-end
- Windows 95/98 operating system on client

Success Factors
CARD has the inherent potential to deliver all the registration services to the satisfaction of the public. Its success depends on several environmental factors such as
- Creation of adequate awareness among the public about the benefits of CARD.
- Sustained maintenance and upgradation of the systems.
- Upgradation of skill level of the employees on an ongoing basis.
- Implementation of the Telugu version of the package.

45,13,232 documents have been registered during 4-11-98 to 31-12-2003, under the CARD project in the 387 computerized offices. Currently, about 90% of the transactions in the CARD offices are being handled electronically. The response from the public as well as the employees is highly encouraging.

CONCLUSION
The CARD project is a good example of a success story in several areas of the public administration like use of IT in improving the qual-

ity of delivery mechanisms, project management & administration, training and motivation. The project has already become a role model for several other departments in Andhra Pradesh besides the departments of registration in several other states of India.

Results (during the period 5-2-99 to 30-11-2003)

Documents registered: 45,13,232

ECs (Encumbrance Certificates) issued: 25,74,637

Market Values Check slips issued: 16,50,461

Source:- www.ap.gov.in/card &   http://igrs.ap.gov.in

CFST (Citizen Friendly Services of Transport Department)

Computerisation in the department was first taken up in the year 1988. In phases, offices at Hyderabad Central, Hyderabad North, Hyderabad East, Vijayawada, Visakhapatnam, Chittoor, Mahabubnagar, Karimnagar, Warangal, Nalgonda and Head Office have taken up computerized transactions on Unix operating system with Unify database. This system has become out dated. It was proposed to shift the operating system to Windows NT with Oracle database, which is an advanced system A proposal was initiated and a detailed study of computerization of the department was done in the year 1997.

Government has appointed an Evaluation Committee in G.O.Ms No. 278, Tr.R&B Department, dated 30th march 1999 to guide the department in computerisation of its offices. After several meetings the committee has selected M/s. Tata Infotech Ltd. as service provider for the Transport Department on 'Facility Management' basis.

OVERVIEW:

The objective of computerisation is to make the Transport Department Citizen friendly in it's functioning and provide SMART services to the public. It is intended to build comprehensive database and provide on-line services to the public covering all gamut of services of Transport Department like Issue of Driving Licenses, Registration, Permits, and Taxation etc. All the offices in the state have inter-connectivity through APSWAN. A logo also has been chosen for this project namely 'CFST', which stands for Citizen Friendly Services of Transport Department. APTS has been appointed as technical consultants.

A core team has been constituted in the office of Transport Commissioner to work with the representatives of M/s Tata Infotech Ltd on this computerisation project of the Transport Department. It was decided to take up computerisation process in two phases.

In phase-I, Regional Transport offices of Secunderabad, Vijayawada and Chittoor were covered on pilot basis. The remaining of-

fices were covered in the second phase. However, high-end server is located at the office of the Transport Commissioner for the purpose of inter-connectivity between the DTC/ RTO offices.

After watching the software demonstration by 4 different companies, the evaluation committee has finally chosen the software developed by M/s Tata Infotech Ltd., as it is comprehensive application software, covering all aspects of the Transport Department's functions. This software is operable on Windows NT and supported by Oracle database. It is also seen that it is compatible for inter-connectivity. The Application software developed by M/s Tata Infotech Ltd. has been purchased on one time basis including source code, which can be replicated / modified through-out the state including in e-Seva project.

The officials of Transport Department have under taken a System Study along with the representatives of M/s Tata Infotech Ltd. and finalised the software requirement specifications (SRS). Further, the Acceptance Criteria and the Acceptance Test Plan have also been finalised and signed.

Pilot Sites

Hardware

As per the terms of agreement, M/s Tata Infotech Ltd. has provided complete hardware along with provisions for inter-connectivity on facility management basis for a period of 3 years. The hardware is installed in all the 3 sites namely Secunderabad, Vijayawada, and Chittoor and also provided a high end Server at the Head Office. The department has not invested in the hardware. Instead, a quarterly lease amount has to be paid at the end of each quarter for the 'Service Provider'. At the end of three years, the hardware is transferred to the department on payment of nominal amount.

Site Preparation

To save delay, the sites have been prepared by the department at all the 3 centres by providing cabling network, furniture, air-conditioning etc. Each site has also been provided with photo and signature capturing equipment to store the same in the database. In order to assist the public, a visitors lounge, a Public Assistance Cell have been provided.

Database

The existing data in those places where computers are already installed is in Unify database. Steps were taken to export the existing Unify data to Oracle database. The data structures of Unify database have been suitably modified to make it compatible with Oracle database. Further steps were taken to enter the data prior to 1992, which was in manual records.

Driving License and Registration Certificate on PVC cards. The format for Driving licenses and certificate of registration Non-Transport category has been developed after consulting all the senior officials of Transport department. It was later changed as per Government of India guidelines. This card used for issue of license, Registration of non-transport vehicles is very handy and durable for convenience of the public.

Contract Agreement

Based on the tender notification and the discussions held between the Evaluation Committee and the representatives of M/s Tata Infotech Ltd., a Contract agreement has been finalised and signed on 21-1-2000 by the Transport Department and M/s Tata Infotech Ltd. The services of the APTS were used in preparation of Contract Agreement.

Inauguration

The Hon'ble Chief Minister has inaugurated the first phase of CFST project on 12-5-2000.

Replication Sites

Application Software

Software developed by M/s Tata Infotech Ltd., implemented in all 35 replication sites.

Hardware

As per the terms of agreement, M/s ECIL. has provided complete hardware along with provisions for inter-connectivity on facility management basis for a period of 3 years. The hardware is installed in all the 35 sites namely Srikakulam, Vizianagaram, Visakhapatnam, Anakapalli, Kakinada, Rajahmundry, Eluru, Bhimavaram, Gudiwada, Guntur, Narsaraopet, Ongole, Nellore, Tirupati, Kurnool, Nandyal, Anantapur, Hindupur, Cuddpah, Adilabad, Mancherial, Karimnagar, Khammam, Warangal, Nalgonda, Mahaboobnagar, Medak, Siddipet, Nizamabad, Rangareddy Central, Rangareddy East, Hyderabad Central, Hyderabad East, Hyderabad South, Hyderabad West, and also provided a Central Server at the Head Office. The department has not invested in the hardware. Instead, a quarterly lease amount has to be paid at the end of each quarter for the 'Service Provider'. At the end of three years, the hardware is transferred to the department on payment of 5% of the hardware cost.

ONLINE SERVICES

In the first phase centers the services were commenced from 15-01-2002 onwards and till to date in various phases all 35 offices have commenced on line services.

SERVICE CHARGES

As there is no budgetary support from Government for the project.

Public Private Participation (PPP) model was proposed and accordingly BOMT (Build Operate Maintain and Transfer) model was approved by the Government. The Government in G.O.Ms.No.147, TR&B (Tr.I) dt.23-11-2001 and G.O.Ms.No.3, TR&B (Tr.I) dt.3-1-2002 approved collection of service charges for various transactions. The total amount is being deposited in a separate head of account.

Achievements:
- Connectivity to e-seva centers for payment of vehicle taxes
- Introduction of SMS Systems to relevant personnel for retrieving vehicles and license particulars.
- Interconnectivity between CFST system and Police Department for online transmission of data.
- Introduction of eLLR System (Testing on Computer).

Roadmap:
- Introduction of computerization in all MVI/Unit Offices across the state.
- Inter-connectivity between CFST system and Pollution Control Systems.
- Introduction of Smart Cards.

Results of CFST Project:

Transaction	No. of Transactions attended up to 27/12/2003
No. of Driving Licences Issued/Renewed	16,30,205
No. of Learner's Licences Issued	10,44,992
No. of Vehicles Registered	14,35,167
No. of other transactions effected	23,96,236
Total	**65,06,600**

(Source:- http://www.ap-it.com/fast.html)

e-COPS: e-Computerized Operations for Police Services

eCOPS is conceptualized by Andhra Pradesh Police to computerize the total policing by utilizing State of Art technology which is catapulting the AP Police into speedy processing, increased efficiency, transparent policing and better interaction with the citizens of Andhra Pradesh.

Andhra Pradesh Police has taken a lead in computerization in

various fields of police functioning. The State is a pioneer in developing an automatic fingerprints identification system, which has greatly enhanced the quality and speed of investigation. For the first time in the State the recruitment results were processed with the aid of computer and developed Software. The State is also taking a lead in computerizing the records of the Department at all levels from Police Station to Police Headquarters. Decision was taken to fully computerize and network the Police Stations, Circle Offices, S.D.P.O offices and District Police Offices to reduce delay and enable officers to analyze crime, disseminate information, access records, etc. In the field of Police administration, critical areas have been identified leading to the development of e-Computerised Operations for Police Services (eCOPS) Application Software.

17th June 2002 was a memorable day for A.P Police when eCOPS (eComputerised Operations of Police Services) was officially launched by Sri. Nara Chandra Babu Naidu, Hon'ble Chief Minister, Government of Andhra Pradesh.

In all there are 1585 Police Stations, 430 Circle Offices, 142 Sub-Divisional Police Offices, 7 Range offices covering the whole State. Manpower includes 82,000 policemen supervised and guided by 1365 officials.

Benefits of eCOPS
- It is the Citizen who is benefited a lot through eCOPS.
- The transparency in the system
- Track of all the cases registered, including those transferred.

Replication

Action is already initiated to replicate the eCOPS Application Software in Cyberabad, Police Commissionerate and Ranga Reddy District. The necessary computer equipment has been procured and supplied to respective locations (Police Stations, Circles, SDPOs, Headquarters etc) in Commissionerate of Police, Cyberabad and Vikarabad District Police. Plans are ahead to extend eCOPS in 12 Districts in this year and in the balance 11 Districts in the next year.

Status: eCOPS is up and running in all the 4 pilot locations i.e. Hyderabad City, Vijayawada City, Visakhapatnam City and Srikakulam District.

Implementation of eCOPS in Cyberabad Police Commissionerate and Ranga Reddy District Police is Under Progress. eCOPS has achieved National recognition by receiving a National Award for exemplary eGovernance initiative on 13th November 2003, in the 7th National Conference on eGovernance at Chennai.(Source:- http://www.ap-it.com/ecops.html)

e-Procurement

E-Procurement.gov.in is a comprehensive e-infrastructure that will help the government and the citizens realize the vision of fuelling growth via profitable B2B e-commerce. Providing a robust, proven platform used by the largest companies in India and the world, it enables trade between companies of different sizes, platforms and locations. To this end, eProcurement.gov.in will provide services like eProcurement, eTendering, eSelling and eAuctions.

The eProcurement.gov.in platform provides its members with access to several trading suppliers. Eprocurement Auction Services offers government departments' easy-to-use, web-based solutions for conducting dynamic exchanges in an on-line environment. It provides real-time bidding solutions for buyers and sellers that bring an unprecedented level of profitability, control, and simplicity to corporate procurement and liquidation processes.

The Tender Management Software helps both the buyers and the suppliers to reduce the cycle time, unnecessary paper work, waiting in long queues and simultaneously maintain the transparency in the entire process. eProcurement will be utilised by all GoAP departments including, local bodies and municipal corporations along with their vendors. Co-operative sectors, public sectors and other state governments can also use this solution.

What is E-Procurement?

E-Procurement is the purchasing of goods and services using the Internet. It

- Covers full life cycle of purchasing (indent to receipt of goods)
- Connects buyers and suppliers through electronic exchange of Tenders, catalogues, contracts, POs, invoices etc
- Electronic Tendering is carrying out the traditional tendering process in an electronic form, using the Internet. Using E-Tendering The Departments of Andhra Pradesh can:
- Includes on-contract and off-contract buying
- Includes a variety of off techniques such as RFPs, quotes, auctions and reverse auctions.

What is Electronic Tendering?

Electronic Tendering is carrying out the traditional tendering process in an electronic form, using the Internet. Using E-Tendering The Departments of Andhra Pradesh can:

- Raise Indents as per the requirement ·
- Approve indents online ·

- Sell Tenders
- Receive Bids
- Award Contract / PO
- Evaluate Tenders
- Create and publish NIT
- Includes a variety of off techniques such as RFPs, quotes, auctions and reverse auctions.

Using E-Tendering, the suppliers can

- Receive notification of the relevant tenders
- Purchase tenders document
- Submit Bids Online
- Track the status of their bids

What are the sources of Tenders?

The tenders are published by the various departments of the Government of Andhra Pradesh. Using the E-Tendering System, the users of the participating department will:

- Raise indents as per the requirements
- Approve Indents online
- Create Tender
- Approve Tender and
- Publish Tender online

How Secure is it?

The security features incorporated in the application ensures that all activities are logged, no unauthorized person has access to data, all sensitive data is encrypted and system can be restored in a minimal possible time in case of a disaster or system crash.

Audit Trail: The Solution has been so designed that all the activities, transactions and changes in configuration are logged and a log report is made available to the concerned people. Further, a log is also available of activities at the database level thereby ensuring that a robust audit trail is always available of all the activities either at the application level or the database level.

Data Encryption: The solution supports 128-bit encryption and all the price bids received against a tender are encrypted at the database level. Further, the login passwords of all the users and the suppliers are also encrypted at the database level.

Secure Administrator access To prevent an administrator from misusing his access privileges, the TMS requires two level password verification before allowing an administrator access to the admin module. The first password is provided by the administrator himself and the second pass-

word is provided by some designated senior person within the buying organization. The administrator will be authenticated on advanced technologies using biometrics.

Process Validation The Solution has been so architected that a user cannot view the commercial bid of a supplier till the technical evaluation of the tender is complete and the date & time specified for the opening of the commercial bid is due.

SSL Certificate The solution uses 128 bit SSL Certificate from Version for communication between the browser and the web server. This ensures that all the data is encrypted and cannot be hacked/misused by anyone

Unauthorized Access - The entire solution is behind a firewall and intrusion detection system that protects it against unauthorized access and hackers

Status:

- 15 months of Pilot Phase completed by 9/2003 -- JV under formulation
- 8 departments enabled so far, APTRANSCO, Singareni Collieries by
- January 2004
- Most of the procurement into eprocurement by next year.
- So far Rs. 2266 Crores worth transactions have taken place covering 656 tenders.
- Project received Golden Icon award from Govt of India (2003) under exemplary eGovernance initiative.

List of approved tenders approved by COT (As on 27-12-2003)

S.No.	Department	No. of tenders	ECV	TCV	Average percentage
1	Irrigation & CAD Department	50	401.25	264.39	-34.10%
2	R&B Department	15	50.05	47.41	-5.27%
	Total	65	451.30	311.80	-30.91%

(Source:- http://www.eprocurement.gov.in/faqs.asp)

e-SEVA

OVERVIEW:

eSeva is the first of its kind of service in the country, providing a wide spectrum of citizen friendly services that will save citizens the bother of running around various departments.

There are 39 eSeva centres (with 350 service counters) spread across the twin cities, operating from 8AM to 8 PM on weekdays and 9 AM to 3 PM on holidays.

eSeva is built on the success of TWINS pilot project. TWINS has been renamed eSeva as the state government plans to extend it to major towns and municipalities in the State.

Services Offered:

Payment of Utilities Bills	Reservation
• Electricity bills. • Water and sewerage bills. • Telephone bills. • Property tax. Sales Tax	• Reservation of APSRTC bus tickets. • HMWSSB: Reservation of a water tanker.
Certificates	**Permits / Licences**
• Registration of births / deaths. • Issue of birth / death certificates. • Registration Department:issue of encubmunce certificates Issue of caste/nativity certificates	• Issue / renewal of trade licenses. • Medical and Health Department: Renewal of Drug Licences Tourism: Reservation of tickets/ accommodation
Transport Department Services (available at Banjara Hills Centre Only)	**Other Services at eSeva Centres**
• Change of address of a vehicle owner. • Transfer of ownership of a vehicle. • Issue of learner's licenses. • Issue / renewal of driving licenses (non transport vehicles). Registration of new vehicles.	• Sale of passport application forms • Receipt of passport applications • Receipt of applications for new telephone connections.* • Registration Department: Sale of non-judicial stamps • Registration Department: Document writing service * Collection of small savings*

Internet Services	B2C Services
• Internet enabled electronic payments.	ATM:Cash withdrawls and deposits
Downloading of forms and Government Orders (GOs).	ATM:Issue of Statements of accounts
	Mutual Funds Collection of applications
	Mutual Funds:Transfer of shares
	Cellphone Bill Payments
Police Services	**B2C Services**
Payment of Inquest/Panchanama fees Rs 50.	ATM:Cash withdrawls and deposits
	ATM:Issue of Statements of accounts
Payment for First Information Report Rs 50	Mutual Funds Collection of applications
Payment for Inquest/Panchanama fees Rs 50.	Mutual Funds:Transfer of shares
	Cellphone Bill Payments
Payment for Post Mortem Report Rs 50	
* Yet to be started	

eSeva Citizen Service with Difference:
Looking at 'service' from the citizens' point of view, the Government of Andhra Pradesh seeks to redefine citizen services through eSeva, using state-of-the-art technologies.

An Integrated Approach
- Integration of departments - central and state governments.
- Integration of services.
- Integration of G2C and B2C.

Efficiency, Reliability, Transparency and Scalability are the watchwords at eSeva.

Salient features of eSeva
- 39 **eSeva** centres (with 350 service counters) spread over the Twin Cities and Ranga Reddy District.
- All service counters are facilitated with an electronic queuing system.
- Operating from 8.00 am to 8.00 pm, on all working days and

9.00am to 3.00pm on holidays (Second Saturdays & Sundays).
- 'One-stop-shop' for over 66 G2C and B2C services.
- No jurisdiction limits - any citizen in the twin cities can avail of the services at any of the 39 **eSeva** service centres.
- Online services: eForms, eFiling, ePayments.
- Payments by cash/cheque/DD/credit card/Internet.

GOVERNMENT FORMS
- AP Transco
- APSRTC
- BSNL
- Commercial Tax Office Statutory
- MCH
- Metro Water Works
- Regional Passport Office
- Revenue Department
- RTA
- Stamps and Registration

AP TRANSCO
- Form of Application for supply of Electricity at Low/High Tension
- Application cum Agreement for supply of Electricity
- Form of HIGH Tension Agreement
- Form of LOW Tension Agreement
- Provisional Assessment Notice

APSRTC
- Requisition form for Reservation / Advancement / Postponement / Cancellation / Return Journey Ticket

BHARATH SANCHAR NIGAM LIMITED
- Form for new Telephone connection (Instruction to fill the form)
- Shifting of Telephone connection with instructions
- Add-on-Facility (Opening/Closing)
- Form No.60 of Income Tax Rules, 1962
- Form No.61 of Income Tax Rules, 1962

Other Application Forms
- Form for paying Telephone Bills (Electric Clearing Service)
- Internet Connection

eSeva through Andhra Bank ATMs

eSeva has been delivering 43 G2C and B2C services to citizens through 31 eSeva centers. While implementing plans for expansion in Twin Cities and also in the districts, eSeva has also been attempting diversification of service delivery through alternate media such as Banks,

ATMs, Supermarkets etc., Two banks i.e., Andhra Bank and State Bank of Hyderabad are participating in this effort through their branches already. In order to reach out to the ever-increasing number of customers, eSeva has tied up with Andhra Bank to deliver eSeva services through ATMs of Andhra Bank. There are 81 ATMs of Andhra Bank in Twin Cities and 220 all over the country. Bills can be paid from any of the ATMs. Therefore the Citizen will have access to the state 24X7 services of eSeva. The transaction is taking approximately 30 seconds. Availability of eSeva services through ATMs is expected to reduce the rush at eSeva centres.

Results:

Performance of eSeva from 25.08.2001 to 31.12.2003:
Number of citizen transactions effected: 148.2 Lakhs
Total Value of transactions: 4877.2 Crores
(Source:- www.ap-it.com & www.esevaonline.com)

Multi-Purpose Household Survey (MPHS)

Multi-Purpose Household Survey (MPHS) is woven around a database with the basic socio- economic data of all residents of the state and a database of land records.

This project is being implemented in all the 1125 Mandals, which are the pivotal administrative units of the Government at the cutting edge level.

OVERVIEW:

Multi-purpose Household Survey (MPHS) is one of the largest I.T. Projects undertaken by the Government. This huge database, which covers 1,125 mandals of 23 Districts of Andhra Pradesh, contains a whopping total of 76.5 million records. Each record gives a graphic detail of the personal, social and economic details of every citizen.

This is an excellent launch pad for effective e-governance. At the cutting edge level, i.e., the mandal, this database is already put to use for instant issue of: (i) Caste Certificates, (ii) Birth Certificates, (iii) Nativity Certificates

The time element in issuing these certificates has come down drastically from 15 days to 15 minutes. Applications in the following areas are being planned to widen the spectrum of services.

- Public Distribution System
- Land Records
- Identification of Below Poverty Line (BPL) families for development activities
- Immunization and Clinical Care

- Maternity Services
- Welfare activities like Pensions, Annapurna, Apath Bandhu, etc.

Given the all-pervading scope of the database, the possible applications are almost endless.

CURRENT STATUS:

The data is validated through sample verification by independent agencies in all the 1,125 mandals. Data accuracy of 92% to 99% has been reported across the mandals. Work on Data Warehousing is currently on. The data would be available on a central server located in the office of Chief Commissioner of Land Administration, as well as servers located at all 1,125 mandals.

LOCATIONS:

These services are currently being provided from all the 1,125 mandal offices across the state. A centralised server is located at the office of Chief Commissioner of Land Administration and it is planned to web-enable the entire project in future.

Results (Feb'99 to Dec'03)

- A 16-digit Social Society Identification Number (SSID No.) is generated for 7.68 crore population in A.P. This is now being changed to a permanent 12 digit Identity Number.

No. of certificates on Socio-economic status Issued to citizens –

Caste Certificates	17,78,426
Income Certificate	14,39,716
Residence Certificate	4,68,738
Birth & Death	34,098
No. of land records certificates issued to citizens	1,59,990

SAUKARYAM – AN E-GOVERNANCE EXPERIENCE OF VISAKHAPATNAM MUNICIPAL CORPORATION

OVERVIEW:

Information and Communications technologies are transforming the way life goes about. This firestorm has also got huge potential to transform the paradigms of governance. Information Technology entails connectivity and networking thereby making the delivery of services offered by governments become better and while talking of governments, local self-governments deserve maximum attention as they are at the cut-

ting edge and immensely affect the daily lives of the citizens. It was in this context that a project 'SAUKARYAM' (meaning facility) was launched in Visakhapatnam Municipal Corporation for delivering all the civic services on-line. The project has been completed as a public-private partnership initiative with not much additional cost to the corporation.

Under this project, a Metro Area Network encompassing 120 Sq.Kms has been created through broad band/leased circuits. A large number of banks for accepting municipal payments and various Municipal Offices have been put on this Metro Area Network and connected to each other. A local area Network encompassing all wings of the Municipal Corporation forms the backbone to this Metro Area Network. This Network has been in turn web enabled to provide access to citizens through a utility driven web site for multiple services. For the citizens who do not have access to the Computer or Internet, a fully computerized City Civic Centers on the network have been created delivering the same set of services.

SERVICES OFFERED

- On line payment of Municipal Dues through Networked Banks.
- Payment of Property Tax.
- Payment of Water Tax.
- D & O Trade Licences.
- Advertisement Tax.
- Lease Rents.

CITIZEN CHARTER (City Civic Center)

- Issue of Birth & Death certificates.
- Registration of Building Applications.
- Registration of Tap Applications.
- Registration of UGD service connections.
- Miscellaneous payments & registrations.
- Registration of Complaints & Grievances such as,(Garbage removal, Cleaning of Drains & Dustbins, Pipeline leakage's, Repairs to Street Lighting, Repairs to Roads & Fixing of House Tax.)

UTILITY DRIVEN Website-www.saukaryam.org (or) www.saukaryam.com

- Property tax payments.
- Complaints & Grievances.
- Building plan approvals.
- Births & Deaths registration.
- Public Health & Sanitation.
- Infrastructure Works.
- Water Tap Connections.

- • On-line Tenders.
- • Citizen's forum and many more...

BILL JUNCTION (eSeva Center):

An integrated payment gateway for all Government bills. Right now the center is collecting payment of Electricity bills in addition to other Municipal dues.

The conceptualization of project began in September 2000 and was dedicated to the citizens for implementation by January 2001. Like most of the IT projects, the Project has been evolving since then adding additional services and features day by day. Offering the citizens all the Civic Services through a user friendly, transparent and accountable method is the USP of this Project.

OUTCOME

The results have been stupendous. Ever since the project has been commissioned, the work has become the talk of the town. The citizens are surprised and enthused by the ease with which their needs are getting attended to, without having to run from pillar to post as before. The complete networking and computerization today enables the corporation to get real time demand / collection statements that help in monitoring of cases with huge pending amounts, thereby improving the tax collection efficiency. Due to the web-enabling of this network, citizens are enabled to get access to the information pertaining to their property assessment, and they are also able to see the calculations that have gone into it. The on-line payment module through net banking also allows the citizens to make the payment directly from the comfort of their homes. This has improved the collection efficiency and a additional Rs. 20.0 Crore was collected during 2002-03, as a result of which the Corporation is able to extend more and better civic services.

Over 2000 people make use of this facility every day, either through the banking network, through the City Civic Center or through the Internet. There are over 45,000 registered users for the Corporation website, while the civic center receives over 200 citizens every day, reflecting its popularity across the range of communities.

The project has been declared as the pilot project for municipal governance and is being replicated in various municipalities and corporations across the state and other parts of the country. Visakhapatnam Municipal Corporation has also applied for its patenting and has entered into a MoU with a private company for the international marketing of this product. The project has already branched out into other areas of utility payments like telephone bills and registration and has tied up with elec-

tricity department for collection of bills on line.

AWARDS & DISTINCTIONS RECEIVED:

1) NIUA Award For the Year 2001

2) Short listed for Stockholm challenge award 2001

3) UNDP Award for the year 2002

4) CSI Award for the year 2002

5) CRISIL Award for the year 2003

Results (2000 –Nov 2003):

20.49 lakh people have utilized the services in various categories (20 services)

Benefits: Increase of Revenue by 30%.

(Source:- http://www.ap-it.com/saukaryam.html)

Social Benefits Management System (SBMS)

The project is being used by all Welfare Departments within AP Secretariat including Office of the CM and offices of various Ministers, all departments outside Secretariat and within the state of AP, possibly NGOs working in the area of welfare.

The project was started in January 2003 and is proposed to launch by January 2004 in approx. 100 locations across the state.

The objectives are:

- Automate the Social benefits Administration and Service procedures of AP Govt. across all departments and organizations of the Govt involved in social welfare
- Provide a unified view of deployment of funds and other resources, in providing social welfare services
- Provide automated access to beneficiaries through beneficiary self service
- Create and enable online access to knowledge base of AP Govt. (like Acts, GOs, rules, judgments, policies, references from Judiciary and Central Govt. Depts. etc.) relevant to Social Benefits and related matters
- Monitoring and tracking of applications for services to beneficiaries.

Status:

Project awarded to M/s Ram Informatics Ltd.

Implementation of Social Benefit Management Scheme (SBMS) in the welfare sector for better monitoring and optimum utilization of resources – Constitution of Project Implementation Committee (PIC) for implementation of Social Benefit Management System (SBMS): (Information Technology & Communications Department, G.O.Ms.No.19, Dated 18.05.2002.)

The Government of Andhra Pradesh has been is spending huge amounts in the welfare sector, covering several departments like, Social Welfare, Tribal Welfare, BC Welfare, Women Development & Child Welfare, Minorities Welfare, Housing etc. Iin order to manage the social benefits systems better and provide better services to the beneficiaries under various schemes etc., it is desirable felt necessary to develop and deploy an integrated Social Benefits Management System (SBMS) across all the departments concerned with involved in social welfare activity. This system would also help in management of deployment of valuable resources across the state in several institutions, schemes and projects.

SBMS has been identified as one of the core initiatives of Government of Andhra Pradesh. In order to ensure its successful implementation, it is also felt necessary to constitute a Project Implementation Committee (PIC). 3. Government after careful consideration of the above hereby accord administrative approval for implementation of social benefit management scheme with a view to ensure close monitoring and optimum utilization of resources in the welfare sector. Government also hereby constitute a Project Implementation Committee Accordingly PIC is constituted with the following members:

1) Principal Secretary, BC Welfare Department - Chairman

2) Principal Secretary, IT&C Department - Member

3) Secretary, Social Welfare Department - Member

4) Secretary, Tribal Welfare Department - Member

5) Secretary, Women Development & Child Welfare Dept. - Member

6) MD, AP Backward Classes Cooperative Fin. Corp. - Member

7) MD, AP State Housing Corporation - Member

8) Secretary, (IT-e-Government) IT&C Department - Member

9) Director (Technical), IT&C Department - Member-Convener

4. Project Implementation Committee (PIC) would be responsible for

a. Overall supervision of the project.

b. Evaluation of offers from bidders and entrustment of work

c. Coordination among all the relevant Departments in GoAP for this project

d. Approve of the strategy, timeframe, resources and other inputs for the implementation of the project

e. Be the highest decision making body in respect of all matters in the project that may arise from time to time during the implementation of the project. a. Dealing with any matter incidental to the above terms.

f. The PIC shall meet once in a month on a regular basis or as and when required during this project tenure, whichever is earlier. The PIC may co-opt experts or consultants or special invitees to assist, advise or provide

any service that the PIC may deem necessary for the project

g. Select a suitable organization through an open tender basis for undertaking the project, which involves detailed custom designing, development, testing and implementation of the Project.

h. Evaluate and initiate the procurement of hardware, software networking and other equipment and services required for successful implementation of the Project.

i. Dealing with any matter incidental to the above terms.

The Government hereby accords in-principal approval for the implementation of SBMS Project and empowers the PIC to select a suitable organization through an open bidding process for undertaking this project which involves detailed custom designing, development, testing, implementation, systems integration, training and other required services. 6. The PIC is also authorized to constitute project teams with members drawn from various Departments of the Government and locations across the state necessary for the implementation of the project. The PIC will also evaluate and initiate procurement of various hardware, software, networking and other services that may be required for the successful implementation of SBMS. After ensuring the successful completion of the project, the PIC is authorized to retire / dissolve itself after communication to and acceptance by the Government. 68. The Finance & Planning (Planning - IT&C) Department will make the necessary budget provision for the project during its tenure starting from the financial year 2002-03.

Status:

- Project awarded to M/s Ram Informatics Ltd.
- System Study and Analysis - completed on 1st Oct. 2003

VOICE (VERSATILE ON-LINE INFORMATION EMPOWERMENT)

The VOICE project envisages the establishment of computing infrastructure at Vijayawada Municipal Corporation and the setting up of Information Kiosks at important public locations in the city of Vijayawada.

OVERVIEW:

Web-based application software on Oracle/Windows NT environment will run on the VMC Intranet for catering to the information interface with the citizens. A multimedia-based presentation on the public services in Vijayawada City is provided on CD-ROM. The same is kept at each Kiosk for faster access to the information from the Kiosk. The information Kiosks placed at various points in the city is connected to VMC Intranet through leased lines. Additionally, there will be a provision to access the proposed AP State Wide Wan (APSWAN) from the VMC Intranet.

The main components of VOICE are

- Web Server & Proxy Server for interfacing with the web Application Server, which will be running the various software systems.
- Client workstations & LAN at VMC premises
- GIS Infrastructure (Hardware and PC Arc/Info software): Using this facility, VMC can build up a graphical database of the city and use the same for decision support.
- **Information Kiosks:** Information Kiosks (booths with a Multimedia PC and printer) placed at various places in the city and connected to VMC Intranet over leased lines.

Application Software functionality:

1. Applications

General Features:

Database Security implemented through user and application roles, grants, and transaction log. Front end Security is implemented through Operating System Login, Data Base login and Application User Login/Password mechanisms. Different Levels of users have different access privileges, accordingly their menu is customized.

Through the system the computations have been automated to the extent possible and parameterization is done wherever possible. Reports supporting the manual registers have been planned for all the syst   e
The various Application software systems in VOICE Project are as follows:

Property & Vacant Land Tax

- Automatic fixation of Property Tax based on the Property Extent details
- Generation of Demand Notices
- Generation of Hearing Notices for revision petitions
- Generation of Endorsements for revision petitions after recomputing
- Transfer Petitions Endorsement
- Tracking of Court Cases
- Automatic computation of arrears' based on Court judgments· Current and Arrear Demand maintenance
- Property Tax/Education Tax/Library Cess Collection Break-up
- Vacant Land Tax Collections
- MIS Reports
- Ward-wise Demand/Collection/Balance
- Bill Collector wise Demand/Collection/Balance etc.

Water & Sewerage Tax

- Applications for Water & Sewerage connections.
- Sanction Details maintenance and automatic demand updation
- Re-connection Details maintenance and automatic demand updation
- Disconnection Details maintenance and automatic demand updation
- Demand & Payment history details maintenance

Commercial Complexes System:

- Lease Agreements maintenance for all the properties owned by Corporations
- Lease Renewals/Title Transfers/Termination of Lease Agreements
- Monthly Demand Generation including automatic interest Computation
- Appropriation of Payments to Interest/Principle
- Monitoring of Collections and Outstanding

Building Approvals System:

- Automatic computation of License/Deviation Fees based on the Plan details
- Tracking of Applications
- Issuance of License and Occupancy Certificates
- Notices for Unauthorised constructions/Deviations from the approved plans
- Revoking of permissions
- Tracking of resubmission and Extensions
- Maintenance of Court cases details
- Registration, Renewal and Cancellation of License Surveyors
- Performance monitoring of License Surveyors

Advertisements System:

- Registration, Renewal and Cancellation of Advertising Agencies
- Registration and removal of Advertisements Boards
- Unique Identification of Boards
- Tracking of Applications
- Automatic computation of Board Tax (Parameterized)
- Monitoring of Advertising Agencies Outstanding.

Development Projects System:

- Multiple Sources/Category/Division/Asst. Engineer-wise Budget
- Exhaustive Project/Work details maintenance in the System.
- Work Identification
- Estimation

- Admin/Technical Sanctions
- Site Marking
- Tender Comparative Statement from the System.
- Work Order from the System.
- Maintenance of Measurement Books link to the Works.
- Automatic recovery of material cost with interface to Stores System.
- Tracking of payments to the contractors.
- Contractor details maintenance with multiple classes and registrations.
- MIS Reports
- Work-wise Progress
- Contractor Performance Reports
- Multiple Sources/Category/Division/Asst. Engineer Budget vs. Expenditure

Stores System:

- Support for Multiple Stores Material Maintenance
- Maintenance of Supplier details
- Maintenance of Rate Contract/Supply Agreements
- Maintenance of Purchase Orders and Amendments
- Tender Details for Multiple bidders
- Stock Receipts, Stock Issues and Stock Returns
- Periodic Stock Reconciliation
- Project/Work-wise Stock Issues
- Generation of Stock Register and Stock Ledger.
- Interface to Development Projects System.

Registration of Births & Deaths System:

- Registration of Hospital/Non-hospital events.
- Corrections to Registrations.
- Inclusion of name on a later date
- Non-availability Certificates
- Telugu Certificates
- English Translated Certificates
- Transliteration supported by a data dictionary

D & O Trades System:

- Rates Schedule maintenance
- Traders Registration/Renewal/Closure
- Registration of Addition/Deletion of Trades
- Capturing of comments at various levels in the Registration Process

- Automatic computation of License Fee and Late Fee
- Demand Generation in various stages
  * Normal
  * 1st Stage Defaulter (25% fine)
  * 2nd Stage Defaulter (50% fine)
- MIS Reports
- Trade-wise, Division-wise and Category-wise Collection defaulters
- Monthly addition/deletion list etc.

Health Programmes System: This involves maintenance of statistics of participation in various Programmes.

- Family Welfare & Immunization programmes.
- Information about national programmes such as National Social Assistance Programmes, Pulse Polio, Medical Camps.
- Division-wise hospital details like name and address of hospitals, number of beds etc. will be maintained.
- The analysis report of protected water, which is brought out every week, and
- Number of anti-malarial operations attended by sub-unit staff will be maintained.

Grievance Handling System

- Grievances/Suggestions Registration
- Work Flow based routing of Grievances/Suggestions
- Status query of Grievances/Suggestions
- Closing of Grievances/Suggestions
- Alert mechanism
- MIS Reports

Dynamic Information System

- Bus/train/flight schedules
- Telephone nos. of VMC officials
- Tender Notifications
- Job Postings
- News Letters, Press Releases
- Sight Seeing Tours
- Police Alerts
- Missing Person Notifications
- Public Notices
- Health programmes and details of health specialists
- Health Alerts
- Garbage Collection Schedule

Multimedia CD English & Telugu Versions Main topics are

- City Profile
- About VMC
- Entertainment
- Transportation

In addition to the above application software modules VOICE facilitates the following:

Commissioner

The Commissioner - the highest authority in the Municipal Corporation is accessible to the Citizens on corruption-related grievances. Various statistics and status of revenue generating sources of the Corporation, pending work details, progress of work, corruption related complaints are at Commissioner's disposal.

The Commissioner can oversee the day to day operations of the huge Corporation force operations which will in long way helps ensuring a quick and an informed decision.

About Municipal Corporation

A brief outline about the Municipal Corporation, its objectives and achievements will be at the Citizens disposal. The citizens have access to information like the names of the Corporators, their addresses, wards, addresses and phone numbers of the important Municipal Corporation officials. VOICE informs the citizens about various officials and the Corporation's progress in terms of its revenue generated and the revenue disbursal to the various department project. Ward-wise divisions, Zonal wise divisions are updated as and when the requirement arises.

Dynamic Information

Dynamic information about all utilities and services provided by Govt. and private sectors of general importance that help make life easier for the citizens is made available by VOICE Kiosks. VOICE allows the information to be updated according to the requirement and the importance of the information.

Dynamic information like schedules of Bus, Train & Flight, Newsletters, Press releases, Health alerts, Sight seeing tour packages, Social & Cultural events, Missing person notifications, Police alerts, Public Notices, Tender notifications, Statistics of trends of Births & Deaths, Population census, Defaulters, Health programmes undertaken, Emergency, Tax payers grievances addressed & settled, Garbage collection schedule, Additions & Deletions, Modifications are update by VOICE.

Multimedia Presentation

A web based Interactive Multimedia presentation about the static

information of the city, which is of common interest, if facilitated in VOICE Kiosks. The presentation, rich and colourful with the use of Audio & Video will target the tourists and visitors to the city. The interactive programme will be menu driven with all the details about the city - Tourist Destinations, Tourist facilities in and around the city; Education & Medical Infrastructure available will be available at the Kiosks.

The Multimedia presentation takes the user on an infotainment tour giving information about the city, its people, its course of journey through the history, Utilities and Services offered and its Municipal Corporation, its activities and its achievements.

Results (upto October 2003)

6,18,222 - Births & Deaths records are available.

60-80 - birth certificates are issued per day.

Counts	Upto (Oct-2003)	Demand	Upto (Sep2003)
Assessments (Property Tax)	1,26,668	Property Tax	Rs. 13,19,42,205
Water Tap	48,548	Water Tap&Meter	Rs. 3,71,20,935
Sewerage Connections	14105	Sewerage	Rs. 28,95,625
Trade Licenses	20,595	Trade Licences	Rs. 94,40,910
Birth & Death Certificates issued during the year	20,871		

(Source:- http://www.ap-it.com/voice.html)

AP ONLINE

Government of Andhra Pradesh has launched its official portal http://www.aponline.gov.in on 23rd March 2002 with a view to provide an electronic gateway to the portfolio of Government services on Internet. AP Portal is developed and managed by "APONLINE LIMITED" a Joint Venture between Government of Andhra Pradesh and TATA Consultancy Services Limited. AP Online is a digital gateway for the Government of Andhra Pradesh (GoAP) to offer multiple services, through a single window, to its citizens. AP Online is easily accessible through multiple delivery channels, homes and offices, anytime, anywhere to deliver services for citizens.

Information Services: Provide up-to-date information on a wide range of

subjects pertaining to different GoAP departments, including Functions & Services, Forms & Procedures, Key Contacts, Organizational Performance, Government Orders, Acts, Rules, Budget Documents, Prices of Essential Commodities, Memos, Advertisements, Tenders and important events. It also hosts multipurpose household survey details of over 7.6 million citizens of Andhra Pradesh.

Interactive Services: Facilitate online submission of forms including applications and requests for registrations, licenses, permits, certificates and representations to different Government departments. Complaints and grievances can also be filed.

Payment Services: Help in online payments for utilities, taxes, fees, deposits and stamp duties. Customer support on payment services like Accounting of Transactions, Deposits into Government Treasuries, Invoicing and Reporting are also provided.

Delivery Channels/Kiosks: Citizens can have access to the portal through designated APOnline KIOSKs that will be set up in large numbers in Twin cities and all over the state in short span of time. A citizen can have an integrated set of utility services from these KIOSKs and pay for any service at the same counter.

This convergence of services is going to help the citizen to pay all the bill payments at the same counter. These delivery channels would accept Credit/ Debit Cards, Cash, DD, Cheques for the payment.

A comprehensive portal www.aponline.gov.in has been launched in the month of March 2002 under PPP model to provide online services to the citizens.

eSeva APOnline launches 15 citizen services

Chief Minister N Chandra Babu Naidu launched eSeva APOnline, a joint venture between Tata Consultancy Services and Government of Andhra Pradesh. An initiative of the Government of Andhra Pradesh, eSeva APOnline is a fully computerised service that allows one to pay utility bills, file applications, and register complaints for various services.

eSeva APOnline launched 15 government-to-citizen (G2C) services, which will be available through an identified network of eSeva APOnline Centers (Service Delivery Points - SDPs) to be opened in a phased manner throughout the entire State. APOnline Limited will be tying up with different service providers like banks, cyber cafes and retail outlets to act as delivery centers for offering these services.

The services being provided to the citizens include - payment of utility bills (electricity, water), filing applications for various services like caste certificate, nativity certificates etc, complaint registrations related

to Agriculture and Animal Husbandry departments and accessing important information without having to go to the respective government departments or offices.

(Source:- http://www.ap-it.com/apportal.html)

ONLINE TRANSACTION PROCESSING SYSTEM (OLTP)

The Government of Andhra Pradesh has successfully launched the pilot project – **eSeva "Online Transaction Processing Project"**, to provide citizen services in the hinterlands of Andhra Pradesh. The Online Transaction Processing project (OLTP) has been developed by RAM Informatics Limited and CMS computers. The project is developed on Oracle technology and will run on Oracle9i infrastructure software.

The project connects 16 government departments in Andhra Pradesh on a single network. All government records and transaction procedure details at the district level will be centrally stored and managed on a single Oracle9i database, which offers full features and capabilities to deliver the scalability and performance needed for deployment of an array of applications, with the highest standards of security and reliability.

This pilot project has been implemented in Bhonigir and Shadnagar Mandals will serve the Government department users and citizens and enable them to conduct government department service transactions efficiently through specially designed inter-enabled kiosks.

These transactions can be carried out in English as well as Telugu interfaces. These services include access to information such as Income Verification and Income Certificates of citizens, Land Cultivation details, Agriculture Marketing, Tele-veterinary services, Registration of small farmers, Birth and Death records, House Numbering, first information reports, Occupation details of residents, Drinking Water details and irrigation sources, among other things.

The village kiosks can also be used to support citizen-centric transaction services which are typically conducted offline, as the system can be updated to provide online capabilities for querying transactions, email and internet access.

Replication across 1127 mandals of the state will be taken up in a phased manner.

Objectives of OLTP:

- The OLTP aims at integration of the Information Systems of various government departments horizontally at mandal level as well as vertically from the village to the state level.
- To enable automatic updation of core data of land and citizens through the use of hand held PDA's and information kiosks at the village level.
- To enable web-based citizen interface for delivering of services and

  providing access to information.
- To enable convergence of services of the Government agencies and derive synergy by sharing of data across departments.
- Provide backend support to the AP Govt. Portal –
  www.aponline.gov in

Technology used:

☐ Microsoft Technology at Bhongir
- Biztalk server for enterprise integration
- SQL
- Windows platform for client & server

☐ Oracle Technology at Shadnagar
- 9i AS Application server
- JSP front-end

System developed / Implemented by:

- Inspira Technologies Ltd & United Telecom Ltd. in Bhongir, Nalgonda District, AP
- Ram Informatics Ltd & CMS Computers Ltd., in Shadnagar, Mahaboobnagar District, AP

Results (February 1999 to December 2003):

Bhongir pilot : Achieved 10,000 transactions up to December 2003.

Shadnagar pilot: Achieved 3500 transactions up to December 2003.

SMART GOV

The Secretariat is the apex administrative body of the State Government with primary responsibility to formulate policies, procedures, rules and guidelines that will govern the implementation of various schemes and projects by the implementation authorities of the government outside the Secretariat. The predominant work done at the Secretariat is workflow intensive, with immense flow of information in the form of "files" from one officer to another in this process, for seeking opinions, approvals and comments. Some of this work requires the creation and maintenance of data-

bases that hold data critical to the decision making process. SmartGov, which is an integrated product, developed for and deployed at Secretariat, Government of Andhra Pradesh, India by Tata Consultancy Services, answers the problems faced by Secretariat, through its immense high-quality features. SmartGov automates the functions of the executive Government bodies at all administrative levels. The Secretariat is being computerized to provide electronic file system in 30 departments involving over 2,000 employees at all levels. This complex project was launched initially in 14 departments on 1st November 2002.

More than 50,000 e-files have so far been processed over SmartGov apart from converting 42,000 existing physical files to e-files by scanning them. In addition over 155,000 currents that have come to various departments have been scanned and uploaded into the system. SmartGov is being implemented in all the departments in secretariat. The version 3.0 of SmartGov with improved functionality features has been released on 20th October 2003. There is a plan to productize SmartGov and deploy it in all major Govt. offices in the state.

The objectives of SmartGov project are
- Automate the workflow of AP Secretariat
- Enhance employer productivity
- Integrate various departments through workflow
- Create and enable online access to knowledge base of AP Govt. (like Acts, GOs, rules, judgments, policies, references from Judiciary and Central Govt. Dept., etc.
- Monitoring and tracking of files to enable speedy clearance through informed decision-making.
- Creation of a Paperless Secretariat

TRANSFERABILITY/REPLICATION

SmartGov is a framework and not a product, built and implemented with a perspective of up scaling and replication. It can be up scaled to do forward and much needed backward integration connecting the HODs, District Administration and Sub-District units that have a citizen interface on a day-to-day basis. It could also be replicated in other state Secretariats and administrative units.

AWARDS AND LAURELS
- **WARIA Silver Award 2003** - Global Award for Excellence in Workflow stamped the effective use of Workflow management in the SmartGov framework - by WFMC and GIGA International Group, USA.
- **Lotus Beacon 2003 Award** - International award for distinguished

solution using Lotus technologies of Workflow, Document Management and Notes.

Technologies used:

Multi-tier architecture

Lotus Notes , Lotus Domino.doc, Oracle 8i

AIX, Windows & Linux operating systems

Windows clients

Achievement

Number of e-files initiated	60,411
Number of currents initiated	1,91,709
Number of files scanned and loaded on the server	44,017
Average number of e- file transactions per day	1,200

IFIS (Integrated Finance Information System)

IFIS project aims at integration of applications in Finance and its associated departments for efficient and effective management and control of receipts to Govt. and payments by Govt., effective budget processes, accurate online status of financial state of the Govt., integration with banking and financial systems for receipts and payments of all kinds, create transparent financial system to the citizens and business organizations transacting with the Govt. This involved integrating the computer networks of 297 Sub-treasuries, 23 District Treasuries, 5 Pay & Accounts Offices, 38 Works & Projects Offices, the office of Accountant General, the Directorate of Treasuries and Accounts and 2 branches each of State Bank of India & Stat Bank of Hyderabad (a total of 370 locations) to the network of the Finance Department at the Secretariat.

OBJECTIVES

- Integrated information news of various organizations within the Finance Dept. like Small Savings, AP GLI, AP Audit, AG, etc.) and sub departments (DTA, DTO, STO, PAO, WAO etc.)
- Efficient and effective management and control of receipts to Govt. and payments by Govt.
- Effective budget processes
- Provide accurate online status of financial State of the Govt.
- Integrate with banking and financial systems for receipts and payments of all kinds.

- Create transparent financial system to the citizens and business organizations transacting with the Govt.

STATUS

- Agreement signed with TCS in June 2002.
- Pilot completed in February 2003
- Roll out has been completed in all DTOs, STOs across the state; DTA, AG, SBH, SBI, PAO, W&P in twin cities.
- Access has been given to all Secretaries, Section Officers and Desk officers in finance Department

HUMAN RESOURCES MANAGEMENT SYSTEM (HRMS)

Government of Andhra Pradesh has more than one Million public functionaries working in several departments, state-owned PSUs, state-run societies and other government bodies. The Government is responsible for the welfare of its employees and manages them very effectively to build a very competent, motivated and efficient workforce. All services that the Government provides to its employees will now be categorized under the broad framework of Government to Employee (G2E) system. Apart from having extensive features for management of all HR processes, the HRMS system also offers a comprehensive employee self-service, payroll and learning management systems that are well integrated. In order to manage the human resources efficiently and provide better services to the Government employees, it is felt necessary to develop and deploy an integrated Human Resources Management System (HRMS) across all the departments and Government owned organizations in a phased manner. This system would also help in management of deployment of valuable resources across the state in payroll and employee benefits through several institutions and schemes set up for the purpose.

2.   Key objectives of HRMS are:
- Develop a single and integrated view of employee information across all departments of GoAP
- Higher utilization of existing infrastructure and technology investments
- Provide Timely & reliable management information relating to human resources for effective decision making
- Integration with other related applications such as Treasury, payroll, etc.
- Provide single-window services to employees
- Provide user-friendly environment accessible over browser
- Provide anytime, anywhere learning.

3.   Various modules proposed to be developed in the HRMS system

are as listed below. Indicative modules of the integrated HRMS Solution including Employee Self-Service, payroll & Learning Management System are shown.

HRMS & Payroll

Recruit-ment/ Appoint-ment	Promotion of Non-Gazetted Staff	Training Administra-tion	Loans & Advances	Resigna-tion	Payroll Processing
Pay Fixation	Regulariza-tion of Staff	Career Planning	Processing of LTC	Retire-ments	
Unique ID Manage-ment	DPC Meetings	Processing of ACR's	Processing of Medical Reimburse-ment		Provident Fund
	Increments	Processing of Transfer of charge	Vehicle Manage-ment		Processing of APGLI
	Seniority Matters	Probation/ Suspen-sion / Termination	Housing/ Quarters Manage-ment		Processing of Bills (Telephone /Newspa-per, etc.
	Additional Pay	Deputation (Foreign / Others)	Travel & Tour Manage-ment		Time & Attendance Manage-ment
	GO Knowl-edge-base	Compul-sory Waits	Leave Manage-ment		
		Perfor-mance Appraisal	Acquiring / Disposal of employee assets		

Processing of Court / ACB Cases	Grievances & Redressal Management

Service Register

Abbreviations used:
DPC – Departmental Promotions Committee
ACR – Annual Confidential Report
ACB – Anti-Corruption Bureau
LTC – Leave travel Concession
APGLI – Andhra Pradesh General Life Insurance

      The HR framework envisaged broadly covers the spectrum of employee related functions including Payroll activities. While this represents the common framework, there are certain departmental specific functions, which are relevant to only that department. Such functions will also be studied and developed as separate modules applicable to specific departments.

4.   HRMS has been identified as one of the core initiatives of Government of Andhra Pradesh. In order to ensure its successful implementation, it is also felt necessary to constitute a Project Implementation Committee (HRMS PIC).

5.   Government after careful consideration of the above hereby accord administrative approval for implementation of HRMS and also constitute a Project Implementation Committee (HRMS PIC) with the following:

    1.   Spl. Chief Secretary (AR), GAD - Chair Person
    2.   Principal Secretary (Home) - Member
    3.   Principal Secretary (Finance) - Member
    4.   Principal Secretary (Revenue – CT) - Member
    5.   Principal Secretary (IT&C) - Member
    6.   Principal Secretary (Social Welfare) - Member
    7.   Secretary (School Education) - Member
    8.   Secretary (e-Governance) IT&C Department - Member
    9.   Special Secretary to CM - Member
    10. Director (Technical), IT&C Department - Member-Convener

6. Project Implementation Committee (HRMS PIC) would be responsible for:

a) Overall supervision of the project.

b) Evaluation of offers from bidders and entrustment of work

c)   Coordination among all the relevant Departments in GoAP for this project

d)   Approve the strategy, timeframe, resources and other inputs for the implementation of the project

e)   Be the highest decision making body in respect of all matters in the project that may arise from time to time during the implementation of the project.

f)   The HRMS PIC shall meet once in a month on a regular basis or as and when required during the project tenure, whichever is earlier. The HRMS PIC may co-opt experts or consultants or special invitees to assist, advise or provide any service that the PIC may deem necessary for the project

g) Select a suitable organization through an open tender basis for undertaking the project, which involves detailed custom designing, development, testing and implementation of the Project.

h) Evaluate and initiate the procurement of hardware, software networking and other equipment and services required for successful implementation of the Project.

i)   Dealing with any matter incidental to the above terms.

7. After ensuring the successful completion of the project, the HRMS PIC is authorized to retire / dissolve itself after communication to and acceptance by the Government.

8. The IT&C Department will make necessary budget provision for the project during its tenure starting from the financial year 2002-03.

Status:

The project is commenced in November 2002 and is expected completion and launch by March 2004

Development of Software is in progress. Soft launch of LMS is completed at Dr. MCR HRD Institute of AP, Jubilee Hills, Hyderabad.

Conclusion

One could see the listing of e-Governance projects initiated and implemented in the State. The electronic services cover a score 20 areas, quiet unimaginable a couple of decades ago. These services make life easy.

CONTRIBUTION OF CGG TOWARDS GOOD GOVERNANCE

The Centre for Good Governance (CGG) was established by the Government of Andhra Pradesh (GoAP) in October, 2001 to help it achieve the State's Vision 2020, particularly the goal of Transforming Governance. CGG coordinates and supports the designing and implementation of GoAP's Governance Reform Programme. CGG undertakes action research, provides professional advice to, and conducts change management programmes for government departments and agencies to help them implement their reform agenda successfully. CGG works closely with policy-makers like Ministers, officials, experts and other stakeholders, especially citizens, to promote Simple, Moral, Accountable, Responsive and Transparent (SMART) government.

Campus

CGG is located on the 30-acre campus of the Dr. MCR HRD Institute of Andhra Pradesh in the stunning, rock-bound Jubilee Hills area of Hyderabad. The site, which is surrounded by greenery, is located about 10 kms from the Begumpet Airport and is close to Hi-Tech City, the IT hub of the State, Shilparamam, the cultural centre of Andhra Pradesh, the Indian School of Business and the International Institute of Information Technology, both world-renowned centers of academic excellence.

CGG Vision

CGG aims to be a world-class institution to guide governance reforms in Andhra Pradesh, India and the developing world, by bringing together knowledge, technology and people. CGG strives to be among the very best in the world in the area of practical reforms to foster growth-oriented and people-centred good governance

CGG Objectives

- To work with government departments and other stakeholders to analyze key issues in governance, identify solutions, help develop action plans, and support implementation of governance reforms
- To act as a think tank and help translate government goals, objectives and policy priorities into tangible reform actions in the areas of governance
- To identify those areas for change that will make the most impact in improving performance and policy-making in government and enable it better to respond to the needs of the people
- To create a bank of best practices and tools in governance re-

forms, including e-governance
- To support change management programmes in government to effectively carry forward governance reforms and to develop a reform communication strategy for wider implementation and to build capacity within the government.
- To provide consultancy services to state and local governments and international and national organizations in the areas of design, action research and implementation of governance reforms, including administrative reforms.

CGG Projects
Simplifying the Government
Completed
- Food-for-Work Tracking in Andhra Pradesh
- Performance Tracking System for Education Department
- Welfare Sector Performance Tracking

Ongoing
- Generic Tracking System for "Government Engineering Works" Programme
- Performance Monitoring and Evaluation System in the Welfare Sector

Moral Government
Completed
- Management of Disciplinary Cases
- Analysis of Judicial Processes

Ongoing
- Government Records Management
- Effective Handling of Government Litigation
- Judicial Process Review
- Designing Performance Based Placement Reward and Punishment System in Government

Accountable Government
Completed
- Citizen's Charter Implementation in Selected GoAP Departments
- Citizen's Charter Guide
- Study of Citizen's Charters in Gram Panchayats in Andhra Pradesh
- Outsourcing and Civilianization of Police Functions in Andhra Pradesh
- Preparatory Work for the Andhra Pradesh Performance Accountability Act, 2003
- Social Audit Methodology for Government Departments and Com-

munity Organizations

Ongoing
- Maithri-Study of Community Policing in Andhra Pradesh
- Inter State Study on Decentralization Strategy and Measures to Strengthen Panchayat Raj System in Andhra Pradesh
- Social Auditing Methodology for Select Departments in Government of Andhra Pradesh

Responsive Government

Completed
- Study of Corruption-prone Processes in some GoAP Departments
- Study of Grievance Redressal Mechanisms in Revenue Department
- Review of the Establishment of Directorate of Works Accounts

Ongoing
- Strategic Review of Revenue Department
- Study of Corruption-prone Processes and Development of Perception Indices
- Study on Guaranteeing Title to Land in Andhra Pradesh

Transparent Government

Completed
- State Financial Accountability Assessment (SFAA)
- SFAA Methodology
- Review of Public Consultation Exercise on the Annual Fiscal Framework
- Performance-Based Budgeting- A Tool for Performance Management

Ongoing
- Establishment of Audit Commission for Guiding Audit of Local Bodies

Policy and Performance

Completed
- Public Sector Reforms in New Zealand- A Case Study
- Best Practice Guide to Strategic Reviews of GoAP Departments
- Study of Finances in Municipalities and Municipal Corporations in Andhra Pradesh

Ongoing
- Change Management-Preparation of Modules, Implementation and Capacity Building
- Leadership and Teamwork Module for Government and Training

E-TOOLS FOR GOOD GOVERNANCE IN AP DEVELOPED BY CGG
ONLINE PERFORMANCE TRACKING SYSTEM
Performance Management System

In line with the Governance Reform Agenda inherent in the Vision 2020 document, GoAP took the initiative in September 2000 to establish a Performance Measurement and Evaluation System (PMES) based on performance indicators to track, measure, review and improve the performance of Government departments and functionaries. GoAP has been focusing on performance measurement and tracking as a key instrument for improving the delivery of services and infrastructure to the people. The PMES at present encompasses 214 State Government Departments and other quasi-governmental and autonomous organizations in the state. The strategic objectives behind performance management are:

- To create a performance culture and ethos across public service in terms of "shared" values, "outcome" orientation and "best" practices
- To promote accountability of employees and organizations in using resources and ensuring that implementation objectives are met
- To empower citizens to generate pressure for change and transformation
- To guide capacity building development for better governance
- To contribute to overall development agenda

The performance management model adopted by the state of Andhra Pradesh is depicted in Figure 1. The performance management cycle involves policy-making, planning and budgeting leading to programme

Figure 1
Performance Management Model

implementation followed by assessment and feedback and then going to
the policy-making.

Performance Tracking

The performance management, monitoring and evaluation experi-
ment undertaken by Andhra Pradesh is based on a performance tracking
system which envisages the participation of all stakeholders at all stages,
starting from and ultimately feeding into the planning and performance
budgeting processes. The entire process begins with the identification of
the input-output-outcome linkages. The most important and challenging
tasks are the selection of performance indicators, setting measurable tar-
gets and monitoring and evaluating performance by the use of composite
criteria. The state government has classified government departments into
eight groups depending on the pre-dominant role the government will need
to discharge as per Vision 2020.

Table 1

Andhra Pradesh: Group-wise Classification of Departments

Group	Group Description	Role of Government
Group I	Economic Development (Primary Sector)	Facilitator of economic growth
Group II	Economic Development (Secondary & Tertiary Sectors)	Facilitator of economic growth
Group III	Human Development	Promoter of human development
Group IV	Welfare	Directly undertaking services for the socially backward and needy
Group V	Local Bodies and Self Help Groups	Decentralization and strengthening of local governments to enable them to discharge civic obligations
Group VI	Infrastructure Development	Building economic & social infra-structure
Group VII	Revenue Generation	Mobilisation of resources for development
Group VIII	Governance (Regulatory & General Services)	Provider of general administration, and regulatory services, upkeep of land records and maintenance of law and order

Performance Indicators

Performance indicators are measurable factors of extreme importance to any organization in achieving its strategic goals, objectives, vision and values. Performance Indicators measure the deliverables of departments and functionaries to:

- Indicate the progress made towards achieving the goal;
- Provide a common framework for gathering data for measurement and reporting;
- Capture complex concepts in simple terms;
- Enable review of goals, objectives and policies;
- Focus the organization on strategic areas; and
- Provide feedback to organization and staff.

Performance indicators can be classified into

(1) Input indicators: measures of economy (related to unit cost) and efficiency (related to resource use: time, money or number of people),

(2) Output indicators: measures of effectiveness (related to programme activities and processes) and

(3) Outcome indicators: measures of quality (related to set standards) as well as impact (related to achievement of overall objectives) that allow us to check whether our development strategies and policies are working.

Through a process of rigorous exercise for about three years, which involved the time of the Chief Minister of Andhra Pradesh himself for more than 300 hours, different departments in the Government have been able to map their inputs, outputs and outcomes and arrive at a set of performance indicators divided into core, functional and departmental indicators. A total of 980 Performance Indicators have been adopted for more than 200 Departments and other quasi-governmental and autonomous organizations in the state.

Process Indicators

Process indicators are measures, which indicate the processes adopted to make an organization run its activities. As regards the Government of Andhra Pradesh, the process indicators adopted include the following:

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Table 2
Andhra Pradesh: Process Indicators

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Group	Process Indicators
Reviews, Tours and Inspections	Review meetings (Performance & Process), Days toured, Office inspections undertaken, Surprise inspections undertaken, Routine inspections undertaken
File Disposal	Disposal of files of Public importance, Court cases, Service matters and Other files
Action in Important Matters	Action taken in Vigilance cases, ACB cases, Commission of Enquiry cases, Departmental Enquiry cases, Audit reports/paras, Chief Minister's announcements, Chief Minister's office references, and Adverse media reports.

Fixing Measurable Targets

Performance target equals the baseline indicator level plus the desired level of improvement. To set meaningful targets, departments are required to identify their short-term and long-term objectives and align them with the Vision 2020 goals. This involves a collective effort by the policy makers as well as implementation teams in terms of resource planning and prioritising government programmes, schemes and services. Targets are fixed based on discussions and bottom-up feedbacks at various levels of hierarchy beginning at the secretariat and drilling down to the district, mandal and village levels. For each function, each functionary and each territorial jurisdiction, annual, quarterly and monthly physical and financial targets are set. The departments have been directed by the Government to study the levels of indicators for five best states and benchmark with the best.

Measuring Performance

The Government has adopted the 4-F model for tracking and measuring performance viz., field (geographical location—village, mandal, taluk, district, and state), function (services—agriculture, industry, education, etc.), functionary (people in respective responsible posts), and finance (allocation and utilization of funds). Measurement of performance is done deploying the Hexagon Model. This model tracks:

- Where a department or functionary is in a month compared to earlier

months
- To what extent a functionary has achieved his annual target
- How does he compare with the achievement for the corresponding period of last year
- How far he is from the Vision 2020 or forward target
- How far he is from the benchmark, fixed, if any and
- How does he compare with his colleagues of the same level or designation

Grading of Performance

All departments, jurisdictions and functionaries are graded every month according to the percentage of target achieved. The criteria for grading adopted by the Government based on the suggestion of the Centre for Good Governance (CGG) are as follows:

Non-revenue earning departments

% of target achieved	Grade (score)
= 100%	A (4 points)
90-100%	B (3 points)
75-90%	C (2 points)
< 75%	D (1 point)

Revenue earning departments

% of target achieved	Grade (score)
= 100%	A (4 points)
95-100%	B (3 points)
90-95%	C (2 points)
< 90%	D (1 point)

Performance Reviews

A thorough review of performance of all departments and other quasi-governmental and autonomous organisations in the state is held monthly, quarterly, and annually by the Chief Minister and at the levels of Ministers and Secretaries to GoAP. This leads to tracking of progress and recommendations for performance improvement. Reports on action taken for performance improvement by the respective departments/functionaries are reviewed in such meetings. Every quarter conferences of Heads of Departments and Collectors of districts are held, which are attended by the Chief Minister, Ministers, Secretaries, HoDs and the print and electronic media. These open meetings act as pressure mechanisms to drive performance at various levels. The Government is contemplating a system of performance-based incentives and disincentives.

Implementation Arrangement

To develop a common framework for measuring and tracking the performance of government departments and functionaries, CGG designed 7-Formats in May 2002 for reporting performance information. These 7-formats seek to gather information on performance indicators: department-wise, field-wise and functionary-wise; process indicators; and expenditure statement.

The initial process, which was followed till December 2002, involved submitting a hard copy of the monthly performance reports as per the formats designed by CGG. The information received from the Departments was then fed manually into the computer and MS-Excel spreadsheet package used to generate various performance reports. This system of reporting took several days to process and involved immense calculations before a report was prepared. In this system there was a chance of losing data while maintaining huge stocks of files built as a result of paper-based work. Besides, the process involved inconsistency in reporting of data, no validation checks while submitting the performance data, inconsistency in calculations, no transparency, etc. The lack of a centralized data system left very little scope for generating various kinds of performance reports required for an effective review.

Online Performance Tracking System (OLPTS): "P-Track"

In parallel work began on automating the entire system. An online performance tracking system, called "P-Track" has been developed by CGG that provides an effective tool for performance management and also addresses the problems encountered in the manual system.

"P-Track" is a robust computer package designed to measure, track and grade performance and generate a number of reports for review purposes. It assesses the performance of functionaries and departments on the basis of pre-determined targets. The tool is being extended from departments at the state-level to districts and mandal levels. It is a generic package applicable to both government and private sector. CGG has initiated the process of patenting the product, which is based on months of brain-storming and hard work.

Objectives of "P-Track"

- To bring transparency and improve accountability in the government;
- To assess the impact of government-run programs;
- To systematically evaluate departments, functionaries, institutions, and programs;
- To link the performance tracking system with all other performance assessment systems (media analysis & information system, peoples'

feedback, etc.); and
• To support objective assessment for incentives and disincentives.

Steps in the Design & Implementation of "P-Track"

The basic elements that aided in the design and development of P-Track are government departments, functionaries, their territorial jurisdictions and process workflows in the respective departments. The steps involved are:

a)Requirements Phase: The development team held several meetings with the Secretaries and Heads of the Department and other senior officials of various Government Departments. These interactions helped the team to appreciate all the constraints and issues involved in modeling P-Track.

b) The Design Phase: The organizational structure of the government and its departments was viewed as hierarchical model where in the superior-subordinate relationship of various employees and territory-sub territorial relationship of various territorial jurisdictions was mapped. Subsequently proper database was designed to accommodate the model.

c) Application Phase: P-Track has been implemented as a web based application to make all functionaries part of the system who are spread over various districts in the state.

d) Testing Phase: The package went through a series of rigorous tests after which the final product was deployed.

e) Training Phase: Training was given to all the concerned government functionaries (Ministers, their PS/PAs, Secretaries to GoAP, HoDs, District-level functionaries) on the usage of P-Track.

Features

"P-Track" is a comprehensive, user-friendly, automated management information system, which is designed to send performance information from the respective lower level functionaries to the immediate superiors of the department through the web. The system works in a systematic manner to evaluate functionaries, institutions, programmes, and departments on the basis of indicators identified for both performance and processes. Target fixing and resource allocation is carried out in the system by the top-down process, wherein targets and resources are distributed step by step from the highest to the lowest level. The data sent by departments is maintained in a centralized database that can be tracked and monitored from a focal position. The present "P-Track" is in its fourth version.

Current features of "P-Track" are:
• Individual Login accounts for 38 Ministers, 42 Secretaries, and

214 Heads of Departments for giving information on their perfor-
mance indicators, process indicators and expenditure statement,
wherever applicable;

- Provision to specify organization structure, addition/updation of
functionaries, institutions, departments and indicators;
- Provision for setting target distribution: field-wise & functionary-
wise;
- Assigns responsibilities at each level: who, what, when, where,
why, how, etc. in data collection, reporting and measurement;
- Automated information flow, computation of grades, ranks, and
generation of a variety of reports for effective and informed deci-
sion making;
- Performance Measurement & Grading at various levels – Minis-
ter, Secretary, Heads of Departments at State and District levels.

On a periodic basis (monthly as it is now) performance-related data is
sent by Ministers, Secretaries, and state-level HoDs through "P-Track".
Minister's Login:

- Number of Ministers who have been given individual logins and
passwords: 38
- Number of input forms prescribed for Ministers is ten. This cap-
tures information relating to
  - Report Submission Dates;
  - File Disposal;
  - Tours, Inspections & Visits;
  - Departmental Attendance;
  - Departmental Review Meetings and Training/HRD;
  - District Review Meetings;
  - Media Relations;
  - Other Programmes (meetings with focus groups, public
forums/meetings addressed);
  - Best Practices and Innovations Undertaken; and
  - Matters of Special Importance brought to the notice of
the Chief Minister
- There is a provision for addition/updation of input forms as per
requirements.

Reports available in Minister's login:

- Minister wise Reports (All Ministers report, Minister wise Secre-
taries report, Minister wise HoDs report);
- Secretary wise Reports (All Secretaries report, Secretary Vs. All
Secretaries report, Secretary wise HoDs report);

- Group wise HoDs reports; and
- District wise Performance reports.

Secretary's Login:
- Number of Secretaries who have been given individual logins and passwords: 42
- Number of input forms prescribed for Secretaries is four. This captures information relating to
  - File Disposal,
  - Tours & Inspections,
  - Review Meetings,
  - Action in Important Matters
- There is a provision for addition/updation of input forms as per requirements.

Reports available in Secretary's login:
- Secretary wise Reports (All Secretaries report, Secretary Vs. All Secretaries report, Secretary wise HoDs report);
- Group wise HoDs reports; and
- District wise Performance reports.

HoD's Login:
- Number of HoDs who have been given individual logins and passwords: 214
- Number of input forms prescribed for HoDs is Nine. This captures information relating to
  - Department's State-level Annual and Months Targets by Performance Indicator,
  - District's Annual and Months Targets by Performance Indicator,
  - Department's State-level Month Achievement by Performance Indicator,
  - District's Month Achievement by Performance Indicator,
  - File Disposal,
  - Action in Important Matters,
  - Review Meetings,
  - Tours & Inspections,
  - Expenditure Statement
- There is a provision for addition/updation of input forms as per requirements.

Reports available in HoD's login:
- Group wise HoDs reports; and

- District wise Performance reports

Types of Reports

P-Track comprises of performance information fed into the system and a host of reports are generated for purposes of evaluation, review and feedback. A few of them include reports on:

- Monthly & cumulative targets and achievement with respect to performance indicators at state-level and districts-level;
- Various process indicators: Reviews, Tours & Inspections, File Disposal, and Action in Important Matters;
- Financial achievements;
- Integrated, performance and process scores and grades reports for departments, department groups, territorial jurisdictions and functionaries;
- Competitiveness assessment of departments, functionaries and territories;
- Trends of all indicators and their differentials;
- Best to Worst Achievers list;
- Hexagon Model Reports.

Advantages and Utility of P-Track

"P-Track" facilitates effective management of data, provides distributed services to employees, ushers transparency in governance, brings about responsiveness among functionaries, assists in rapid retrieval of data, and most importantly, it is simple to use. "P-Track" enables integrated grading and achievements assessment of functionaries, institutions and departments on the basis of targets fixed and responsibilities given. The system is programmed to facilitate easy and cost-effective communication between departments, thus saving on time, resources, and cumbersome procedures. Some of the advantages are:

- Periodical summary reports aiding Ministers, Secretaries to Government, Heads of Departments and District Collectors in their periodic Review Meetings;
- Precise information to manage resources efficiently and effectively;
- Assessment of 'where we are', 'how we are progressing', and 'what to do' in order to progress in a desired direction at a desired pace;
- Increased individual department's ability to identify or "red-flag" problems early;
- Linked employee objectives and functions to overall department's objectives, thereby creating a sense of contri-

bution for the employee;
- Enhanced communication by ensuring clear understanding of department expectations about results;
- Facilitates performance feedback on an objective basis;
- Provides a centralized record of performance of each functionary.

Features on the anvil
- Presently the system is functioning at the state-level i.e. information is first collected from various levels within a department and then the integrated information is fed into P-Track using the state-level login account. With enhanced internet connectivity at district and lower levels, work is in progress to further drilldown the system and create login accounts for functionaries at various levels within a department such as the information comes directly from lower levels and gets integrated automatically at the state level.
- Provision for setting target models by indicator, by functionaries, by department and field-wise.
- Integration and Linkages with External Assessment – Media Perception, Peoples' Feedback, Call Centre Service Fulfillment etc.
- Links to 'best practices'.

Lessons learned and documentation
The present "P-Track" is in the fourth version. It is a flexible system which has evolved gradually based on the users' feedback. Following documents related to performance management have been documented at CGG:
- User manual on "P-Track"
- Manual on Performance Management in Government

Transferability/Replication
This initiative in general relates to the field of performance measurement and more particularly to performance measurement & tracking of government departments and functionaries. It is a generic package and is capable of application in the private sector as well.

Conclusion
Developing a sound performance management system involves the careful designing of several aspects. These include, establishing profile: vision and mission, clarifying and delegating responsibilities, creating internal institutional mechanisms, preparing departments and organizations, facilitating system development, supporting implementation, preparing for management of "change", developing framework for innovation

and accountability, assessing current reality, identifying stakeholders and creating structures for stakeholders' participation, developing performance monitoring and evaluation system, including performance indicators-baselines-targets-data collection-data analysis-reporting-publishing and adopting the system, implementing the system: gathering data, monitoring, measuring, reviewing, evaluating, reviewing and improving performance, etc. The process involves many challenges.

Countries have taken decades to establish a sound performance management system. The Andhra Pradesh experiment is only three years old. To measure is to know. There is no alternative to performance measurement if one is serious about improving performance – whether in private sector or in government. The Government of Andhra Pradesh considers the performance management system as a tool for improving performance. It is focusing on how to use this tool effectively. The virtue of simplicity – "Keep It Simple" – is kept foremost in mind by the policy-makers. Future directions include the improvement of indicators and linking quantitative measurements to qualitative assessments. All efforts are to usher in an era of good governance in consonance with Vision 2020 goal of "*Swarna* (Golden) *Andhra Pradesh*".

Food For Work & Sampoorna Gramin Rozgar Yojana
Backdrop

Creation of employment opportunities with food security has been an important objective of developmental planning in India. The relatively higher growth of population and labour force has led to an increase in the volume of unemployment and under-employment from one plan period to another. To make a dent on the prevailing poverty, unemployment and slow growth in the rural economy and to provide food security, there is an urgent need to provide a demand driven infrastructure at the village level to facilitate faster growth in the rural areas and to increase opportunities of employment through access to the market oriented economy.

Introduction

1. Food for Work Programme (FFW), a notable scheme, in Andhra Pradesh has emerged as a successful measure to address the problem of food shortage and to simultaneously encourage self-employment.

The idea is simple but effective. This is a scheme providing food grain in exchange for work. It has succeeded in generating employment through more than 5 lakh works, involving a cost of around 2400 crores. But the success of a project of such a huge extent needed an intelligent and effective management and tracking system.

Food for Work Monitoring System provided a ready made answer to all the problems and obstacles. It not only manages a huge database, maintains login password for almost 1 lakh officials, generates several kind of reports but also provides an effective mechanism for the Government, to track the progress and performance of the project at all levels.

2. **Sampoorna Grameena Rozgar Yojana** is a scheme which aims at providing wage employment and ensures food security in drought affected areas. The Prime Minister of India launched the scheme on 15th August 2001 with an outlay of Rs.10,000 crores. Accordingly the Ministry of Rural Development reviewed the hitherto ongoing schemes like the Employment Assurance Scheme (EAS), (the only additional wage employment scheme for rural areas) and the Jawahar Gram Samridhi Yojana (JGSY) (a rural infrastructure development scheme) and by merging them into one scheme, launched the New Scheme called the Sampoorna Gramin Rozgar Yojana (SGRY).

Objectives of the Programme

- To provide wage employment to every person seeking employment within the area he/she is residing. The effort is to reduce the need for unusual migration of labour due to the adverse conditions, from the affected villages;
- The works taken should engage only manual labour and usage of machinery in any form is strictly prohibited;
- The District Collectors should make efforts to meet the felt needs of the local areas. This programme should be availed in all affected villages of the state;
- The District Collectors should convene meeting of all the Departments including NGO's and identify the works village–wise and scheme-wise where labour component is involved for dovetailing works under the programme;
- The District Collectors shall endeavor to ensure that at least one work is commenced in each habitation to avoid hardship to the local workers in view of the drought and to avoid migration;
- As and when there is need, a second or third work can also be commenced;
- To this effect, funds available under different schemes of all the Departments / Local Bodies / PRIs / Market Committees / NGO's / Government Agencies / Corporations shall be worked out and still if any gap is existing, the District Collector may send necessary proposals to the Government, for allocation of funds.

Situation before the Initiative
Daily news coverage of irregularities
Press and Electronic media gave a wide publicity of the irregularities in works. As the system had no transparency people believed what ever the media had published;
Lack òf proper documentation
The work details, Audit details, meeting details, muster rolls were not maintained properly by the authorities.
Lack of accountability
There wasn't much clarity at the highest levels about the workwise responsibilities of the each functionary.
Non- Availability of Food Grains
The food Grains could not be distributed in time to the workers. The reason was non availability of the food grains. Planning for transportation of the food grains beforehand was not possible due to lack of information. No proper details of the works taken up, the number of people involved in the work and the demand for food grains was maintained.
Details of the Programme
Works to be taken up
- In the Food for Work and Sampoorna Grameen Rozgar Yojana (Special Component), preference is given to labour intensive works, which contribute to drought proofing. Keeping in view the objectives of this programmes, the following works are suggested to be taken up under SGRY (Special Component):-
  1. Neeru-Meeru works like moisture conservation, watershed development and water harvesting including check dams;
  2. Digging or desilting of ponds / tanks;
  3. Construction of Community Tanks (manually);
  4. Construction of Rural link roads to upgrade earthen roads to metal roads;
  5. Afforestation of Forest Department & A.P. Forest Development Corporation:
     - Raising Fodder in Government / Community lands and pot lands with buy-back arrangements;
     - Farm roads linking to agricultural fields;
     - Development of socio-economic assets such as schools, kitchen sheds for schools, dispensaries, community centers, Panchayat Office, development of hats (markets) etc.
     - Compound Walls and toilets in schools;

- Maintenance of R&B Roads like clearance of shrubs and maintenance of shoulders and berms;
- Blacktop Roads;
- Cement Concrete Roads.
- Construction of Farm ponds in Private lands.

Identification of Works

- In each village a shelf of Projects / Works are prepared by the Sarpanch and placed before the Gram Sabha for consideration. The Shelf of Projects / Works includes works useful to the community;
- Works at the weaker section localities are given preference;
- The Gram Sabha considers the proposals and passes resolution recommending the proposal to the Collector for according administrative sanction;
- The Gram Sabha also selects the works of its choice, prioritize the works and recommend the same to the District Collector;
- The Government Departments like Irrigation, Roads & Buildings, Education, Social Welfare etc. intending to dovetail their works with Sampoorna Grameen Rozgar Yojana (Spl. Component) also recommend their works to the Collector for according sanction.

Administrative Sanction

- The District Collector issues administrative sanction to all such works proposed by Gram Sabhas of the affected areas as per the priority;
- The District Collector also considers the proposals sent to him / her under guideline 6.5 and accord administrative sanction.

Preparation of Technical Estimates

- The MEO and other Engineering Officials from different departments prepare the technical estimates for the works approved in the Gram Sabha basing on the SSR rates. The MEO / concerned Engineer on getting the sanction from the Collector obtains the technical sanction from the competent authorities;
- The MEO / concerned Engineer also prepare 'peoples estimate', basing on local existing rates for all the approved works. In the 'peoples estimate', the MEO / concerned Engineer draws a comparison of rates provided in the technical estimate as per SSR and the local prevailing rates;
- The works administratively sanctioned are executed by strictly following the procedures / guidelines issued in G.O.Ms.No.375 of PR & RD Department, of the Government of Andhra Pradesh,

dated.15.12.2001, in which the concept of 'peoples estimates' involvement of stake holders, formation of Vigilance Committees, conduct of Avagahana Sadassus are clearly laid down;

- The Panchayat Works Committee conducts Avagahana Sadassus thrice at the work spot i.e. before starting the work, after completion of 50% work and on the completion of the work. In the first Sadassu, copies of **'peoples estimates' are** distributed to all the stakeholders and the concept of **'peoples estimates'** and cost effective analysis (Difference between SSR and Local rates) with the anticipated savings is to be explained in detail;

- A Vigilance Committee is to be formed by the MEO / concerned Engineer / Panchayat Secretary for each work with 5 Members from among the user groups / stake holders. The Vigilance Committee shall watch the receipt of material, quality and utilization of material / rice received at the work spot;

- The Vigilance Committee shall maintain one register for each work and enter all details of conduct of Avagahana Sadassu, **'peoples estimates'** daily arrival of materials, workers engaged, Rice distributed etc;

Sanction of the Rice

- The District Collectors scrutinize and make available rice as a matching share for all the programmes on the basis of indents received from Gram Panchayats / Various Depts / Agencies etc.

- Preference given for sanction of works where the Local Bodies are coming forward for utilizing the rice along with matching cash mobilization to provide immediate relief as per the felt needs of the local people.

- The highest priority accorded for works being taken up in dark, grey and water stressed areas and in areas where adverse seasonal conditions are most acute.

Rates for Unskilled / Skilled Labourers

- Unskilled Workers: The unskilled worker may choose payment per manday under any of the 3 options indicated below:

o   Option 1:   5 Kgs of rice + cash eligible as per SSR rates. (Green coupon holders)

o   Option 2:   8 Kgs of rice + cash eligible as per SSR rates. (Blue coupon holders)

o   Option 3:   10 Kgs of rice without any cash component. (Yellow coupon holders)

- The price of rice to be supplied to the labour is decided at Rs.8.00 per kg. If, the labourer choose 10 kgs. per manday, no cash payment would be made to him. This is applicable all over the State.
- In case, if the labourers go for other options, the District Collectors to make available the balance portion of cash Component of the wage from the departments / agencies to which that work belongs keeping in view the SSR rates applicable in Irrigation / Roads & Buildings / P.R. Departments whichever is less.
- Skilled Workers: Skilled Workers shall be paid wages as per SSR rates. They may be given 10 Kgs. of rice per manday and the balance of wages are paid in the form of cash as per the eligibility and SSR rates by the department executing the works.

Calculation of Man-days

- A specific procedure to be followed while preparing the estimates for the works taken up under Sampoorna Grameen Rozgar Yojana (Spl. Component) and calculation of Mandays and the quantity of rice required for a particular work.
- The Standard schedule of rates for the current year is to be adopted for working out the detailed estimates for any type of work to be taken up under SGRY (Special Component). The labour component involved is to be shown separately.
- The number of Mandays in a particular work is to be worked out taking into consideration the total value of labour component and dividing it by the daily mazdoor rate in the current schedule of rates in the concerned Department and district.

Features of the System
Login Accounts

Around one lakh accounts were created for different officials. Each login with a distinct role assigned to it. The services provided to each user are dependent upon the role they have been assigned (based upon the roles and services mapping) there by bringing up a service oriented architecture. Logins for collectors and mandal wise, executive agency wise, Panchayat Wise officials, the stake holders, Works Committee, Vigilance Committee etc were created.

Drill down Reports

Another unique feature of the system is the provision of drilldown reports. The user can drill down the complete details of the works right from the district level to the ultimate work level. Webpage for each and every work being executed is presented with the complete details.

Exceptional Reports

Several exceptional reports are provided to different officials concentrating on different aspects. The following some of the reports provided:

- Estimated costs and cumulative expenses of each district;
- District-Wise Cement/Non-Cement consumption Graph;
- District wise works completed in likely completion date;
- District wise works not completed in likely completion date;
- District Wise Number of Works Exceeding the Estimated Costs;
- District Wise Number of Non Completed Works;
- District Wise Man Days Generated.

Transparency

The system has been successful in providing complete transparency into the program. Entire details (from Administrative sanctions to completion) of the works taken up were available online to all the stake holders.

The progress of works at different stages is also monitored so that the supply of the food grains and building materials can be planned for the proper implementation of the work. Photographs of the work at different stages were also put online.

All the details both financial and material about the work are made available for everybody, with an inbuilt Complaint Tracking system. Anybody can register a complaint about a work in progress, if there is any irregularity observed. The Complaint Tracking system has provided a proper interface between the officials and the citizens there by adding up to the success and proper implementation.

All the adverse media reports about the works taken, substantially decreased after the deployment of the application. Each and every aspect of the work can be drilled down there by providing complete transparency to the system.

Accountability

All the information that is fed into the system makes the agencies/departments furnishing the details of the work accountable for the details. Any details about a work can be tracked down to the concerned official.

Complaint Tracking System

Any user can examine the work details, the financial components and the other components involved in the works executed through this package. In case of any discrepancy complaints can be submitted online. Each complaint furnished is given a unique complaint number and it can

be tracked from time to time for the action taken on it. A copy of each complaint is sent to the following authorities:

- Executive Agency;
- District Collector;
- Vigilance department;
- Relief Commissioner;
- Summary to Chief Secretary.

A complaint about a work is forwarded to the concerned official (Vigilance committee) there by giving scope for a focused action to be taken up. The summary of the complaints, the details of the work on which the complaint was made, the officials involved, the action taken by the different departments on the complaint made is thereby sent to the Chief Secretary. This system has brought about a radical change in the treatment of the complaints received.

Information Accessibility

This application was the first one to provide an offline tool. Through the offline tool the details of the works being executed could be furnished into the application without much dependence on the internet connectivity. This kind of support was very useful and handy, as the internet facilities at the mandal level was not available.

The success of the program mainly depended upon providing timely food to the poor. Careful planning and estimation is an important component as the program caters to the needs of lakhs of people. All this can be accomplished successfully only when there is a provision for timely and accurate information. This Information system succeeded in providing the right platform for making accurate decisions.

Decentralization of activities

Management of this huge project was a major task before the Government of Andhra Pradesh. One of the major highlights of the monitoring system was decentralization of activities at different levels. There was a proper distribution of responsibilities and thus reduced complications in decision making.

Lessons Learnt

Understanding the infrastructure at Mandals

Food for Work application was the first application to be used through out the state at mandal level. Several practical problems came up with the poor quality of network connectivity available at the mandal level. The offline tool developed had to be applied to the existing conditions (The infrastructure and the internet setup) as most of the mandals were using APSWAN connectivity with very less band Width.

Exposed Limitations

Being the first application to be deployed through out the state of Andhra Pradesh, it brought forth all the issues concerned and requirements that need to be taken care of while developing an application of such a large scale. It also helped in highlighting the problems that may come up for the end user for an application extending throughout the state. All the problems faced while developing the application were of immense value while developing the other e-applications and brought a substantial change in the quality of the other applications.

Lack of Awareness

Lack of awareness amongst the user groups was a major problem with the package initially. Consistent efforts were made to make the system more user-friendly and simple. This was done in a very effective manner, which was reflected by the repose from the people. The result was that the number of users using the system multiplied.

Andhra Pradesh Micro Irrigation Project Monitoring System and Portal (APMIP)

Introduction

Agriculture in India has shaped the thought, outlook and culture of the people for centuries. Agriculture is the lifeline of the economy of AP, contributing over a third of the Gross State Domestic Product and providing livelihood for over 70% of the population. The pathway to agriculture has to be environmentally sustainable, economically rewarding, intellectually satisfying, happy farm family and sustainable farming systems approach. There is a need to ensure that best farm practices are adopted so that the cost of production is brought down further while increasing the overall productivity. This is possible by adopting new technologies and best practices including micro irrigation systems. Micro irrigation has great potential in changing the profile of agricultural sector particularly in relatively dry tracts of the country.

The rate of growth of irrigated area has considerably decelerated in recent years, partly due to the exhaustion of easily irrigable areas and the depletion and degradation of water resources. These can be attributed to several factors which include rapidly shrinking natural resources including water, accelerated soil erosion, silting of reservoirs and over-exploitation of groundwater. Micro Irrigation comprising of drip, sprinkler has become a pivotal element of integrated water management system with many agro ecological, socio-economic and environmental advantages. It is a versatile solution provider - distributing the benefits completely, evenly and equitably unlike other irrigation systems.

Government of Andhra Pradesh has always been among the forerunners in using technology in various domains so as to improve the efficiency and effectiveness of producing goods and services for rapid growth. Towards this end, GoAP launched the Rs.1200 crore Micro Irrigation Project to provide sprinklers and water guns to farmers to irrigate 2.5 lakh hectares, which will not only conserve water but also increase productivity.

Key Stakeholders

The project is aimed at helping the beneficiaries (farmers) with sustainable water use to address environmental degradation. In order to facilitate this, high level Government committee was formed to work out the detailed modalities with drip companies and bankers. Subsequently, guidelines for APMIP implementation were provided wherein several intermediate stages were identified between the receipt of the application from the farmer seeking this mode of irrigation and the final provision of the service with financial subsidy from the Government and loan from the banker encouraging the farmer to use this mode of irrigation. The key stakeholders include:

- Farmer, beneficiary in the context of receiving assistance for taking up the micro irrigation method;
- Project Director, District Water Management Agency, who is involved in the verification of the applications from the farmer and in administrative sanction;
- Bankers, who are the financers for the said initiative for the selected farmers; and
- Micro Irrigation Suppliers, who are the actual providers of the service to the farmers in the form of the sprinklers and drips etc.

The implementation of the APMIP involves tracking the flow of processes among the stakeholders before the said service is rendered to the beneficiary-farmer.

Situation before the initiative

Micro irrigation technology is being implemented at different places in India for almost a decade. But most of the time the potential benefits has not been realized because of improper coordination among different departments of government, mismanagement of technology and lack of transparency and accountability within the system. All these factors have inculcated a thoroughly dissatisfied and confused group of farmers. The technology is a boon until it is implemented with proper management. With this envision this project is being implemented in the state.

Strategy Adopted

The idea is to make the entire process, from filling of application for loans by farmers to release of third and final installment by banks, transparent. The overall progress as well as entire benefits of the project is presented in the form of online reports that can be seen by anybody on the internet. Thus the issue of responsibility and accountability is automatically infused into the overall progress. The following aspects were considered in designing the system:

- Quality of irrigation system components;
- Systems performance with respect to design emission uniformity;
- Supply of spare parts;
- Training to farmers and topics covered;
- Technical & agronomic support; and
- Performance in terms of productivity rise in the region, water saving, energy saving, and labour requirement.

Objective

- To keep track of the applications of farmers enabling their at each stage;
- To aid in identifying the number of applications pending at each stage of the project;
- To facilitate online submission of petitions by applicants for redressal of grievances;
- To provide an integrated package to include dissemination and awareness of the Micro Irrigation among all sectors of people as well as a comprehensive monitoring system for the proper implementation of the project.

Efficient utilization of resources together with complete accountability and coordination among different departments of government and financial institutions is realized easily by the system, which is otherwise difficult to maintain.

Online Monitoring & Evaluation – APMIP

Regular monitoring and evaluation of the micro irrigation scheme with respect to its progress, quality parameters; after sales technical & agronomic support to farmers by drip suppliers, impact analysis etc and necessary correction (if any) are key factors to achieve sustainability of the technology in farmer's fields. APMIP monitoring system aims to accomplish these objectives by bringing in complete transparency into the system.

This system is a massive exercise which involves:

- Farmers

- Nodal Officers
- Bankers
- Implementation Agencies — under the guidance of Executive Agency.

Features

APMIP monitoring system has a variety of features which attract the attention of its stakeholders, as it simplifies the whole mechanism of the implementation, complexity involved in the information flow among the stakeholders and in turn aids in better delivery of services to the ultimate beneficiary-farmer. Its rich feature set includes:

- It is an online system which is available to all the concerned officers of different departments from any place to update the information whenever necessary. These officers are given login and password to access the system. Not only officials but also farmers can fill in application for loans to a bank and file a complaint to the concerned department.
- Once the farmer has submitted the application he is given a unique application number with which he can track the status of the application any time from any where.
- Once the status of an application can be tracked it becomes easy to identify the less responsive stake holder. The system can also generate exceptional reports, which provides a kind of alert mechanism.
- The database that the system is managing is a kind of huge repository of records which can provide any kind of analysis and report.
- It provides Online Grievance Handling.
- Availability of Offline tool with which data can be entered without internet connection.
- There is an inbuilt information/guidance system to give advice to farmers.
- It aims to produce several types of comparative periodical reporting like
  - Beneficiary wise
  - Category wise
  - Sector wise/Crop wise
  - District/Mandal/Village wise
  - Executing Agency wise
  - Irrigation system wise
  - Crop acreage wise

- Bank wise
- Application status wise

- Farmers can be communicated about the schedule of meeting, information items, maintenance issues, best practices specifically to their accounts.
- Built-in messaging system which equips officers to give instructions to the next agent to act on the application.
- The system is not only tracking the overall development but also providing guidelines and advices to different stakeholders. It is also a source for a list of indicators, based on which a number of policy decisions can be taken.

Easy tracking of application status of the farmers at each stage of the project, thus enabling key government functionaries in identifying the number of applications pending at each level. This in turn aids in analyzing the various reasons and causes that had resulted in the pending of applications at each level.

Identification of less responsive stakeholders and their subsequent impact on the implementation of the project. This includes the reporting mechanism that reflects the time taken by each of the stakeholders in serving the request against the scheduled time.

Elimination of the need for the farmer to approach various offices for the delivery of the service as well as to submit his/her petition towards the grievance redressal. This is the result of the provision for the beneficiaries to submit their grievances to the respective functionaries online.

A comprehensive reporting mechanism which throws light in to the grievances district wise, mandal wise, village wise and complaints against the various stakeholders.

Reports which provides insight in the utilization of the beneficiaries lands among various sectors such as agriculture., horticulture, sericulture, sugarcane and also the relative initiative among the beneficiaries in taking up new technology – Micro Irrigation.

Proper Alerting Mechanism from the higher level functionaries to the defaulters (stakeholders) as well as the communication mechanism among the various stakeholders for the proper implementation of the project.

Reports that reflect on the impacts of the new technology-Micro Irrigation on the improved energy utilization, water saved and also on the increase in the yield.

District Wise Report on Power Saved, Water Saved & Increase in Yield

Village wise, mandal wise and district wise reports that provide

overview of the banks that the applicants approached for financial assistance as well as the amount sanctioned by each bank. This reflects the promptness on the part of the bankers in sanctioning the loan. This also aids in understanding the net amount particular bank has rendered to the beneficiary in the form of loan.

Reports which aid in identifying farmers categorized as gender wise, caste wise, area of the cultivated land wise, crop being laid. This provides good view of the ratio of section of farmers getting benefited by the project.

GIS Support
Provides tool to see not just the figures but also the visual effect where one can make a query, generate several dynamic reports and see the changes occurring on the map of the state.

Impact Analysis
The APMIP monitoring system is a comprehensive system which addresses the issue of tracking of activities stage wise against the scheduled time limit by which they get addressed and also the promptness of the stakeholders at each stage of the project implementation.

With about two lakh applications seeking new mode of irrigation, it is humanly impossible to track the applications at each level precisely and timely without the aid of an automated system. The APMIP monitoring system is a tool provided to the functionaries to maintain this huge database in an organized way. The reports generated by the system aid the Government functionaries and the stakeholders in analysing the process or work flow involved in the implementation of the project besides providing information about the various sections of farmers getting benefit by this project.

Viability and Sustainability
The system is modeled and integrated in such a fashion that it can be implemented in a self sustainable and self sufficient fashion involving negligible cost. This is worth noting in light of the fact that the system is helping in the implementation of a project which is worth Rs.1200 crores. The technology and architecture involved is flexible enough to implement any modification/change. The software and other tools used into the system are freeware. The system contains an offline version reducing the dependency on internet connectivity. There is an inbuilt information/guidance system to give advice to farmers.

Lessons Learned

Need to generate Unique ID: In the first version of the application we faced problems in synchronizing online and offline applications because of the need to provide IDs which ought to be unique from different perspectives. We sorted it out in the next updated version.

Change Management/Change Mindset: To start with people from different departments of government were not able to comprehend the methodology which can bring in mutual coherence and coordination among different departments of government. But gradually they started understanding and appreciated the whole idea and the result is that the project has got accolades and laurels at the national level.

Transferability/Replication

This system can be easily implemented in any government and non-government initiatives aiming for efficient utilization of resources and requiring transparency in the implementation. The system has already been appreciated at the national level. Many organizations have shown their interest in it.

Online Agriculture Information System

Backdrop

Andhra Pradesh is an agriculturally prosperous state with bountiful natural resources, endowed with fertile land, water and favorable agroclimatic conditions. The food grain production in the State during 1999-2000 was 149.05 lakh tonnes as against the average of 122.68 lakh tones.

Andhra Pradesh is the largest producer of rice in India. It is also the leading producer of cash crops like Tobacco, Groundnut, Chilly, Turmeric, Oilseeds, Cotton, Sugar and Jute. It produces some of the finest varieties of mangoes, grapes, guavas, sapotas, papayas and bananas. Nearly 75% of its area is covered by the river basins of the Godavari, Krishna and Pennar, and their tributaries. There are 17 smaller rivers like the Sarada, Nagavali and Musi, as well as several streams. Godavari and Krishna are the two major perennial rivers, and with their extensive canal system, provide assured irrigation.

Situation before the Initiative

Majority of the population in Andhra Pradesh is dependent on agriculture. There is a direct impact of the growth of agriculture on the rest of the society in more than one ways. As most of the farmers are illiterate, and have absolutely no awareness on issues like how to increase the yield, what are the best practices to be followed etc, the results are disappointing.

Despite favorable natural conditions, farmers in Andhra Pradesh

lack awareness on relevant issues of improving agriculture performance. Farmers do not know the relevant strategies to adapt their farming to get the best results. The farmers are also not aware of the concerned officials who they can contact, the various government schemes they can avail, and the financial issues.

Increasing the level of awareness of various government schemes to farmers can increase the level of production and can reduce the involvement of third party members who snatch away the output of the farmer. Due to their ignorance most of the farmers blindly follow ancient agricultural techniques; they are unaware of the use of branded seeds that can give them better yields. The farmers are also unaware of the seasonal aspects which results in less and unfruitful yield.

There are a number of consequences to the above situation:
- Demoralized farmers resulting in suicides;
- Sky rocketing prices of food grains;
- Declining food production and productivity; and
- Declining soil fertility.

This agriculture portal was conceived and adopted by the Government of Andhra Pradesh to improve the condition of the farmer and bring in some kind of a technical assistance to him. The Agriculture website was designed by the NIC and APTS initially. Later in May 2002, the Centre for Good Governance (CGG) was given the task to work in coordination with the department, where all the District Collectors, Joint Director, senior officers were required to send their weekly, fortnightly and monthly report on seeds, pesticides, fertilizer sale and stock positions.

Agriculture website: http://www.cgg.gov.in/agri
Objectives
- To provide technical assistance to farmers on issues of farming;
- Improve decision making by providing the following information to the senior officials of the department;
  - Provide a weekly stock position and sale of seeds;
  - Monthly Fertilizer sale and stock position;
  - Weekly sale & stock position of gypsum;
  - Fortnightly pesticides distribution & availability;
  - Monthly Samples of seeds, fertilizers and pesticides;
  - Monthly farmers trainings;
  - Monthly farmers club meetings;
  - Monthly Extension Plan;
  - NPK disbursements; and

o   Formation of Rythu Mithra Groups.

APMIP Districtwise Applications & Area
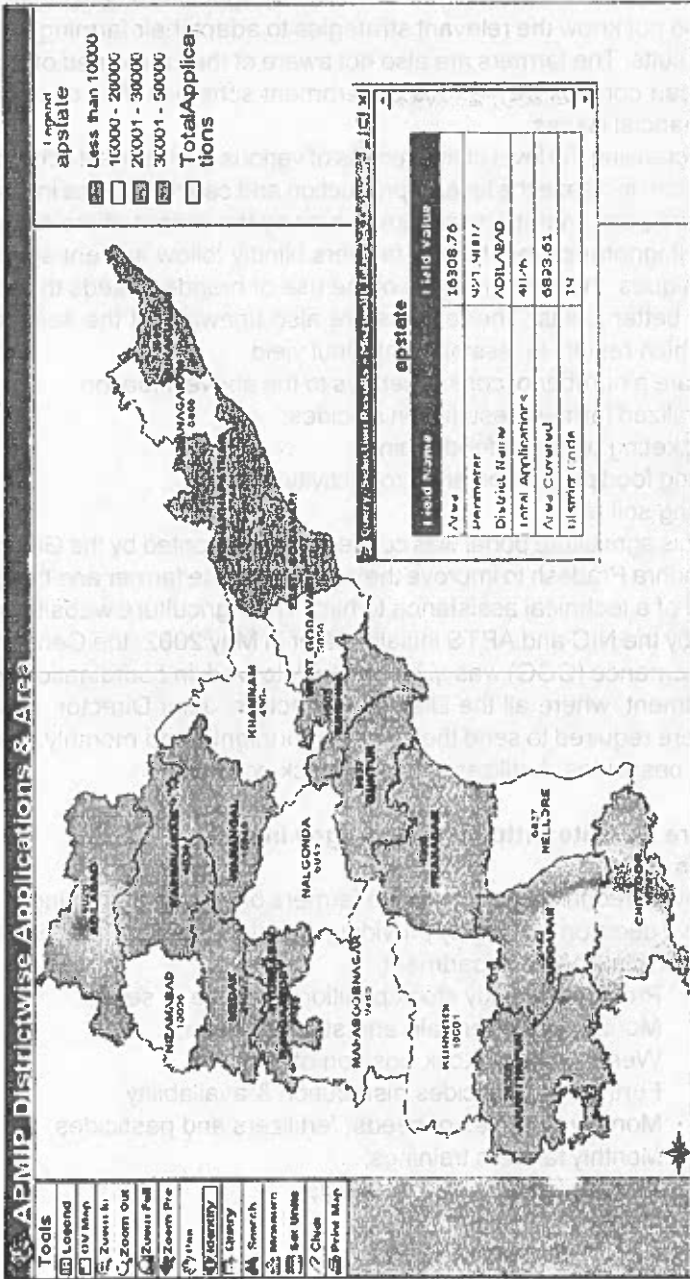
Strategies adopted

To address the problems of the farmers and departmental officials CGG developed an "Agriculture

Portal" which provides a single window by which farmers can get the latest information and updates on all aspects of farming right from the kind of seeds to strategies for better yields etc. The website also acts as a platform for the farmers to give their feedback by connecting to the call centre-PARISHKARAM. This feedback is propagated to all the concerned officers, so that appropriate action is taken. This portal also integrates new technologies, strategies and best practices suggested by the Acharya N. G. Ranga University, which is a leading agricultural university in India and has a great deal of International repute.

Features of the Agriculture Website

The fruitful interaction with the senior executives of the agriculture department led to the development of the strategy to be adopted for the implementation of the Management Information System for agriculture. The following applications are done as part of the execution of the plan.

Pesticides Sample Analysis (Coding Centre)

This application automates the manual work in coding, decoding and maintenance of the pesticide samples received all over Andhra Pradesh. The application also enables to trace out the misbranded samples and take appropriate actions against the misbranded sample dealers to get fruitful results in agriculture sector.

Seed Sampling

Various kinds of agricultural seeds are analyzed and tested against the target assigned to each district every month. The report shown gives the targets assigned and achievements of various districts in Andhra Pradesh

Soil Samples

Soil samples are analyzed and tested against the target assigned to each district every month to improve and increase the quality of soil so as to increase the overall productivity. Soil health cards are dispatched depending on the results obtained.

Mandal-wise month-wise Cropping Pattern (MMCP)

Mandal-wise month-wise cropping pattern, the technology designed and developed by the agricultural scientists of Andhra Pradesh from Acharya N.G. Ranga Agricultural University is now available with a few clicks of mouse which gives the farmers the forecast information guiding them about best suitable crop and varieties to use for a particular season.

Online Agricultural Information System - Budget Details

Manages and maintains the budget details of the agriculture department regarding scheme wise budget details, concessional prices and

area sown information.

Rythu Mithra Groups

Manages and maintains information regarding the formation of Rythu Mithra groups at district level viz., number of groups formed, amount of assistance given, bank accounts opened. The system has now been extended to mandal level wherein the detail of each individual of the group is captured.

NPK Disbursements

Manages and maintains district wise and crop wise the information regarding the recommendations, requirements and consumption of NPK (Nitrogen, Phosporous and Potassium).

MPEO registers

The system facilitates maintenance of Best Practices followed by farmers, PP Equipment & Farm Implements Register, Rythu Mithra Groups Register, Soil Sample Register, Minikit Demonstration Plot Register, Production Increase and Cost Reduction Register, Demonstration Plot Register and their requirement.

Information and Analysis

Extensive interaction was done with various department officials, professors from A.N.G.R.A.U and senior administrators to gather all the information needed by a farmer. The information is gathered and analysed in such a way that it satisfies all the needs of a farmer.

Benefits of the Website

- The development of website has helped number of farmers to get the desired information;
- Rainfall, reservoirs and barrages levels are displayed through the website every day;
- The cropping patterns and contingency plans provided by the website, helps the farmers to know the soil condition, type of irrigation and geographic location best suited for particular crop, replicate the best practices used elsewhere for better yield;
- For the policy makers the website is extremely useful as it provides with a large amount of data along with exceptional reports being generated from the district level facilitating quick decision making.

The Achievement

- Unique login accounts for 23 district JDAs for giving information on the monthly pesticides, fertilizers and seeds drawl of Input samples, Pesticides distribution and availability, NPK Disbursements, and Farmers Training, weekly stock position of Gypsum, Rythu Mithra groups

Formation.
- Provision for setting target distribution for each district.
- Generation of automated reports.
- Centralized performance measurement, monitoring and tracking system.

Features are on the anvil:
- Login accounts for all the functionaries of the Department of Agriculture. i.e., support to over 4000 employees and 23 districts including mandal, habitation and village/panchayat level.
- Communication facilities – Messaging, e-mail, SMS Messaging, Web-boards etc.
- Future Plans include modelling of a crop life cycle and generalizing it to model for any other crop keeping in view various parameters such as soil condition, irrigation type, crop etc.

Viability and sustainability
- Transparency;
- Reliable and Authentic Information;
- Large amount of data;
- Various kinds of exceptional reports for effective decision making;
- Easy to use User Interface.

Lessons learned and documentation

The department officials being novice users of online system initially faced a number of problems in entering the data, but constant interactions with the department officials and provision of training to the officials on the use of the system improved their knowledge about the system.

It took substantial amount of time to redesign some of the input forms to meet the requirements of the online systems.

Transferability/Replication

Management Information System for each government and non-government organization can be implemented aiming for efficient utilization of resources.

Performance and Results

The system is running successfully giving data and exceptional reports of various kinds required for decision support. Using the reports generated by the system the department head can know the problems specific to a region and hence can concentrate on that problem using various initiatives.

The MIS is making the department responsive and accountable thereby benefiting the farmers and other users.

Evidence of Satisfaction: The comparative report shows the improvement in the achievement of targets.

Dealing with uncertainties and risks: To avoid the exception cases such as system crash and power anomalies backups of database and application are taken at regular intervals of time and are stored separately.

Internal and external conflict resolution: The designing and implementation of the call centre system is done using object oriented methodology to resolve and minimize the internal and external conflict resolutions.

Responsible Organizational behavior: Being the developers of the software, as part of maintenance we visit the department on regular basis (weekly) to gather requirements and modifications as required, and also by asking the DIOs to assist the JDAs in their districts in using the software.

Welfare Schemes Tracking System

This article throws light on the MIS developed to track the implementation of Welfare Schemes (One Crore benefit Schemes) in Andhra Pradesh. The Welfare Schemes Tracking System aids in monitoring the implementation of each scheme and provides beneficiary wise detailed information which helps in the assessment of the progress in the implementation of these schemes.

Introduction

In order to support the under-privileged sections of backward class community, minorities, people in drought-affected areas and to help them lead a decent life by increasing their incremental income, the Government of Andhra Pradesh has launched several special schemes targeting beneficiaries cutting across various sections of society — women, girl child, artisans and more importantly farm sector including agriculturalists adversely affected by severe drought conditions.

"Koti Varalu (one crore boons)" — a package of welfare schemes aimed at distribution of sops to one crore people was launched by the Chief Minister of AP on July 1, 2003. Koti Varalu is aimed at striking a balance between the development of the state and welfare of the people. Following key benefits are included in the scheme:

- Crop insurance, waiver of interest on long-term loans, repairs to lift irrigation schemes and subsidy for micro-nutrients to revitalize the farm sector;
- Formation of Rythu Mithras or farmers' societies on the lines of self help group;

- Construction of about 10 lakh house sites, Pucca houses to five lakh people;
- Providing two lakh bicycles to girls from BPL families studying in class 8 to Intermediate;
- Electricity to SC and ST hamlets;
- New ration cards to 10 lakh eligible beneficiaries;
- Gas connections under the Deepam scheme to 10 lakh people;
- Sanitary latrines to 35 lakh beneficiaries;
- 20 lakh other beneficiaries under various schemes; and
- Pensions and other benefits to 10 lakh more people.

Key Schemes

About 65 schemes are being covered by the System. Some of the key schemes are:

Soukaryam

The GoAP has undertaken several interventions in order to prevent drop out of girls at secondary stage. However, there are still a large number of habitations where a high school or a junior college is not provided and students passing 7th and 10th classes have to go to distant villages for pursuing their secondary and intermediate education. The mobility of adolescent girls has emerged as one of the major limiting factors in continuing schooling and intermediate education. The Government has therefore decided to provide mobility to girl children under the scheme "Soukaryam" to pursue their secondary education (8th, 9th and 10th) and intermediate education. The scheme provides for supply of free bicycle to girl children of BPL families studying in classes 8th, 9th, 10th and intermediate first year in rural areas of the state. The scheme covers Government/ Local Body/Aided high schools and Government/ Incentive/Aided Junior Colleges located in rural areas.

Deepam

Considering the need to make available more LPG connections to women belonging to BPL families in the State, so as to provide them relief from drudgery of cooking, etc., GoAP decided to sanction 10 lakh LPG connections to eligible beneficiaries over a period of two years i.e., 2003-2004 and 2004-2005. The Commissioner of Civil Supplies shall, in consultation with the Self Employment and Women Empowerment Department and Municipal and Urban Development Department, decide the number of connections to be sanctioned for women in rural and urban areas respectively.

Rural Sanitation Programme

Government has decided to undertake a massive Rural Sanita-

tion Programme for construction of 32.5 lakh Individual Sanitary Latrines (ISL) and 58,000 School Toilets in rural areas by mobilizing resources and creating awareness in a campaign mode with the objectives of improving health and hygienic conditions of the people and to protect the dignity of women.

Rickshaw Pullers Insurance Scheme

Government has decided to introduce a special insurance package to two lakh Rickshaw-pullers in the State as welfare measure. It has been decided that two lakh Rickshaw-pullers will be covered under the Group Insurance Scheme of Janashree Bhima Yojana of the LIC. Premium of Rs.100/- per rickshaw-puller will be paid by the Government of A.P. and another Rs.100/- per worker will be met from the Social Security Fund of Government of India. The Government of Andhra Pradesh has paid an amount of Rs.2 crores being the premium to the LIC to cover two lakh Richshaw-pullers in the State. Hence, no premium needs to be paid by the Rickshaw-pullers under the scheme.

BC Welfare Schemes

The Backward Classes constitute half of the population of the State and they have been carrying out specific occupational activities for making a living. Inspite of implementation of various development initiatives and programmes, certain under-developed sub-communities/occupational groups have not been able to improve their living standards to the desired level. In order to give an impetus to the all round economic development and welfare of these occupational groups and to secure rapid economic development and create opportunities for self employment and income generation and the overall welfare of the Backward Classes in Andhra Pradesh, Government have decided to launch special schemes and development programmes for the Backward Classes, covering several activities with a total outlay of about Rs.430 crores.

Situation before the Initiative

- Absence of an effective tool for reviewing the progress of the implementation of welfare schemes;
- Inconsistency in figures reported by the state headquarters and that reported by the field level officers.
- Lack of authentic and well maintained data system at lower levels. Manipulation of figures at the lowest level due to inadequate monitoring and tracking system and improper communication between higher authority and lower authorities.
- To view the reports of a particular scheme, information required to

be collected from different levels, which proved to be a cumbersome process.

- No system indicating the impact/results of implementing the welfare schemes.
- No information available on the self-help groups in the state (about the members, benefits received in cash and kind, departments providing benefits, etc.)
- Lack of a centralized data system to monitor the benefits being provided to beneficiaries under various schemes.
- No transparency and accountability

Objective

The monitoring system has been developed

- To continuously monitor the implementation of welfare schemes at the district, mandal, village and habitation levels;
- To ensure the successful implementation of the schemes in a manner such as the ultimate user i.e. beneficiary realizes a net increase in income and improved standard of living;
- To bring complete transparency in the implementation of government programmes and schemes;
- To provide a centralized database system giving details of all the self-help groups operating in the state;
- To realize the goal of bringing all the welfare schemes provided by various government departments under a single system; and
- To bring transparency in the implementation of welfare measures.

Features

- Individual login accounts provided to functionaries of concerned departments at district and mandal levels;
- Use of SSID number to track each and every beneficiary;
- Input forms for each scheme requiring details of the beneficiary and the benefits provided under the scheme.
- Beneficiary-wise scheme-wise and habitation-wise detailed information to be fed at the mandal level. This information gets accumulated at subsequent higher levels, enabling government authorities to assess the progress of each scheme at various levels. This also aids in identifying the lapses, if any, in implementing the schemes.
- Beneficiaries under the welfare schemes are identified either by the grama sabha of the concerned beneficiary/groups or by inviting applications from individual beneficiaries/ groups. The final selection is done in a transparent and objective manner. The

Mandal Development Officer maintains the record of all beneficiaries and information is forwarded to the concerned department for
 · further action and feeding of the information in the system.

- More accountability is brought into the system by keeping track of bank account information of the beneficiaries
- Provides various exception and progress reports, which show high performing and low performing departments with respect to implementation of welfare schemes.
- Sends automatic alerts to departments which are not furnishing timely reports.
- Provides user manual with extensive help and documentation.

Results achieved / anticipated

- The system has resulted in complete transparency and an improved welfare monitoring and tracking system.
- Prevents lower level authorities from entering improper or manipulated data.
- Provides an authorized channel at all levels within a department and between departments.
- Provides an effective tool to government authorities to assess at any level (habitation, mandal, district, etc.) the implementation of welfare schemes implemented throughout the state.
- Generates reports at the various levels like district, mandal, department wise, scheme wise, target wise, beneficiary wise etc.
- Since the system involves monitoring the achievement of financial and physical targets, it aids in identifying gaps in the implementation of the schemes.
- In a single click of mouse, information on implementation status of welfare schemes can be obtained aiding in informed and effective decision making.

In brief, this system aids in monitoring the implementation of welfare schemes at the ground level with respect to physical as well as financial targets. It aids in identifying lapses, if any, and also gives a detailed overview of the progress status of each scheme.

Impact Analysis

The system is used by the Chief Minister of AP in his weekly video conference to review the implementation of welfare schemes in the state. This leads to tracking the progress of the implementation of welfare schemes thereby facilitating timely and informed decision at the highest level. The system is also helping the District Collectors in their review of

the implementation of welfare schemes.

The system is presently being used by departments which are involved in the One Crore Boon Schemes. The rapid growth in usage of the system occurred due to the continuous usage and effectiveness of the system. As of now almost all departments involved in the One Crore Boon Schemes are utilizing and conducting reviews by using this monitoring system.

Sustainability

- Overall system integration is effective, making it sustain individually.
- The entire system is built using freeware without any cost.
- Use of home build tools for implementation of this system makes it dependable.
- The system is also provided with an offline version taking into account the problem with respect to internet connectivity at the mandal level. This gives flexibility in the usage of the system relieving the dependency on the web-based version.

Conclusion

This article has provided a brief overview of One crore benefits monitoring system. It provides an effective tool for implementing government programmes successfully and in a transparent manner such as the intended benefit reaches the target beneficiaries The system provides a tool to eliminate corruption in implementing welfare schemes and simultaneously ensuring welfare of targeted beneficiaries.

Drought Mitigation Information System

This chapter provides a brief overview of implementation of Drought Mitigation Information system for Government of Andhra Pradesh. *DMIS* application helps Government in monitoring the situation of drought in Andhra Pradesh and in turn facilitates decision making at right time in right direction.

Introduction

The global community has demonstrated enormous sympathy for the victims of natural disasters, and drought has been long present among those disasters. India is one of the few countries with over two centuries of recorded experience in managing the consequences of monsoon failure, from which we can learn. But the tragedy is that we are a classic case of a data-rich but action-poor country.

Andhra Pradesh is a state where every year at least some places are found to be affected by drought. But, the year 2003 proved to be very bad for the state. Almost 90% of the state was affected by severe drought. The state has never faced such drastic drought conditions in the past 40 years. But government succeeded in facing the situation very efficiently with the help of several key decisions and tools like DMIS (Drought Mitigation Information System).

Situation before the initiative

Before the launch of DMIS application, reporting done by the officials to Government was manual and time consuming. As a result decision making was delayed making the circumstances worse in the drought affected area. It was difficult to know from where the assistance should be sent. The agricultural sector and daily wage labor group was the most affected social group in the drought affected areas.

DMIS enabled the government officials to isolate the worst drought affected areas and send assistance to these areas to fight with the circumstances. The DMIS application enabled the govt. to know the fodder position status, prices of essential commodities, power supply for agriculture sector, water supply status and daily wage employment in each and every gram panchayat. DMIS helped in speedy movement of fodder from surplus areas to deficient areas controlling the prices of essential commodities, providing employment to people and providing accurate and timely information to government officials in taking necessary action.

Aim of application

The aim of DMIS is to analyze field level reality of drought affected

areas and there by help officials to take immediate actions, informed decisions, prepare action plans and mobilize resources where ever need is shown by the application.

By getting the information at each level in the hierarchy, problematic areas can easily be traced out and necessary actions taken in order to improve the conditions.

Establishment of priorities

The development of DMIS was a challenge as the time constraints were very binding. The basic concern was of identifying the key components required to be addressed. These issues were discussed with the State Chief Information Officer (SCIO) and with several Secretaries to GoAP.

Objectives and strategies

- The main objective of DMIS was to assist government officials in making key decisions by providing all the required information on time. The motto was to save the people being affected by drought;
- The plan of action was established by a team of experts consisting of the SCIO and Secretaries to Government;
- Drought parameters like fodder status, prices of essential commodities, etc. were identified by the expert team;
- Officials working in the lowest territories were made responsible for reporting the status of various drought parameters; and
- Training was given to all field level staff on computer basics and application usage.

Mobilization of resources

DMIS application was financially backed by Govt. of AP. The application was developed by System Designers of the Centre for Good Governance (CGG) with close co-ordination of District Information Officers of Andhra Pradesh. SCIO was responsible for the correct development of the designed system. DIOs played a key role in the implementation of the system. DMIS involves decision makers in government of AP, System Designers of CGG, DIOs, ASOs (Assistant Statistical Officer) at Mandal level and PS (Panchayat Secretary) at Panchayat level.

Process

Developing an application is easier than implementation. As Andhra Pradesh is a big state having 1018 Mandals and 21985 Gram Panchayats, training of the users was a tedious task. Almost 90% of the desired potential users were computer illiterates.

To achieve the goal of DMIS these personnel were required to be trained to be well acquainted with the basics of computer. As the goal was

to be achieved at a short time, DIOs present in each district contributed their level best in the training module. Each DIO has an average of 50 Mandals and he/she trained ASOs and PSs in reporting the drought parameters and continuously monitored the process.

All the reports were made available to public and allowed them to complain against any of the wrong information fed by the concerned official. This method allowed Government to identify the official who was feeding wrong information, thereby making the officials more responsive and accountable.

Features of the Package
Data Collection Forms

Data is collected on key areas like power supply, fodder, drinking water, prices, and employment.

Reports

Various kinds of analytical reports are made online. Each report can be drilled down to lowest level i.e from state, district, mandal and up to panchayat level.

Information accessibility

This application also provides an offline tool. Through the offline tool information could be furnished into the application without much dependency on internet connectivity. This kind of support was very useful and needed, as the internet facilities at the Mandal and Panchayat level in the state are not so appropriate.

The success of the program mainly depended upon provision of timely support to poor people. Careful planning and estimation was required as the program involved lakhs of people. All this can be accomplished successfully if there is a provision for timely and accurate information. The Information system succeeded in providing proper and timely information needed for informed and effective decision making.

Results achieved

DMIS proved to be a very successful tool. Most important, it helped people against the effect of severe drought. It helped Government in taking valuable and quick decisions based on current reports and building an action plan based on projected analytical reports.

Lessons learnt

DMIS application was the first application to be used throughout the state at Mandal and Panchayat level. Several practical problems came up with the poor quality of network connectivity available at both the levels. The offline tool was developed to be applied to the existing conditions (the infrastructure and the internet setup) as most of the Mandals were

using APSWAN connectivity with very less band width.
Transferability/replication
    This application can be used effectively to monitor drought situation at any time in future in any state.

Integrated Water Management System
Introduction
    Water is one of the earth's natural resources. It is a finite resource, which means that the total amount of water is limited. Most of the world's water supply is saltwater stored in the oceans. Converting saltwater to freshwater is generally too expensive to be used for industrial, agricultural or household purposes.

    Water that is generally used in human activities is fresh water. Only 3% of the world's water supply is fresh water and two-thirds of that is frozen, forming the polar ice caps, glaciers, and icebergs. The remaining 1% of the total world water supply is freshwater available as either surface water or ground water; ground water accounts for two-thirds of this amount. Surface water is water that is visible above the ground surface, such as creeks, rivers, ponds and lakes. Ground water is water that either fills the spaces between soil particles or penetrates the cracks and spaces within rocks.

    It is necessary to preserve this live sustaining natural resource (water) and to educate people about the importance of water and how to use it.
Situation before the Initiative
    Information about water is available in 11 different departments. However, there is no common database for all the 11 departments. There is lot of interdependency between departments. Absence of a common database makes it difficult to identify the areas where there is a severe shortage of water.

    Main source of surface water is Rain. The process of collecting rainfall data was manual wherein the officials at mandal level collected the rainfall measure from Rain gauge and sent it to the district headquarters. Subsequently, officials at the district level consolidated all the reports which came from mandal levels and sent these to the State headquarters. This manual process involved a lot of time and money as the communication came either through fax or phone. There was no way to get timely

statistics on rainfall and take necessary measures quickly.

The reservoir/barrage water level status, inflow and outflow are monitored on a regular basis and day to day reports are sent to the head Office at Hyderabad for review. Similarly the discharge into various canals of the barrages are monitored and reported. The earlier manual process involved communication either through telephone or fax. This manual system of collecting and consolidating data to get various reports for administrative purpose proved to be cumbersome and expensive.

The Government of Andhra Pradesh launched the Jala Chaitanyam programme from 5th to 14th April 2003 with an intention to motivate people about the life sustaining natural resource water.

The Integrated water management portal started on a day before the Jala Chaitanyam programme was launched, with the guidance and active involvement of an expert team from Andhra University and several District Information Officers.

Integrated Water Management System provides information on water resources in Andhra Pradesh, Rainfall Information and importance of the life sustaining resource Water. This chapter gives information on
- Water portal, its implementation, features and usefulness;
- Rainfall Information System, how data is being collected, how it enables in timely decision about cropping patterns; and
- Reservoirs and barrages information system which provide details about the water levels in different reservoirs and how it is implemented.

Purpose

The purpose of developing an Integrated Water management System, which includes Water Portal, Rainfall Information System, Reservoirs and Barrages information system, is to provide pertinent information & guidance on water resources and its management to:
- Citizens;
- Students (for awareness, propagation & adoption in day-to-day life);
- Entrepreneurs (National & International);
- Public Representatives;
- Bureaucrats (State, District, Mandal/ Village/ Municipal Corporation) and
- Researchers.

Scope

The portal is meant to provide information on:
- Daily rainfall;
- Details of rainfall in different mandals;
- Strategy to be adopted where rain gauges are been placed;

- Information about the water levels of different reservoirs and barrages, which includes the amount of inflow into the barrages, reservoirs and amount of outflow through different gates;
- Providing the details of rainfall and water levels in the state, providing their weekly and monthly averages, giving the details of rainfall as against the normal rainfall and comparison with previous year's rainfall.

Objectives

- To develop a Comprehensive & Integrated Water Portal;
- To Integrate data scattered in 11 Departments and Link them;
- To Provide a Decision Support System for planning cost-effective water harvesting structures, cropping practices and industrial Use; and
- To develop a society sensitized to the proper use of this precious life sustaining resource, Water.
- To simplify the reporting mechanism through a computerized solution (Reservoir-Barrages Status Information System, Rainfall Information System).

Features of the System

Reservoir-Barrages Status Information System is a web based application and enables the Chief Engineer of the reservoir or Barrage under consideration to enter data into the application from his office only there by reducing the time delay in data movement from the reservoir/barrage to secretariat.

Rainfall Information System is a web based application and enables the Chief Planning officer at district level to enter the Rainfall data online. The application automatically generates various kinds of reports and thus reduces the manual intervention hitherto required in generating reports. It also saves money involved in sending data by other means and time involved in calculating the reports for taking different administrative decisions.

This application is capable of generating textual and graphical reports and also the Geographical Information System (GIS) reports which can be used for analysis purpose. The System also generates various exceptional reports and progress reports.

Input Forms

Data is entered online for different mandals

Reports

Cumulative report between two dates can be used to access and assess the situation between the two dates.

Based on different reports the situation of rainfall in a particular district or mandal can be assessed. Equipped with timely and consolidated information on the amount of rainfall, necessary support can be given to the farmers to protect their crops.

This web based application enables the Chief Engineer of the reservoir or Barrage under consideration to enter data into the application from his office only. The concerned officers at the secretariat can view the reports of the Reservoir/barrage immediately after the data is fed at the reservoir/barrage site place there by reducing the time delay in data movement from the reservoir/barrage to secretariat

The package has the following features

- Water Budget – by Panchayat / Municipality (Development of a Tracking System);
- Action Plans for self sufficiency by Panchayat, Mandal, District and their Tracking;
- Treatment Action Plan for Micro Basins;
- Lesson Plans and Project Ideas;
- Possible tools for Map generation;
- Information on the results of comprehensive testing of soil and making the data available online by survey number;
- GIS related links to site; and
- Animations to illustrate various aspects of water

Results

- The portal gives information on: Meteorological, Surface Water, Ground Water, Drinking Water, Environment Protection, Jala Chaitanyam, Water, Agriculture & Animal Husbandry, Watershed Management, Water Budget, Water, Women and Health, Rain water Harvesting, Education on Water.
- With the Integrated Water Management System, all data and information is now available at one place for scrutiny and decision making reducing the dependency on multiple departments for getting accurate information.
- Aids in identifying areas where there is severe shortage of water, getting reports from the information system to take necessary measures to improve the water levels in different parts of state and educating the people about the usage of the water and improve the situation of the water levels.
- With the Rainfall Information System and Barrages Information System in place different types of reports can be generated to take decisions. Different reports showing the deviation with nor-

mal can be accessed to know the situation with respect to normal rainfall. Reports can be generated to know about dry spells in different districts, and necessary preventive measures and support can be given to farmers to protect their crops. The reservoir information system enables to know about inflows from different rivers into the reservoir and outflow from the reservoirs.

Viability and sustainability

By integrating different Information systems with the Integrated Water Management Portal, the following can be achieved:

- All data is available at one place for scrutiny and study
- Reducing dependency between departments.
- Identification of areas where there is severe shortage of water.
- Getting reports from the information system to take necessary measures to improve the water levels in different parts of state.
- Educating the people about the usage of the water and improve the situation of the water levels.

Lessons learned and documentation

The Information system has been developed after consultations with concerned departments. Various reports are being generated for taking timely and informed decisions.

Transferability/Replication

The Information system being implemented can be used to know details of rainfall and reservoirs and barrages.

Plantation Performance Monitoring System (PPMS)
Situation before the initiative

The Forest department of the Government of Andhra Pradesh initiated the Plantation Performance Monitoring System. Before this initiative, the plantation details were maintained manually. The basic objective of the Government in having the plantation programme was not being fulfilled as there was no attention shown towards survival of plants and lack of accountability at the Government level on maintaining the details.

The Problem

- Multiple agencies involved in maintaining details of plantations;
- Lack of coordination among these agencies;
- Expected results not achieved;
- The estimated fund used for plantations not maintained properly;
- Details of expenses and stock at the nurseries not maintained prop-

erly;
- Difficulty in getting details at the higher levels due to mismanagement at the lower level; and
- Lack of transparency in plantation.

Objectives
- Provide a formal system to verify plantations;
- Provide a system to trace the survival and growth of plantations;
- Evaluation and tracking of expenditure on plantations; and
- Evaluation and tracking of maintenance of plantations.

Strategy

The strategy adopted to implement the package is the one that was already in use at the field level with an exception of the technology component that was included. Login Accounts to the system have been provided to the concerned government functionaries with input forms designed to gather details of the plantation, inspection, replantation at their respective territories thereby providing extensive reporting mechanism.

The Stakeholders
- All Citizens
- Forest Section Officers
- All Divisional Forest Officers
- Chief Conservator of Forests
- Principal Chief Conservator of Forest
- Special Secretary, Additional Secretary of forest Department
- Principal Secretary to Forest Department
- Chief Secretary
- Chief Minister

Details of the Project

Capturing Habitation wise Plantation Details:

Capturing of data from field level is a crucial process, which is done by filling the details in the input form. The details of Plantation outside the reserve forest, includes the district, mandal, and the habitation where the plantation was done.

Capturing Habitation wise Inspection details:

The purpose of Plantation and the Replantation process depends on the survival percentage of plants planted. System captures the required details of the survived plants as part of inspection details.

District Wise Plantation Details:

The value of data comes into picture once the data captured from individual habitations is merged and represented in a diagram/figure. The

following chart visualizes the **'District wise Plantation Details'** along with survived plants, to give a picture about the survived plants percentage.

District wise Survival Percentage:

System generates detailed chart, which gives a clear picture about the survival percentage of plants for decision-making on the replantation in the same area.

District Wise Plantation & Survival Details

Plantation takes place within the reserve forest as well as outside reserve forest. The system generates a district wise picture of the amount of plants planted and the plants survived.

District wise Survival Details

The growth in forest area can be estimated by knowing the details of the survival percentage of plantation done in reserve forest.

Plantation activity can be made successful with the coordination of the Government functionaries in encouraging the activity and educating the community of such activities. The whole exercise is aimed at providing a tool that aids in bringing transparency with respect to the information on plantation and nursery maintenance as well as respective seedling and plant distributions.

One can visualize the effective and efficient usage of the existing resources if the information is acquired from the grass root level i.e., field level. The collected information is henceforth accumulated at the higher level, which improves the accuracy of the data and indicates the loopholes in the process.

Privileged services are provided to key functionaries which includes the reserved rights for sanction of funds for the activity, addition of a nursery, stock detail maintenance and so on which aid the concerned officer in policy matters and decision making. The system also provides e-mail, SMS, FAX services, which aids in the online communication among the different functionaries.

Process

The department functionaries are the primary source of information pertaining to the knowledge of the system. Discussions were held with senior officials of the Forest Department, Government of Andhra Pradesh. A number of interactive sessions were also held with officials at the development site.

An open ended questionnaire was prepared for the interactive session with the senior officials. The questionnaire was designed in such a manner that al necessary information pertaining to plantation could be

gathered. Personal discussions with officials were also conducted to get a feel of the issue and the nature of tool that was required by the department.

Study of several online manuals on Forest Department, analysis of best practices that were successfully implemented related to plantation, were among the sources for gathering requisite information. With the aid of senior project managers, knowledge managers, a suitable design on modeling the system was finalised. UML diagrams, scenario diagrams helped in modeling various scenarios.

In order to build a package that can serve similar needs of other departments, the package has gone through several refinements based on requirements and study of several best practices in the field.

Documentation of the package is based on the Consortium's standards and a user manual prepared which included the step by step process flow, inter-communication of all the processes that are involved and role of actors who are involved in the process.

Feedback from end users helped in improving upon the features of the package. User percentage increased as various reports were incorporated and a number of privileged services offered. The provision of individual login accounts to each functionary and facilitating them with services such as SMS, email, Fax proved in faster communication of feedback. The simple interfaces, online manuals, process wise help documentation helped the end users in proper usage of the system.

Results Achieved/Anticipated
- Increase in the plants survival percentage.
- Accountability in respect of the department personnel.
- Accessibility of Information by any one at any time through single Interface.
- Informed decision and policymaking.
- Livelihood to illiterate/unemployed/tribal people.
- Identification of under-utilized sources.
- Reports on District wise plantation details,
- Agency wise reports which aid in establishing accountability, transparency and coordination within and among the beneficiaries of the environment (Department people, Citizens & Implementing Agencies).

Viability and Sustainability
- Information at right time is invaluable. Timely updation of data at one place is reflected throughout the state, which gives readily

accessible, up-to-date information.
- Improves the quality of decision making thereby improving the lives of living beings through pure air, water and plants.
- Brings Social Awareness about plantation.
- Helps in achieving ecological balance.

Lessons learned and documentation:
- The accuracy of the data can be brought from grass root level than from higher levels which is the data source.
- Taking into account the inter-dependency among departments/agencies.
- Maintenance of document on minutes of each meeting with Department Personnel, daily diary, E-R Diagrams, and UML diagrams usage.

Transferability / Replication

The package is developed using reusable components so as to cater the similar needs to be addressed for the other departments. Also the process flow of the mechanism is documented using well known Consortium's standards.

Conclusion

This initiative has provided a tool for maintaining up-to-date & accurate data, accountability among the department functionaries and transparency in the Forest Department. This case study suggests that e-tools for good governance aids in successfully implementing governance reforms and similar initiatives will help achieve the Forest Department's Vision & make AP a 'SWARNADHRAPRADESH' by 2020.

The information system provided by the State in respect to mitigation of drought is a crucial and highly significant emasure in conservation and use of rain water. Further, as it is obvious, this Chapter also deals with plantation and protecting of the plants which is an integral part and means in mitigating drought in the State.
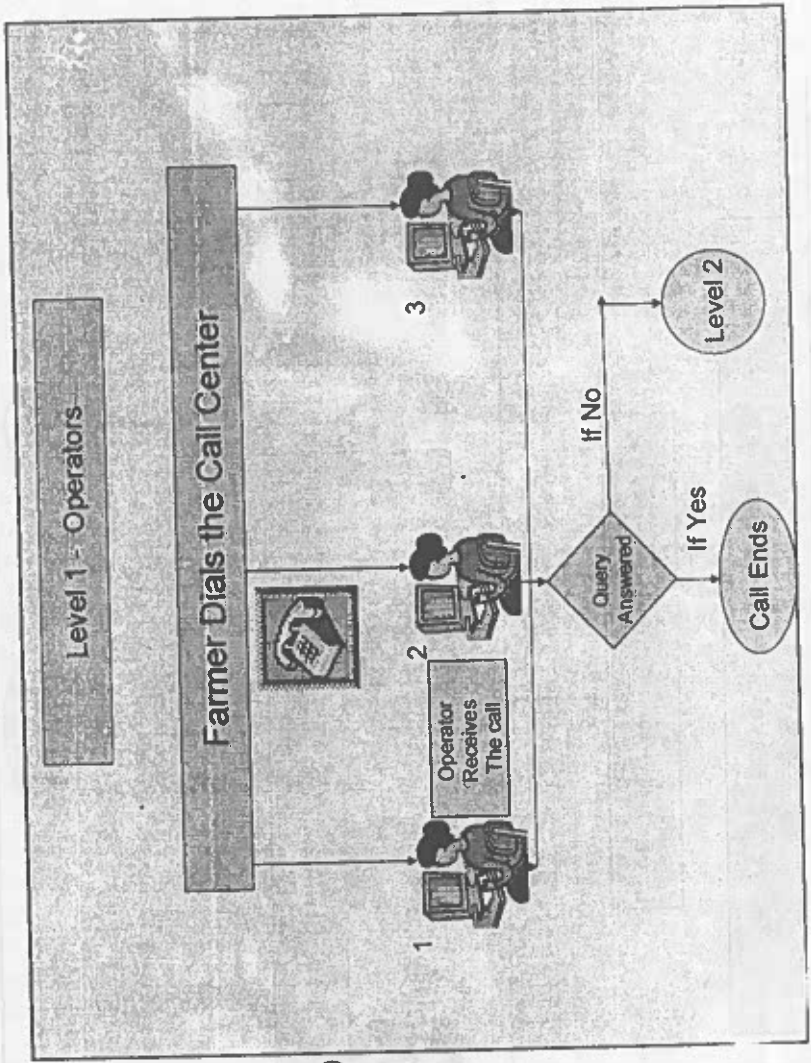
Call Centre Applications:
Citizen's Charter, Grievance Redressal Monitoring System & Agriculture Call Centres
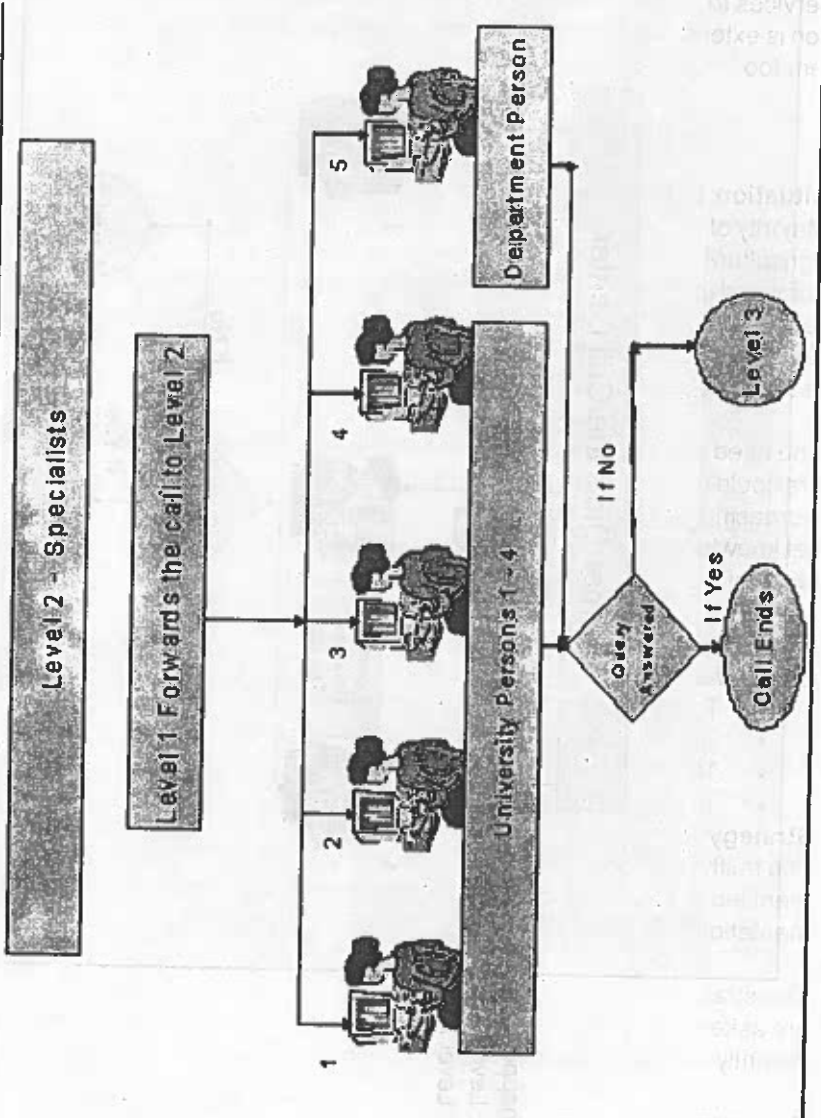
Call Centre Application

The Call Centre application has been initiated by the Government of Andhra Pradesh at the beginning of the Kharif season to educate the farmers about the best practices to be followed in order to achieve more yields. To help the farmers in getting the right information and to approach right official, the Hon'ble Chief Minister of Andhra Pradesh Sri N. Chandra Babu Naidu launched PARISHKARAM – Call Centre for Farmers on 1st of July 2003 in Hyderabad as a single source of information pertaining to all agricultural issues from which the farmer can get information with a single toll free phone call numbered "1111" from his place and from anywhere in the state.

The Call Centre concept was supported by senior scientists from Acharaya NG Ranga Agricutural University (ANGRAU), Hyderabad and experienced officials from Agriculture Department. The strategy adopted is very simple and effective where only few details are asked from farmer and best possible solution is given to farmer transparently from behind a three level architecture.

If the question asked by the farmer is not solved at the first level then the question is escalated to the second level consisting of agricultural officials where possible solution is given to farmer. If the query is not solved by the second level a unique docket number is generated by the system is given to farmer and the farmer is advised to call after some time with that docket number as a reference so that the best possible solution can be obtained from scientists and concerned department official. The process is carried with utmost transparency, where the farmer is aware of

Figure: Level 1 – Operators

Farmer Dials the Call Center

Operator Receives The call

Query Answered

If Yes → Call Ends

If No → Level 2

what is happening.
(Figure: Level One)
(Figure: Level Two)

Level 2 - Specialists

Level 1 Forwards the call to Level 2

Department Person

University Persons 1 - 4

1 2 3 4 5

Query Answered

If No → Level 3

If Yes → Call Ends

Later on this concept of call centre application was extended to other services to include other departments. At present the call centre application is extended to Citizen's Charter as well as Grievance Monitoring System too.

I. Agriculture Information Monitoring System

Situation before the Initiative

Majority of the population in the State of Andhra Pradesh is dependent on agriculture. Growth in agriculture yield results in improved family conditions and in turn improves the living condition of the society. Due to ignorance and illiteracy, most of the farmers blindly follow the same agricultural techniques irrespective of season and use less branded grains which resulted in less and unfruitful result.

The need was felt for a source of agricultural information where the farmers could get useful and needful suggestions on climatic and methods of increasing yield. Also a system of information where the farmers could get knowledge about various official and financial issues related to agriculture which could help them increase the level of productivity and awareness. This would automatically avoid any involvement of third party who snatch away most of the benefits from the farmer's outputs.

Objectives
- To provide timely information to farmers;
- To provide technical assistance;
- To facilitate decision making for the farmers;
- To keep track of the issues faced by the farmers.

Strategy Adopted

The fruitful interaction with the senior executives of the Agriculture Department led to the development of the strategy to be adopted for the implementation of the call centre.

The strategy adopted is very simple and effective where only few details are asked from farmer and best possible solution is given to farmer transparently from behind a three level architecture.

Current Status

The system is working fine giving various kinds of exceptional and data reports to aid better decision making support.

Testing
Various kinds of testings have been used including stress testing to make sure that the applications is bug free and can withstand a substantial amount of load.

Features
Input Forms
1. Input form to capture the details regarding the farmer and his query
2. Input form to give the solution to the query asked by farmer
3. Input form showing the queries to be handled by the department official
Reports

1. Report on No. of calls received from various districts wise during 1-8-2003 to 2-11-2003. This report gives the overall picture of the calls received from various districts under various categories.

Sl. No.	District	Adminis-trative	Techni-cal	General Enquiry	Others	Total
1	Srikakulam	2	39	53	1	95
2	Vizianagaram	17	177	176	5	375
3	Visakhapatnam	7	31	56	1	95
4	East Godavari	28	133	158	3	322
5	west Godavari	27	129	285	3	507
6	Krishna	49	226	269	3	547
7	Guntur	29	255	314	1	599
8	Prakasam	23	253	267	3	546
9	Nellore	20	48	72	0	140
10	Chittoor	11	70	92	1	174
11	Cuddupah	19	94	99	0	212
12	Anantapur	16	83	106	0	205
13	Kurnool	16	192	179	2	389
14	Mahabubnagar	17	125	123	1	266
15	Ranga Reddy	37	425	358	1	821
16	Hyderabad	11	10	25	1	47
17	Medak	6	62	46	0	114
18	Nizamabad	2	56	73	2	133
19	Adilabad	8	138	135	0	281
20	Karimnagar	25	181	195	0	401
21	Warangal	22	369	326	2	719
22	Khammam	22	180	211	3	416
23	Nalgonda	35	114	135	3	287
	Total	449	3453	3753	36	7691

2. Report on No. of calls received from various districts crop wise during 1-8-2003 to 2-11-2003

This report gives the overall view of the number of questions attended crop

wise so that appropriate actions can be taken in the scanty areas or areas in which large questions have been recorded.

Sl. No.	District	Paddy	Cotton	Mirchi	Ground Nut	Mango	Castor	Sun Flower
1	Nalgonda	160	48	91	2	16	2	0
2	Khammam	301	158	63	10	16	11	1
3	Warangal	44	10	13	1	0	0	1
4	Srikakulam	222	23	13	4	8	8	1
5	Vizianagaram	34	1	2	0	3	0	0
6	Visakhapatnam	171	12	2	1	9	0	0
7	East Godavari	301	9	4	9	7	0	1
8	west Godavari	272	34	33	5	11	0	2
9	Krishna	143	118	126	4	4	3	2
10	Guntur	115	72	73	13	3	11	3
11	Prakasam	53	3	2	3	3	0	3
12	Nellore	51	0	3	22	14	1	2
13	Chittoor	53	6	11	18	5	3	14
14	Cuddupah	36	4	5	44	12	0	21
15	Anantapur	66	28	35	39	2	16	48
16	Kurnool	63	31	14	18	19	40	4
17	Mahabubnagar	188	101	42	14	22	28	13
18	Ranga Reddy	10	1	0	0	7	1	0
19	Hyderabad	39	4	1	2	4	0	1
20	Medak	56	2	5	0	3	2	1
21	Nizamabad	73	103	34	2	4	0	1
22	Adilabad	57	35	9	10	10	14	3
23	Karimnagar	127	63	35	10	13	4	1
	Total	2635	866	616	231	195	136	123

Also various kinds of other reports are generated giving the overall picture of the problems faced by the farmer at various locations so that appropriate actions can be taken accordingly.

Achievements

- A single source of information for farmer.
- Increased the level of confidence and decreased the level of ignorance on the part of the farmer.
- Different kinds of problems faced by different parts of the state can be known and thereby problem specific actions can be taken.
- Achievement of increased productivity by farmer.
- Building up of database of farmers across the state.

Viability and sustainability

The following features of "PARISHKARAM" have made it viable and effective as a farmer call centre:

- Immediate response to the farmer about his enquiry;
- Repeated calls from the same farmer showing his level of confidence and satisfaction;
- Transparency;
- Reliable and Authentic Information delivered to the caller.

Lessons learned

The Agriculture Department people being novice users of computers faced some problems initially, which was set right by training them on how to use the package.

Initially the call traffic did not get the necessary response from the farmers as they were not aware of its benefits, but once the farmers were made aware of the facility they started using the system.

II. Citizen's Charter

"The Government of Andhra Pradesh is committed to becoming a simple, moral, accountable, responsive and transparent government.

.....The Government will need to draft a clear citizen charter for routine services citizens need on a regular basis like the provision of industrial approvals, birth certificates, or driving licenses. Citizens' rights, departmental responsibilities, and the quality and timeframe for providing the service will need to be clearly specified. Government employees will need to be trained to provide quality service. In addition, robust mechanisms for monitoring quality (e.g., through citizen surveys or social audits) and

redressing grievances will need to be created."

Vision 2020
What is a Citizens' Charter?

A citizens' charter is a document representing the organisation's system-
atic effort to focus on its commitment towards its citizens with respect to
standard of services, information, choice and consultation, non-discrimi-
nation and accessibility, grievance redress, courtesy, and value for money.
The document also includes the organisation's expectations from the citi-
zens for fulfilling its commitment. However, the citizens' charter is not
legally enforceable and, therefore, is non-judiciable. It is a tool for facilitat-
ing the delivery of services to citizens with specified standards, quality,
time frame, etc., with commitments from the organisation and its clients.

Situation before the Initiative

Every citizen at some point or the other has to approach the government
departments for some service or the other. In most of the occasions,
repeated requests have to be made or even bribe the employees to get
work done. This happens in most of the government departments, be-
cause the process adopted by the departments is not transparent to the
general public and the department officials are not directly accountable to
the citizens for the services they provide. There is no guarantee for the
quality of service. There is also the factor of delay in the process due to
the physical movement of files from one department official to another,
with a result that there is no scope for tracking the movement of the files.

Citizen's Charter provides information to the citizen's about the nature of
services provided by the department, the duration for providing the service,
the expected quality of service etc.

Government Initiatives

The Government of Andhra Pradesh has adopted a fairly simple, but effec-
tive strategy to bring in transparency in the process followed by the gov-
ernment departments through Citizens Charter application. This brings
Accountability in the department officials, so that they will be more Re-
sponsive to the requests of citizens. The responsiveness, accountability
will become the indicators to track the performance of the department
official.

A Web Based Application of Citizens Charter

In this context, a web based Citizens Charter application for the govern-

ment departments has been developed at the Centre for Good Governance.

Objectives

The objective of the web based application of citizens' charter is meant to provide relevant and clear information to the citizens about the services provided by the organisation:

- Creating an effective redressal system;
- Enhancing courtesy;
- Providing transparency;
- Setting standards for users and providers;
- Setting scope for consultation and choice;
- Deriving value for money.

Features of the Application

The web based application is a generic application for all the departments. It captures the service request of each department and the time frame in which the services are redressed. This application serves as an effective monitoring mechanism to the citizens and as well as the higher officials of the departments. This application can be used to detect the bottlenecks in the process of redressing the requests. This application produces several reports through which the responsiveness of the departments can be measured. These reports can be used to monitor the performance of the department officials and they can be given incentives or disincentives, also can be linked to the Performance Monitoring System.

Without good complaint redressal system, citizens charters have no effect. Departments should establish a highly credible & responsive complaints procedures and redressal systems. For this purpose a web based Grievance Monitoring System has been developed and is presently being implemented in Vizianagaram district of Andhra Pradesh. In the near future, this online application can be linked to the Citizens Charter application.

Registration Form

User :: admin   Date :: 11/25/2003

Application Form

Date	25/11/2003	select	Applicant Name*	S. Raghavendra Babu
Fathers Name*	S. Mohan Kumar		Age*	52
Sex	male		SSID	9868768896548729
Address*	H-No : 5-324 / 42A		Phone	254323454
Mail Id	raghus@yahoo.com		District	Krishna
Mandal	JAGGAIAPET		Village	BUCHAVARAM
Service Category	App for subdivision of fields/lands			

[Save]

Acknowledgement for service

Office of Chief Commissioner of Land Administration

CITIZEN CHARTER SERVICES

RECEIPT/ACKNOWLEDGEMENT

Registration Number: SFL/03/000001

Date of Registration: 2003-11-25

Name: S. Raghavendra Babu

Address: H-No: 3-324/42A

Phone: 234323434

Office: CCLA

Service Name: App for subdivision of fields/lands

Time Limit for request processing: 30 days

PRINT

Work Flow

SERVICES TO BE FORWARDED

select	Com No	Name	Reg Date	Service Type	Current Status	Remarks	forward list
⌐	GSG/03/000001	P. Rama Krishna	25/11/2003	App. for grant of house sites/pattas on Govt land	Received		none
⌐	AGS/03/000001	R. Radha Kumari	25/11/2003	App 4 assignment of Govt/ceiling surplus land	Received		none

1

Forward

User: admin   Date :: 11/25/2003

SERVICES TO BE FORWARDED

select	Com. No	Name	Reg Date	Service Type	Current Status	Remarks	forward list
☐	GSG/03/000001	P. Rama Krishna	25/11/2003	App. for grant of house sites/pattas on Govt. land	Received		none ▶
☐	AGS/03/000001	R. Radha Kumari	25/11/2003	App 4 assignment of Govt/ceiling surplus land	Received		none ▶

Forward

1

User cclaAdmin   Date :: 12/12/2003

WorkFlow Report for Reg. ETR/03/000001

User	Date of Action	Status	Forwarded To
dc-16	2003-12-09	Received	-
dc-16	2003-12-09	Forwarded	cclaAdmin
cclaAdmin	2003-12-11	Forwarded	dc-16

Abstract report

User: admin   Date :: 11/25/2003

Services wise Abstract Report for CCLA

Department Id	Department Name	Service Name	Total No. of requests	Requests Cleared		Requests still Pending		Requests Rejected	
				within Charter Time	After Charter Time	within Charter Time	After Charter Time	within Charter Time	After Charter Time
101	CCLA	App for subdivision of fields/lands	1	1	0	0	0	0	0
101	CCLA	App. for grant of house sites/pattas on Govt land	1	0	0	1	0	0	0
101	CCLA	App 4 assignment of Govt/ceiling surplus land	1	1	0	0	0	0	0
			1						

PRINT

Advantages of the Application
A citizens' charter for an organisation goes a long way in making the life of the citizen easy. It creates a sense of accountability on the part of the organization to provide the promised services to its customer. This in turn empowers the citizen with customer rights.

- Information flow,
- Awareness generation, and
- Resultant empowerment.

Conclusions
The Citizen charter System coupled with strong applications such as Grievance Monitoring System and Call Centre will result in increased level of responsiveness, accountability and transparency in government departments.

III. The Grievance Monitoring System in Vizianagaram

The Collector, Vizianagaram receives about 200 to 300 petitions every week from citizens of the district. The redressal of these petitions is substantially delayed due to the physical movement of files from one department to another, and in some cases the original petitions are also lost. People travel few hundred miles, only to know the status of their petition, which results in loss of their valuable time and money. Most of them are villagers and very poor people, who cannot afford to travel frequently. So, the Collector felt the need to have a web based monitoring system for tracking of the petitions for various departments. The Centre for Good Governance has developed a web based solution for the above problem.

This tool effectively helps in reducing the time involved in transferring of files, because the files are being transferred electronically, thus eliminating the chances of losing the petitions in transit. This also helps the departments to redress the petitions with in the time frame. The collector can monitor the responsiveness of the departments through the reports provided by the system. The tool generates comparative graphs for the redressal of petitions by various departments.

This tool also has the facility of the Geographical Information System,

using which, we can locate various mandals in the district from which more number of petitions are coming and can drilldown to the village level and view the actual petitions.

The following histogram shows the mandal wise cumulative petitions received and the report shows the petitions received by the department.

Features of the Application

Login page for the application
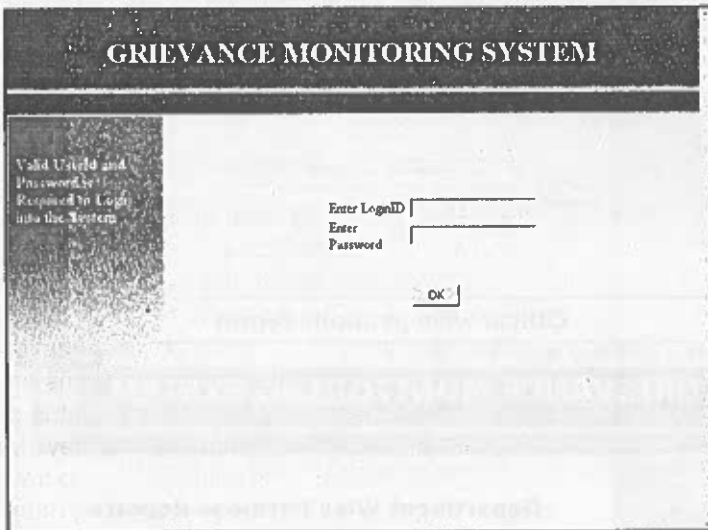
Form for Registering the Petitions

Department wise petitions report

Officer wise petitions report

Department Wise Petitions Reports

Department Name	Petitions Received	Petitions Redressed	Petitions Eligible But Not Redressed	Petitions Already Solved	Petitions Missent	Petitions Rejected	Petitions Pending
REVENUE	20	0	0	0	0	0	20
SC SOCIETY	16	0	0	0	0	0	16
BC CORPORATION	8	0	0	0	0	0	8
WOMEN & CHILD WELFARE	1	0	0	0	0	0	1
HOUSING	18	0	0	0	0	14	4
ZPP	3	0	0	0	0	0	3
MUNICIPAL ADMINISTRATION & PH	5	0	0	0	0	0	5
BC WELFARE	1	0	0	0	0	0	1
PH CORPORATION	8	4	0	0	0	0	4

PRINT

GRIEVANCE MONITORING SYSTEM

Welcome to DISTRICT REVENUE OFFICER,VZM

Officer Wise Petitions Reports

Officer Code	Officer Name	Petitions Received	Petitions Redressed	Petitions Eligible But Not Redressed	Petitions Already Solved	Petitions Missent	P R
110	MRO VIZIANAGARAM	9	0	0	0	0	0
111	MRO GANTYADA	1	0	0	0	0	0
112	MRO BHOGAPURAM	0	0	0	0	0	0
113	MRO DENKADA	1	0	0	0	0	0
114	MRO PUSAPATIREGA	2	0	0	0	0	0
115	MRO NELLIMARLA	1	0	0	0	0	0
117	MRO GARIVIDI	2	0	0	0	0	0
123	MRO MENTADA	1	0	0	0	0	0
127	MRO VEPADA	0	0	0	0	0	0
128	MRO L.KOTA	0	0	0	0	0	0
130	MRO KOMARADA	1	0	0	0	0	0
134	MRO GARUGUBILLI	0	0	0	0	0	0
138	MRO SALURU	1	0	0	0	0	0
139	MRO MAKKUVA	1	0	0	0	0	0
301	CHIEF EXECUTIVE OFFICER,	3	0	0	0	0	0
1001	ED SC SOCIETY VZM	10	0	0	0	0	0

Register Petition
Update Petition Details
View Petitions
Solved Petitions
View Reports
View Reminders
Add User
Upload Offline Data
GIS
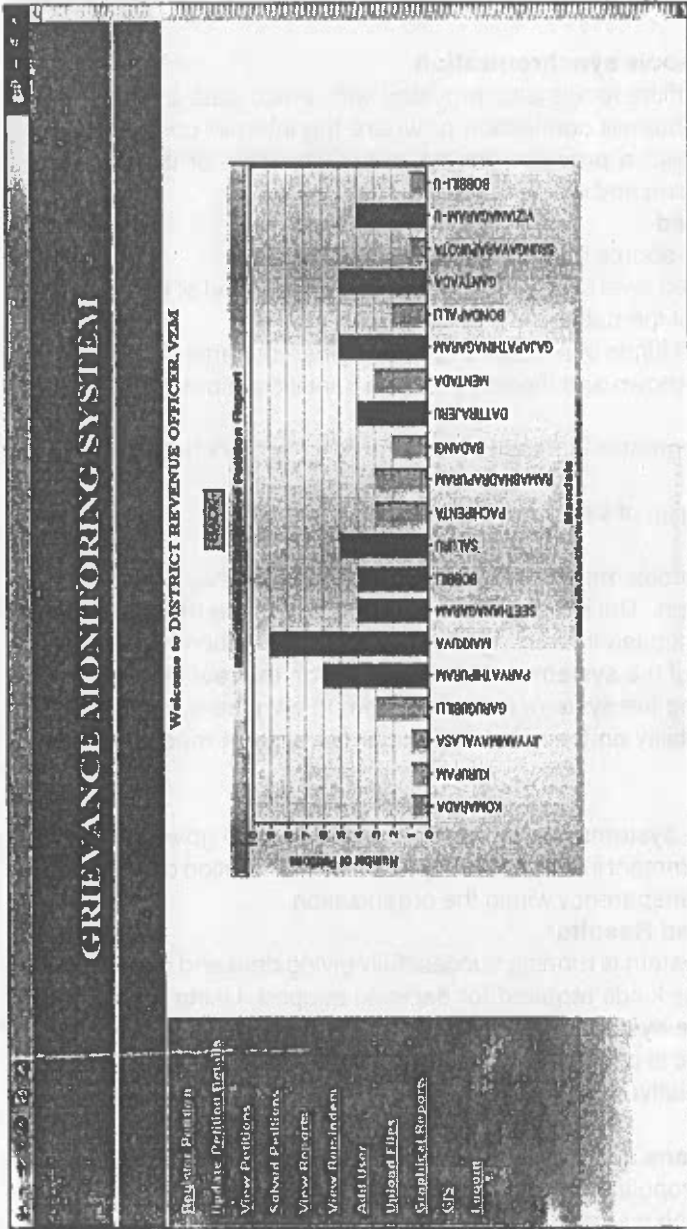Graphical reports
Logout

GIS – Mandal Level
GIS Village Level

Grievance Monitoring System
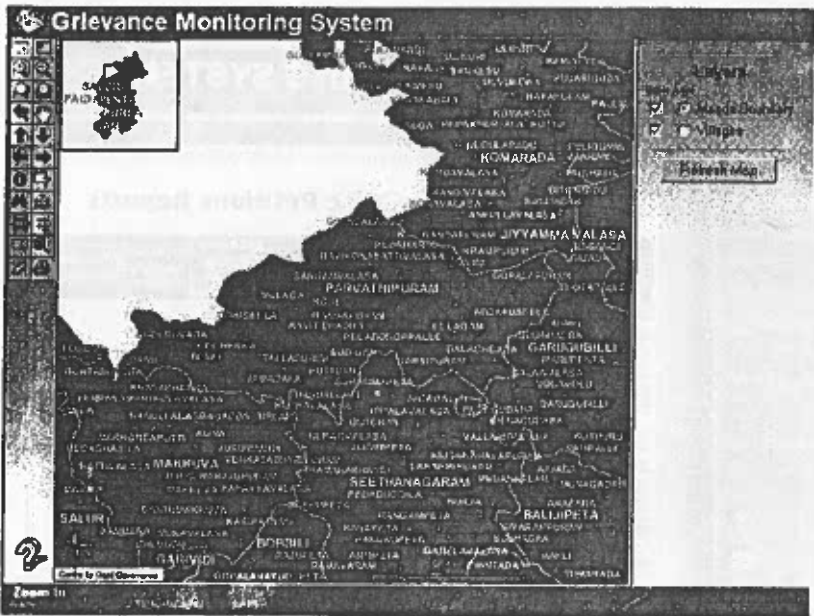
Refresh Map

The following histogram shows the mandal wise cumulative petitions received and the report shows the petitions received by the department.
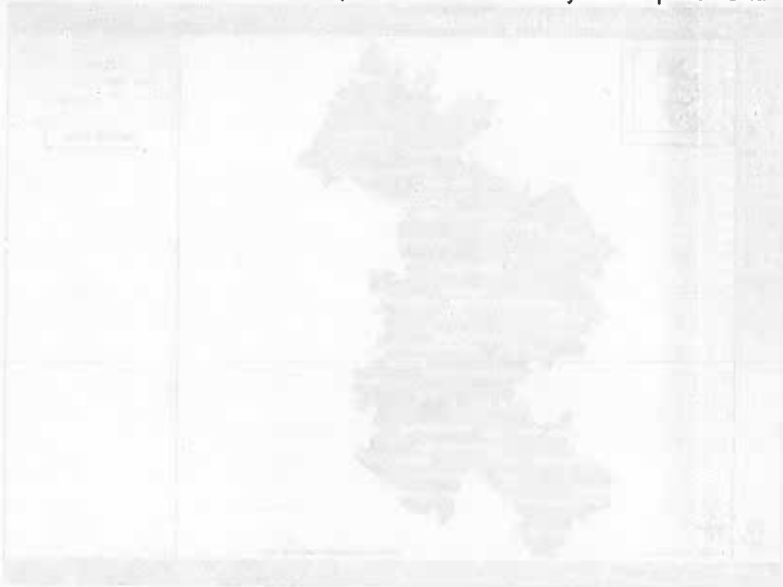
The above web based applications can be effectively used for monitoring purposes by higher officials. But if a layman wants some information about this service, he has to approach the department or some person who can operate the web based applications to know the information. As the telephone is easily available

communication medium to the layman, the concept of call centre has evolved.

Online/Offline tools synchronization

Availability of Offline tool is also provided with which data could be uploaded without internet connection or where the internet connectivity is slow. There is also a provision for the synchronization of the data uploaded using online and offline tools.

Results achieved

- A single source of information for the layman.
- Increased level of confidence and decreased level of ignorance amongst the public.
- Different kinds of problems faced by different parts of the state can be known and thereby problem specific actions can be taken.
- Achievement of increased productivity by farmers through call centre.
- Building up of standard database across the state.

Lessons learnt

We have faced problems with the department people as they are reluctant to give information. But it took us few days to change the mindset of the officials by continuously interacting with them and letting them know about the importance of the systems and their impact on the real world. Once they started using the system, we made them to own the system, which placed responsibility on their part and made the system much more robust.

Transferability   •

The above three systems can be easily extended to any government as well as non-government initiatives aiming for efficient utilization of resources and complete transparency within the organization.

Performance and Results

Results: The system is running successfully giving data and exceptional reports of various kinds required for decision support. Using the reports generated by the system the department head can know the know the problems specific to a region and hence can concentrate on that problem using various initiatives.

Impact on Citizens and Stake holders: As the call centre is achieving more and more popularity because of its immediate disposal of right information it is making a strong impact on a farmer that he can get the right information in right time.

Evidence of Satisfaction: The repeated callback of farmers to get more and more information, calls meant only to thank the call centre officials about the results they achieved by following the call centre information show the high level satisfaction of the stakeholder.

Future Plans and Innovations: The call centre not only can be used by agriculture department but can be extended to different departments of government to help the people and hence the state to a large extent.

Dealing with uncertainties and risks: To avoid the exceptional cases such as system crash and power anomalies backups of database and application are taken at regular intervals of time and are stored separately.

Internal and External Conflict Resolution: The designing and implementation of the call centre system is done using object oriented methodology to resolve and minimize the internal and external conflict resolutions.

Data standards
It is advised to maintain standard codes for all the departments, their functionaries and employees of the departments, so that redundant information will be eliminated and various applications can make use of the same database. Also, there should be unique identification numbers to the people in the state such as social security number, so that the same identification number can be used for several applications.

Project Management in Urban Governance
Introduction
Electronic-Governance (e-Governance) is the use of information and communication technologies for the planning, implementation and monitoring of government programmes, projects and activities. It is expected to help delivering cost effective and easy to access citizen services and improving of the transactions both within the government and between the government and other agencies. Andhra Pradesh identified e-Governance as one of the crucial components in realization of the concepts of SMART Government and good governance.

The Project Management through urban governance is the e-Governance initiative taken up by Andhra Pradesh Urban Services for the Poor Program (APUSP) that acts as a hub for promoting good urban governance

through institutional capacity building, enabling innovations on tools and methodologies for good urban governance and there by, bringing about internal efficiency and effectiveness in the delivery of services to the urban poor.

APUSP Project

The Andhra Pradesh Urban Services for the Poor program [APUSP] is a partnership between the government of Andhra Pradesh and the UK Department for International Development [DFID] aimed at achieving a sustained reduction in the vulnerability and poverty of the urban poor in Andhra Pradesh through municipal reforms, environmental infrastructure and strengthening of Civil Society. The program, which is expected to be a long-term initiative, began in April 1999 with financial commitment from DFID for a period of 7 years. The program covers 32 class 1 towns (Class 1 towns are those with a population exceeding 100 000) and is expected to benefit approximately 2.2 million slum dwellers (approximate slum population of the 32 towns).

The APUSP project has taken the initiative of empowering the municipalities for better governance and providing better services to the urban poor. For improved Governance the project is strengthening the municipalities with the technical expertise in the form of resource persons and by providing the software packages for an effective decision making and bringing the services to the people in a more effective manner. As part of regional planning several infrastructure facilities are provided to the municipalities by extending financial support.

e-Seva centres have been established which offer a wide spectrum of citizen-friendly services that will save citizens the bother of running around various departments.

Situation before the Initiative

The Municipalities were lacking in expertise which lead to their poor performance. Multiple entries were done for single data. Further the manual processes led to a lot of inconsistencies further delaying the decision making process. Accounts were not updated properly, funds were not monitored properly and the resources were not exploited at all making them financially weak.

There were no agencies, which were coming forward to fund the works to be taken up in the poor settlements.

Strategy Adopted

The project follows a process-oriented approach and it has the following salient features for developing the infrastructure

As part of strengthening the municipalities with resource persons initially Community Organizers (COs) were recruited for social development and to monitor the Self-Help groups. They were trained on Participatory Micro Level Planning (PMLP), Strengthening Self Help Groups (SHG's). Software professionals have been recruited to strengthen them in a better decision-making.

Municipal Information and Performance Officers (MIPOs) were recruited to support municipal staff with Software/hardware skills. APUSP has engaged 30 MIPOs (Municipal Information & Performance Officer) who are placed in the project towns.

Geographic Information Systems have also been introduced and the packages are being developed and will be handed over to the municipalities. This can be used as a very effective tool for increasing their revenue and improving their financial status.

The project is implemented in three different phases termed as components C1, C2 and C3.
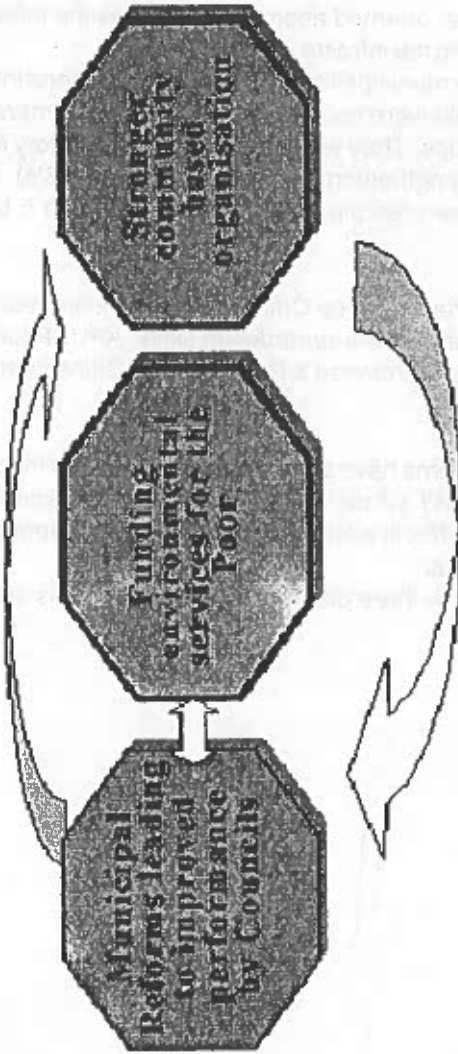
Component 1 (Municipal Reforms)

The aim of this component is to improve the way in which municipalities operate through initiatives that: strengthen municipal finance, improve financial planning and municipal accounting systems, improve operation and maintenance practices and train staff in relevant areas so that they are better able to address the needs of their citizens especially the poor. The component is designed to build upon existing government initiatives on good governance and financial management and in so doing support the implementation of the 74th Constitutional Amendment Act, which gives greater autonomy to local bodies. Funds under this component may also be utilized to assist in the design and implementation of infrastructure funded under C2.

Component 2 (Environmental Infrastructure)
The aim of component 2 is to improve environmental infrastructure for the poor in participating Class 1 towns of AP (i.e. drains, roads, street lighting etc). Using a matrix of existing levels of infrastructure against levels of poverty, slums for infrastructure improvement are identified. Once this is done communities living in each slum use micro planning to prioritize what kind of infrastructure they need and where it should be built. Later during implementation community contracts for small works are encouraged. Both these processes essentially aim to put the direction and prioritization of local development decisions in the hands of poor communities. The component is designed to converge with other policy programmes and projects.

Component 3 (Civil Society Strengthening)
The aim of C3 component is to strengthen civil society so that it is better able to advocate for pro poor development at a local level. The process begins with a Participatory Poverty Assessment (PPA) in each town through which reasons and areas of action for poverty reduction are identified. The PPA provides communities with a voice through which areas of need that concern them are identified. Once this has been completed a Town Level Working Group [TLWG] comprising of representatives from community, NGOs, private sector and government holds a town wide stakeholder workshop to reach agreement on key areas that need intervention. Community organizations, NGO's and government officials are then encouraged to submit proposals on initiatives in these key areas. Proposals are then evaluated by the TLWG and sent on to an Urban Initiatives Fund Committee [UIFC] for final approval and funding support.

Reform Indicators have been introduced to grade the municipalities and support them for a faster growth. This is an innovative process to bring in the spirit of competitiveness among the municipalities.

Improving Urban Management using IT
Among the various efforts required for capacity building for urban governance and management, the **most essential** step is:
Taking state-of-the-art information technology and applying it to various operations and functions of municipal governments for improving their ficiency and financial viability.
It is in this direction that several Software packages were developed to aid the local municipality in rendering its services in efficient and

effective manner.

Municipal Online System

As part of developing e-Projects Municipal Online System (MOS) Package was developed which aims at automating the activities that take place in the municipality. A detailed study was made on how the municipality works and the major activities for automation have been identified. This is a step towards making the municipality a paper less office. Further this system was extended for providing the citizen services. A citizen can avail the services of the municipality if he/she has got an internet connection. The system also aids in decision making process with various value-added reports that throw light on the status, mode of the various services being offered.

A Screen shot showing the different services provided under the Revenue section of a municipality.

A screen shot showing the report on the tap connection charges collected.

Project Management Information System

The Project Management Information System (PMIS) package has been developed to track the works that are taken up by the APUSP project in different project towns. This is an online package which will be used at both the town level and the project level. The town level people will enter the hands on information which gets updated and will provide various reports for an effective decision making at the project level. It is also proposed to provide an offline tool for this package because of lack of connectivity at the town levels.

The Tour and task monitoring module has also been developed which will keep track of tasks and the tours of the employees. This package is quite useful for monitoring the tasks assigned to the employees. Further, it also maintains the number of people those who have visited a town. This package is useful in identifying the tour schedule of the employees depending on the need of that town. For e.g. if a town is lagging in the engineering works, the project coordinator can allot more

engineers towards that town.

A Report showing the detailed design monitoring of the works in Chittoor municipality

DD and TS Monitoring for Chittoor Municipality

S.NO	Name of the Package	Poor Settlement	APUSP Share
		Sector	Municipality Share
		Type of Work	Total Amount (Rs in Lakhs)
1	GLSR at Sanjay Gandhi Nagar	Sanjay Gandhi Nagar	6.39
		WaterSupply	0
		ONSITE	6.39
2	Water supply in 14 slums		20.31
		WaterSupply	0
		ONSITE	20.31
3	CC Roads and Drains in D.Venganapalli	D. Vengana Palle	23.2
		Roads & Drains	0
		ONSITE	23.2
4	CC Roads and Drains in Kokavandluvooru	Kokavandlavooru	10.16
		Roads & Drains	0
		ONSITE	10.16

A Report showing the EC approved amounts in each municipality and
the engineer in charge

S.No	Name of District	Name of Municipality	Name of the Engineer	EC Approval	
				No.	Amount
1	2	3	4	5	6
1	East Godavari	Kakinada	V.N.Rao	22	649.38
2	West Godavari	Eluru	V.N.Rao	25	482.35
3	Guntur	Guntur	G.K.Rao	40	803.63
4	Guntur	Tenali	G.K.Rao	15	375.04
	Andhra			102	2310.4
5	Chittoor	Tirupathi	Mohan Kumar	30	526.6
6	Chittoor	Chittor	Mohan Kumar	25	446
7	Anantapur	Hindupur	T.Anjaneyulu	23	376.23
8	Ranga Reddy	Malkajgiri	K.K.Murthy	16	398.38
9	Ranga Reddy	Kukatpally	KoteswaraRao	23	526.35
10	Ranga Reddy	Qutubullapur	KoteswaraRao	19	578.09
11	Karimnagar	Ramagundam	K.K.Murthy	19	497
12	Warangal	Warangal	K.K.Murthy	23	749
13	Khammam	Khammam	K.K.Murthy	10	438.53
	Telangana			110	3187.35

House Hold Poverty Survey Package

The APUSP project has initiated the process of collecting the details of
the poor in its towns. The main aim of this survey is to maintain a compre-
hensive database of the poor. This concept has been further extended to
the whole state. This package can handle the data and can generate
several reports like the grading report which identifies the poorest of the
poor. It can also generate the vulnerability report, Infrastructure report,
Health and Education reports.

Profile of Poor Settlement

Municipality Name - Qutubullapur   Poor settlement - Bagaraghuagar

Section 1

No Houses	Population	SC	ST	BC	OC	Hindu	Muslim	Christian	Sikh	Jain	Buddhists	Zoroastrian	Others
1905		25	27	548	225	939	68	31	0	0	0	0	0

Section:

Type of House

Sub	Tiled	Asbestos	Thatched
217	1-3	597	19

Type of Roof / Ration Card

Pvt	White	Artyodaya	Annapurna	Cardless
216	125	2	0	715

Fuel

Tiled	Cncrt	Earthen	Gas	Electricity	Kerosene	Charcoal	Firewood
565	377	116	421	2	427	41	167

House Ownership

Total	Rent	Own
1038	330	728

House Documents

Patta	Poss. Certificate	None
756	30	272

Toilets / Structure

Total	Community Open defecation	Own	Pucca	Kutcha	None
1058	317	730	730	257	69

Live Stock

Total	No of Buffalo/Cow	No of Sheeps/Goat	Pig	Hen	Donkey
103?	11	9	4	30	50	9

Vehicles / No of devices

Furniture	Auto	Bicycle	Bullock cart	Rickshaw	Pushcart
117	18	366	0	19	9

Fridge	Telephone	Two wheeler	TV	Handpump	Sewing machine
41	71	380		7	66

Section 3 — Water Sources

	Own tap	Public tap	Bore well	Well	Municipal tanker	Private tanker
Drinking	606	191	46	13	3	188
Usage	300	106	318	221	0	51

Source of drinking

	Kutcha	Metal	Cement
CC 17	8?	45	
	645	331	714

Health Services

	Pvt Clinic	UHC	govt. Hospital	RMP	Quacks
	723	0	314	20	1
	318	1	581	156	2
Emergency					
Common					

Street light

Tube	Bulb	No Light
972	45	24

Govt Schemes

Degram	Adarana	LCS	S E S
97	0	230	1

Drains

Street	Kutcha	Pucca	In slum	Out side slum
99	177	714	420	989

Source to road

Door collection	Dust bin	Road	Open	Drain
263	131	12	583	69

Section 4 & 5 — Persons with disability

Disability
43

No persons died

Male	Female	Social	Health
72	36	90	88

Dead Houses Covered by SNG: 732

| Seasonal	Permanent
22	1035
0	5

Poverty Grading of House Holds
Poor settlement: BHAGATSINGH NAGAR   Municipality:
Qutubullapur   Ward No: 0,14

S.No	Name Of Head	DoorNo.	Ration card	Total Score	Rank
1	D SAMMAIAHA	46-476	none	10	1
2	DADOOLA MALIYYA	46-336	none	14	2
3	KUCHPOLA SRINU	46-248/4/A	none	15	3
4	MADHETHA SURYAM	46-915/1	none	15	3
5	BESTHA SRINU	4-30-511/1	none	16	4
6	KOTA .PRASAD	46-373/B	none	16	4

Municipal Reform Indicators
This package is developed to handle the reform indicators of the munici-
palities. The grading concept has been introduced among the municipali-
ties based on various factors like accounts pending, improvement in rev-
enue collection (property tax, vacant land tax etc.), improvement in col-
lection of non taxes. The municipalities are graded at regular intervals and
their performance is being monitored. These indicators are also used in
granting of funds by the APUSP. This concept of grading has brought a
sense of competition among the municipalities leading to their improved
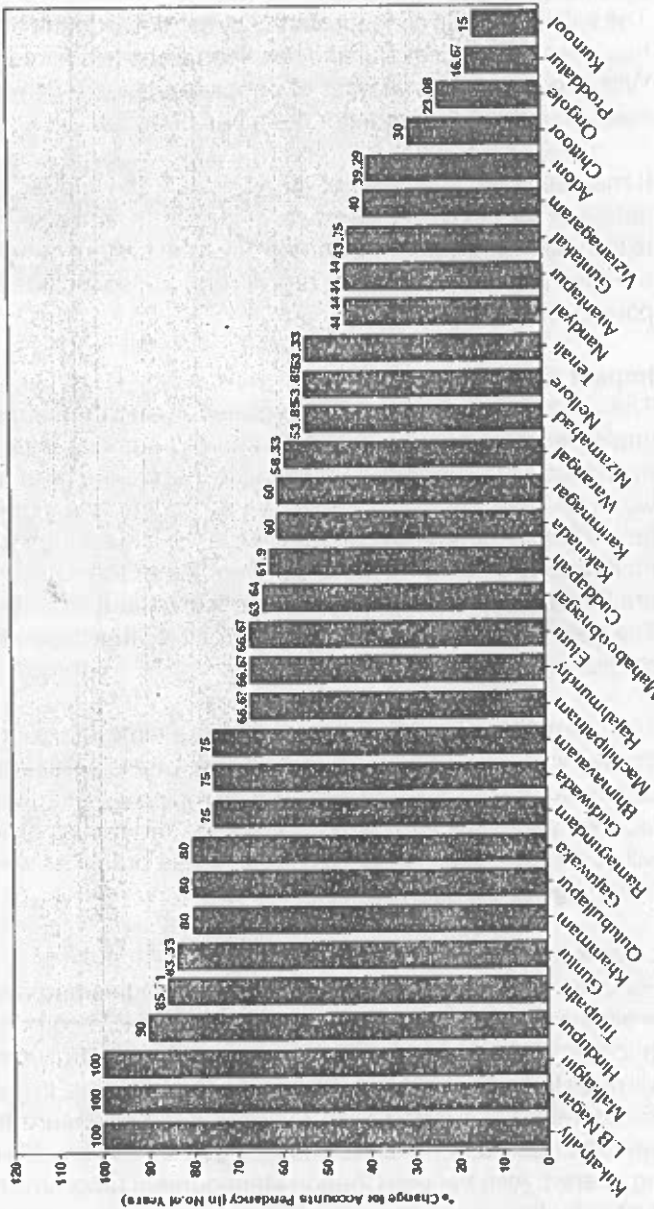performance.

A chart showing the total grading of municipalities
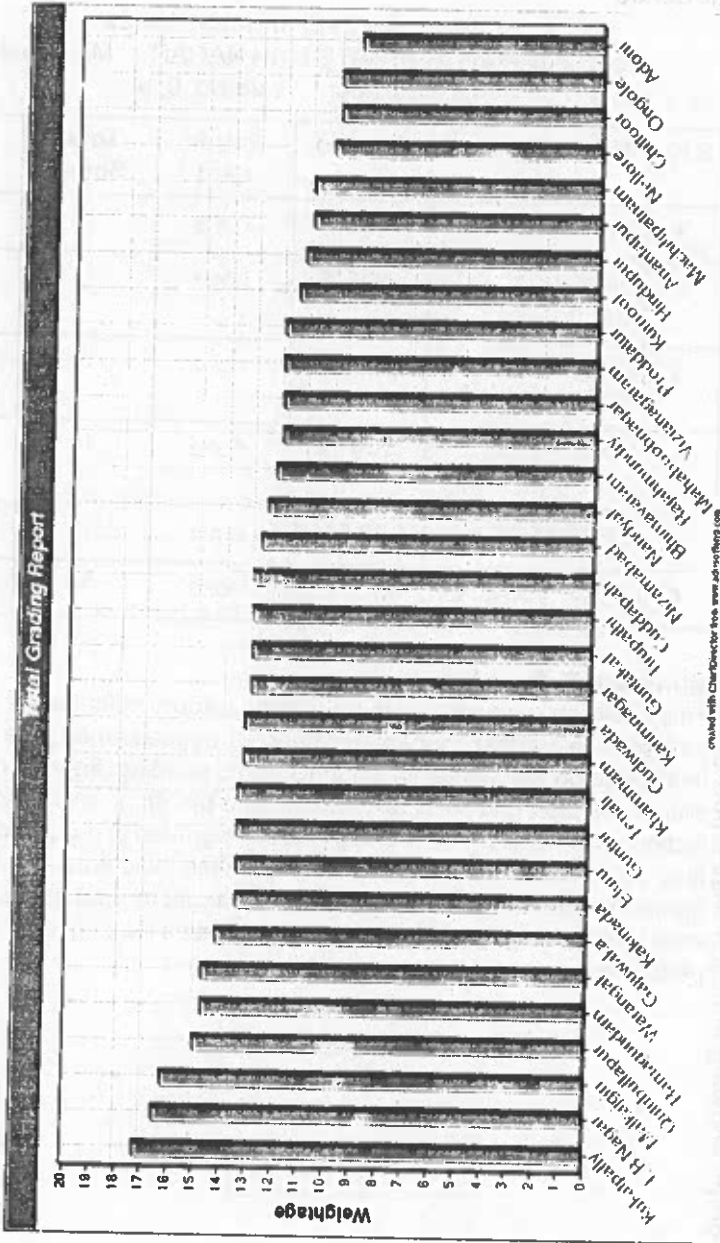
Total Grading Report

A graph showing indicator wise report of the municipality

IndicatorWise Grading Report

Self Help Groups Package

The self help group concept started by the government of Andhra Pradesh has been very successful and has seen a positive response from people. With the increasing number of people participating in this scheme, the need for a system to monitor them has been felt.

It maintains the database of the various Self-Help-Groups in the state, details of the individual members in the group, and also details pertaining to the various transactions carried out. This system generates the reports of ranking of the community organizers. It also includes the grading reports of different groups.

Impact Analysis

The system is modeled and integrated in such a fashion that it can be implemented in a self-sustainable and self-sufficient fashion involving almost zero cost. It is important to notice that we are talking about a project worth of 1400 crores and even a 1% change is a significant one. The technology and architecture involved is flexible enough to implement any modification/change. The software and other tools used into the system are freeware, which can be downloaded without spending single rupee. The system contains an offline version of it, so that dependency on internet connectivity can be minimized.

The steps taken up under this project are aimed for long term benefits. The reforms initiated for strengthening the municipalities include provision of infrastructure like laying of roads, providing water supply and drainage facilities which are permanent assets for the municipalities. The project will guide them for a better future and these practices when followed will result in good governance.

Lessons Learned

For communities to really make the technologies and applications work to aid the development of healthy and sustainable communities requires much more than *building SMART Applications.* A truly smart community will need to develop comprehensive plans to address, in greater depth, the issues relating to awareness and education to ensure that all Citizens have the opportunity to benefit from these Citizen friendly IT services being offered. Also Various Change Management programs need to be conducted for the employees, key officials of the local municipal governments to make them aware of these initiatives and ventures.

Annexure

The Design, Technology and Architectures Used in developing the e-tools for good governance

> Open Source:

Applications have been developed using the open source technologies, because it is cost effective as well as free for distribution. The basic idea behind open source is very simple: when programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, and people fix bugs. And this can happen at a speed that, if one is used to the slow pace of the conventional software development, seems astonishing.

> MVC Architecture:

Applications follow the classic Model – View – Controller architecture where there is a clear separation of user interface from the implementation details. This model clearly separates the role of the developers in the development of the system. Because it clearly separates the user interface from the business logic, the changes to any one of them will not affect the other. This helps in easy maintenance of the overall system.

> Web Based Applications:

Web based applications can be accessed at any place, by any person who is connected to internet and provided with a user id and password. Different stake holders in the system are provided with a unique user id and password. The workflow can be captured into the system and the sharing of information can be done electronically. These applications help in increasing the productivity of an individual as he is much less concerned with the physical movement of the files. These web applications follow the client server technology.

> Service Oriented Architecture:

Applications implement service oriented architecture, where every

stake holder in the system has a predefined role and according to the role, he has certain privileges. When a stakeholder logs in to the system, he can access only those services, which are defined for his/her role in the system.

➢ Online / Offline:

Most of the data entry work is required to be done at the Mandal level in the state, where people don't have access to high speed internet facilities. The offline tool is a monolithic application that has the similar user interface as that of its online counterpart to overcome the current limitation of infrastructure, which allows the user to enter the data locally and upload the same to the main server, whenever there is internet connectivity.

➢ IDs to all resources:

Generally in the manual systems, the importance of the unique identifier for the resources is ignored to a large extent. But it plays a major role in identification of records in the computer applications. In this application unique id is given to all the resources so that redundant data can be eliminated.

➢ Drilldown reports:

Most of the applications feature the drilldown report concept, where data can be viewed at different levels in the same report. In this type of reports, at the highest level, the aggregated data will be presented, which can be further drilled down to the next subsequent levels. For example, the state level report consists of the district level information, which can be drilled down to the Mandal level, which in turn can be drilled down to the village, then to the individual records at the village level and to a particular record itself.

➢ Reports – text-based, graphical, GIS

Most of the applications are capable of generating textual, Graphical Reports and also the Geographical Information System (GIS) reports which can be used for analysis purpose. Graphical Reports and GIS reports effectively present the information. These reports convey vast information in a consolidated way, making it easy for any person from any domain to understand. The System also generates exceptional

reports and progress reports with Pie Charts, Bar Charts, etc.

➤ Database Used

The Online System makes use of "Postgre SQL" data base which is freeware with almost all enterprise requirement features. Postgre SQL is an object-relational database management system and uses a multiple row data storage strategy called MVCC to made it extremely responsive in high volume environments.

➤ Resources Used

Linux Advanced Server, Apache Web Server, Tomcat Web Server, Java, Java Server Pages, PHP, JP Graph, Chart Directory.

➤ Usage

The User interface is made simple, so that minimal training will help the users to adapt to the system. Extensive help in the form of power point presentations, help documents are provided to the end users.

➤ Methodology adopted

Requirements analysis is done by continuous interactions with the department officials and different stake holders of the system. System is modeled using Unified Modeling Language. After the completion of the coding phase, testing is performed. After the system is deployed, it evolves based on the feedback from the stakeholders.

13
HRD IN INFORMATION TECHNOLOGY

Computer training for government employees was started way back in the year1988. The first programme on Computer Applications was for All India Service Officers from various states. The institute in fact conducted this programme with out a computer lab of its own, with faculty drawn from outside. The Department of Personnel & Training, Government of India sponsored this programme. The venue of the programme was the National Informatics Center, and faculty were from the newly formed AP Technology Services Ltd. The initiative was taken by the then commissioner Dr K.M. Ahmed IAS and another senior IAS Officer Sri K. Srinivasan belonging to Orissa cadre. On successful conduct of the first programme, 6 similar programmes were conducted in two years.

The Institute of Administration, which was functioning in a small rented accommodation till 1988, has moved to its own campus in the year 1989 and it took some time to set up a computer lab in the new campus. In the mean time the National Informatics Center migrated to UNIX operating system. But the institute has gone ahead with procurement of 25 PC/XTs and 5 PCs with an intention not to stop these programmes, and whenever there was a progamme, all the 30 computers were moved to NIC and once the programme was over they were brought back to the institute and kept in boxes. Finally a computer lab was set up in the year 1990. The first programme conducted here was for the newly recruited Data Processing Officers of AP Technology Services Ltd.

The Institute started conducting computer awareness training programmes for government employees covering MS DOS, WordStar, Lotus 123 and Dbase III. The response for computer training programme used to be not very encouraging at that time. The Institute circulated a questionnaire seeking information on availability of computer hardware and software in government departments and the departments were requested to identify suitable officers and staff for computer training. The participants were selected only from those lists. This strategy was followed for several years there after. At that time the Treasuries & Accounts was the first and foremost department to computerize the treasury functions by developing a package known as CTAS (Computerized Treasuries and Accounts System) and a series of training programmes were conducted for the staff of this department covering a large number of employees. This continued for a period of 6 years till Microsoft introduced their new operating system Windows 95

Windows 95 was like a dream coming true for the PC users. The institute also upgraded to Pentium computers in the year 1996 and started conducting the programmes in Windows 95 and MS Office. However, the formulation and implementation of the State Training Policy in the year 1997 was a major break through not only for general training programmes but also for IT Training.

The institute has set up 2 computer labs with 30 computers each in the year 1998. Later, one additional lab in secretariat, for the secretariat employees exclusively and 2 more labs in the institute one for general programmes and another for Chief Information Officers were set up subsequently. There has been a phenomenal growth of PC users in government departments since 1997-98. Consequent on identifying IT as a growth engine in Vision 2020 document, several e-governance projects were launched paving way for extensive use of computers in all government departments. Several departments have strengthened their offices by procuring computers and using them for day-to-day activities.

The strategy for computer training has been redefined. The training programmes have been categorized into,

1. Basic Awareness Training Programmes for employees at HOD level and at district level
2. Basic Awareness Training Programmes for All India Service Officers
3. Basic Awareness Training Programmes for Ministers and MLAs
4. Application specific training programmes for user departments eg. SmartGov, HRMS, FHIMS
5. Specialized training programmes for selective participants
6. Training Programmes for Chief Information Officers.

IT Training Programmes at Dr.MCRHRD Institute

Basic Awareness Training Programmes for Gazetted and Non Gazetted Officers at HOD level

Dr.MCR HRD Institute of AP is imparting the Computer Training Programmes for both Gazetted and Non Gazetted categories on Basic Awareness covering Introduction to Computers, Windows 2000, MS Office (Word, Excel & Power Point) and Using Internet. The duration of these programmes is 6 working days for Gazetted Officers and 8 working days for Non Gazetted Officers. Similar training programmes are being conducted at District level in association with few identified training institutes like CMC, NIIT & APTECH etc. The details of these programmes are given separately.

Basic Awareness Training Programmes for All India Service Officers :

The Institute has organized a series of programmes for All India Service Officers for 3 hours in a day for 3 days to develop their skills in using computers for day-to-day functions in their offices. This has helped the Secretaries, Principal Secretaries and other senior level officers in the secretariat to implement SmartGov; a office automation package developed for the Secretariat activities later.

Basic Awareness Training Programmes for Ministers and MLAs

The institute has organized a series of programmes for Ministers and MLAs to encourage them to use computers for their general activities and for using e-mail etc. Facilities were set up in the conference hall of Assembly during the Budget sessions and training programmes were conducted after the assembly sessions are over everyday. These programmes were conducted every year in the months of March-April for the last 3 years. The staff of Assembly were also given this training simultaneously.

Other Training Programmes:

The Institute also conducting few Training programmes on Multi-lingual Software (iLeap), Page Maker, Photoshop, MS Access, Oracle and Visual Basic & Web Designing Macromedia Flash & Director, in addition to Basic Awareness Programmes for the participants who have adequate familiarity with MS Office.

The participants attending Foundation/Induction training programmes will undergo a 6-day module on MS Office, CTAS as a part of their main programme. The Institute also conducts specific training programmes as per the request of the departments duly designing such courses as per their requirement.

The Institute has expertise in conducting advance-training programmes on Lotus Notes & Domino Software, Networking and Multi Media.

Training Programmes on SmartGov :

SmartGov is an S-Governance application for automating the functions of the Secretariat. It enables the officers to process the files electronically.

The predominant work done in secretariat is workflow intensive, i.e. there is a flow of information in the form of files from one level to other level, in this process lot of information like opinions, comments, back

files, precedence cases etc are needed for taking a decision or giving an approval.

SmartGov is an aid that will make the work in the secretariat more productive by,

- Automating routine tasks – workflow, numbering, maintaining personal registers
- Helping in decision making – checklists, access to precedents, acts, rules, statutes etc.
- Prioritizing the work – reminders, automated prioritizing of pending work
- Avoiding unnecessary work
- Building the knowledge base while working on the files – acts, precedents, documents and Gos
- Sending the files to other departments
- Enabling to share the information with other officers
- Reducing the use of paper in the office

Dr. MCR HRD Institute of AP has been identified for providing training on SMARTGov. A series of training programmes were conducted covering about 2300 employees at all levels working in Secretariat from April-December 2002.

IT TRAINING FOR DISTRICT LEVEL STAFF

Background

In order to achieve SMART (Simple, Moral, Accountable, Responsive, and Transparent) Government, several initiatives were taken up by Government. Implementation of State training Policy is one of the major initiative pertaining to Human Resource Development. As a part of this initiative Dr MCR HRD Institute of AP started conduct of Basic Awareness Computer Training Programmes for the district level staff through identified computer organizations in the year 1999. A committee constituted for this purpose has suggested a strategy for training the staff at district level through some of the reputed training institutes in the field of IT Training. The Committee has also finalized the curriculum, course material and prescribed course fee for these programmes. The IT committee will review the conduct of these programmes from time time and suggests modifications in the curriculum etc. In the year 2003 a fresh tender has been called for from the reputed organizations. The committee has revised the curriculum, short listed eligible organizations and prescribed the course fee. Consequently, fresh guidelines were issued.

Target group

- All government employees working in district offices who do not have working knowledge of computers are eligible to undergo this training programme.
- Priority to be given to such employees belonging to the offices where the computers are available, but not put to optimum utilization due to lack of knowledge & skills among the employees in operating computers.
- Employees of such departments/offices, which are in the process of procuring computers, are to be considered thereafter.
- Those who have undergone the Basic Awareness Programme during the last two years will not to be considered.
- Those who have undergone similar training programme elsewhere, will also not be considered.

Shortlisted Computer Training Institutes:

The following computer organizations have been short listed for conducting Basic Awareness Computer Training Programmes at district level either by them or by their branches/franchise centers as per the guidelines given and the curriculum specified.

NIIT Limited, APTECH Computer Education, CMC Limited, CMTS Informatics Limited, Data Pro Computer Education Division, STG International Ltd, SSI Limited Education Division.

District collector is authorized to decide on organization(s) to whom the training activity to be entrusted after a through verification of the infrastructure facilities and faculty capabilities available with these institutes at various centers in their districts.

Training Methodology and other requirements :

- The course content irrespective of the institution imparting training, has been standardized to a large extent. The broad structure and session wise details are as prescribed by the institute. No deviation from this schedule is allowed either by the institution or by the districts.
- Training institutes must have at least Pentium III PCs preferably with a LAN set up. Preference will be given to centers having latest Pentium IV computers.
- The center should have congenial atmosphere for learning, should be located in a decent area with proper ventilation and air and with out disturbance of traffic, business activity etc.
- Working lunch, Coffee/tea in the morning and afternoon should be provided by the organising computer institute. Necessary

facilities for this purpose should be made available by the organizing computer institute.

- The center must have qualified trainers (MCA/B Tech). Sufficient number of lab assistants are to be provided at a ratio of 1 for 5 participants.

- Each batch may consist of a minimum of 10 and a maximum of 20 participants. Allotment of courses will depend on reliving of employees by respective departments. No commitment or assurance will be given either in respect of courses or in respect of number of participants.

- The Computer Training Institute should be able to provide the man machine ratio of 1:1 invariably.

- Each course shall be 6 days duration (42 hours) of which 50 % shall be interactive (input) session using LCD Projector and the balance 50% shall be practical sessions (hands on).

- The course timings will be normally between 9.30 am to 5.30 pm

- Standard course material developed by the institute and the exercises used in the manual alone should be used. A master copy of the course material will be made available by Dr MCR HRD institute in the form of a CD and it is the responsibility of the computer organization to get it printed and supplied to each participant.

- Each participant should also be provided with a folder, notebook and a pen by the computer training center.

- The Course Participation certificate will be issued on behalf of District Training Center, Dr MCR HRD Institute. However the computer institute may have its logo/name printed on the certificate with the signature of the Center head.

- The medium of instruction shall be either English or Telugu or a mix of both based on the preference of the participants.

Training benefits:

- Instructions in Telugu may enable the trainee to understand con-

cepts better.

- The practical learning is based on the Government work environment (using customized exercises). These exercises have been developed exclusively for better appreciation of the government employees.

- The course material is developed with proper sequencing, more screen shots and adequate assignments for each topic.

- On completion of the training programme, each trainee is expected to acquire sufficient skills in handling a Personal Computer with adequate knowledge in MS Windows 2000 including networks, Internet and MS Office 2000.

Charges Payable:

The charges payable will be decided from time to time as quoted by the organizations while responding to tenders. The charges include the cost of course material (book and a tutor CD), folder, pen, notebook, faculty charges, lunch and tea arrangements to each participant.

Role and Responsibility of the District Training Manager:

The District Training Manager will be responsible for proper and smooth implementation of the training programmes. The responsibilities include :

- To identify the employees who are eligible to undergo this training programme in consultation/coordination with various departments in the districts.

- Function as a single point contact for the purpose of coordinating with the computer institutions imparting training.

- Correspond with the training institutions on matters of nomination of employees, timings, dates, certificates etc duly obtaining approval from district collector/nodal officer (Trg)

- Arrange payments to the computer training institutes at the end of each course from out of the funds allocated to the district by Dr MCR HRD Institute of AP. The payments are to be made to the organizations short listed and not to their franchise centers.

- Maintain attendance of the participants

- Obtain feedback of the individual participants at the end of the

course in the prescribed format.

- To visit the computer training institute at least twice during the course period preferably at the time of commencement of the course and closing.

- Consolidation of feedback.

- Prepare report on each programme containing the dates on which the programme was conducted, institution's name, final list of participants and consolidated evaluation should be sent to Director (TR), Dr MCR HRD Institute of AP Hyderabad along with monthly progress report.

- Critically examine the feedback received from the participants along with the views on the performance of the computer training institute and put up collector/nodal officer (Trg) and decide upon allocation of further programmes to different institutions.

- DVD Resource Person may also whenever there are no DVD Training Programmes, visit the computer training center during when a computer training programme is going on.

- Nodal officer (Trg) may also visit the computer Training centers while courses are in progress for successful implementation of the activity.

Role and responsibility of the Training Institutions:

The Training institute is required to:

- Identify and nominate a representative to coordinate with the District Training Center.

- Conduct the allotted training programmes systematically as per the guide lines/instructions given above. Detailed schedule is give at Annexure A.

- Prepare and submit a report containing copies of registration forms, attendance sheet, feedback forms, to the Training Manager in time for claiming course fee.

Training Programmes for Chief Information Officers.

Andhra Pradesh government in coordination with IIM, Ahmedabad conducting a 11 week Training Programme on Planning and Implementation of Information Systems for Electronic Governance for the CIOs of A.P.

Government. This training program is to develop IT Managers within the government.

Objectives of CIO's Training

The overall objective of the programme is to prepare the participants to play a leadership role in the planning and implementation of information systems projects in the governance of the state. The specific objectives, which contribute to this overall objective, are:

- To help the participants acquire a holistic view of an IT application: to enable them to consider a government information system from the point of view of the various players including the citizens, the government, and the technology vendors, so that while dealing with such applications both the technical aspects and socio-economic aspects are taken into consideration.

- To enable the participants understand their role in the analysis, design, and implementation of an information system, to lead members of IT project management and implementation teams, to interact meaningfully with agencies who have been awarded contracts to participate in the implementation of the projects, and to effectively monitor such projects during their different phases of life cycle.

- To develop an appreciation among the participants for information technology and its role in operational and strategic decision making, and to expose them to current trends in hardware, software, communications and networks, so that they can assess the implications of the new technologies for offering new and improved services, choose cost-effective technology in planning and upgrading their systems, and to acquire a variety of skills for handling techno-commercial decisions.

- To help the participants appreciate the fact that what determines the success of an IT application is not merely its technical excellence but also the extent to which it impacts the concerned organization or society, and on how well the resulting socio-cultural, administrative, and other organizational changes are managed.

Participant's profile

Senior officials of government of Andhra Pradesh and other states with experience in managing government and public systems, and with a strong motivation to introduce e-governance in their respective fields of work. Participants should have knowledge and experience in using IT

systems. Government of AP would identify suitable participants to attend this programme. A participant is expected to have a good working knowledge of computers and should be comfortable in using MS office, in addition to being experienced in managing government processes.

Duration

The programme duration would be 11 weeks, each week consisting of six working days. Out of the eleven weeks, first seven weeks will be devoted to in-class modules and the last four weeks to project work.

Venue of the Programme.

The first two weeks of the programme would be held at Indian Institute of Management Ahmedabad. The remaining part of the programme would be held at Dr. Marri Chenna Reddy Human Resource Development Institute, Hyderabad. The programme is fully residential.

Programme Structure and Pedagogy

The in-class modules impart to the participants skill and knowledge in information systems design, implementation, and management in the context of government. There would be a balance between principles, tools and techniques, methodologies, system development paradigms and legal, economic, and social implications of information systems.

The objective of the project is to provide an opportunity to the participants to consolidate what they have learnt in the in-class modules, by applying the principles to a real situation. The project involves identification of a list of computer applications in a government department and prioritizing them; for one of the applications, to develop a logical design using standard methodologies; and, for the application chosen, to develop a project plan with necessary details. The projects are done in groups. Each group is required to document their work in the form of a project report and make a presentation of their work at the end of the programme.

The learning and teaching methodology would involve conventional lecture method, case analysis, problem solving workshops, lab work, role play, and participant presentations.

At the beginning of each week, a detailed session-wise list of topics and the readings is supplied to the participants along with the reading material. Several text books also will be used as course material. These will be distributed to the participants at appropriate points in the

programme.

The various in-class modules are:

- E-Governance and Information Systems: Strategy and Planning
- Information Technology: Overview and Emerging Trends
- Systems Analysis and Design
- System Development
- Data Base Management and Online Transaction Processing Systems (DBMS & OLTP)
- Decision Support Systems
- Change Management
- Project Management

A tentative outline of each of the modules is given in the appendix. Depending on the background and interest of the participants, and depending on the assessment of the faculty on how the programme is progressing, the contents of the modules will be modified suitably during the programme.

Commitment expected from Participants and AP Government

The programme is a full time residential programme during the in-class modules; during the project module also, it is to be treated as full time commitment by the participants. Accordingly, the participants are not to be distracted by their office work during the programme, and should be allowed to devote all their energy and time to the programme.

A participant should be prepared to spend adequate time in preparation for each class. This preparation would involve study of the class material and participating ingroup discussion. Attendance in classes and for class preparation is compulsory. The programme observe any holidays except Sundays. No provision for leave exists, except under emergencies, when a participant is allowed to abstain from the class after obtaining the permission of the coordinator(s). In any case, a request for leave of absence should be routed through the government of AP. In case a participant abstains from any part of the programme, the responsibility for making up for the lost time lies entirely with the participant. The

progran me faculty will not devote extra time to teach or guide the participants in such cases. During the in-class modules that will be held at Ahmedabad,

The government of Andhra Pradesh should be willing to spare the necessary resources including the time of the relevant officers to provide to the participants and faculty the data and information needed for the course projects.

Outline of In-class Modules

The following outline of the modules is based on IIMAs experience with the first three batches of participants that went through this programme. The outline is to be treated as tentative. The programme faculty might modify the outline during the course of the programme, depending on their assessment of the desirability and implementability of such changes.

1. e-Governance and Information Systems: Strategy and Planning

- Principles e-governance
- Different categories of information systems
- Choice of applications for e-governance
- Cost-benefit analysis of an information system
- Environmental constraints and strategic choices
- Performance analysis of information systems
- Comprehensive analysis of a variety of e-governance applications

2. Information Technology: Overview and Emerging Trends

- Desktop Hardware and Software Technologies
- Data communication and computer networks
- LAN and WAN technologies
- Internet, Intranet

- Network security and firewalls
- Tools for Web-enabled applications

- Client-Server technology
- Groupware

- Technology view of Electronic Commerce
- Distributed Computing Technologies
- Network Operating Systems
- Future road map of technology

3. Systems Analysis and Design

- Principles of re-engineering
- System Design Life Cycle
- Requirements specification using structured and object oriented methods
- Risk analysis
- Estimation of size and effort of a software project
- Logical system design
- Case Tools

4. System Development

- Quality assurance
- Configuration management
- Testing
- Documentation
- System maintenance, and housekeeping

5. Database Management and Online Transaction Processing

- Introduction to Database Management Systems
- Introduction to Entity Relationship diagrams

- Data Modelling for database applications (Exercise with normalization)
- Introduction to SQL
- Physical Database Design
- Query by Example (QBE)
- Creating Forms and Reports
- Issues in Large Database Management
- Distributed Databases, client server databases
- Data warehousing and data mining
- Examples and comparison of Database Management Systems

6. Decision Support Systems

- The idea of a decision support system
- End User Computing Tools for DSS
- Design of interfaces in a DSS
- Heuristics in DSS
- Case studies of DSS

7. Information Technology Project Management

- Development of overall project plan
- Project Time Management
- Project Resource Planning
- Project Cost Management
- Project Human Resource Management
- Project procurement management
- Project execution and Control

8. Change Management

- People related issues in introducing technology

- Communication and negotiation skills needed by a change agent

- Importance of team work

Guidelines on Course Project

The objective of the course project is to help the participant to consolidate the learning that is expected to have taken place in the in-class module.

Towards achieving this objective, he/she will choose a government department, a public sector organization, or a department within it, or a public programme of his/her interest and study its current and long-term objectives and activities. Then, for each activity, he/she will derive the information support needed and identify the information systems required. The list of information identified can be organized into a prioritized list by performing cost benefit analysis. Process re-engineering is a part of this phase (Phase-1). In the next phase (Phase-2), one of the systems identified above is chosen and a logical design is developed for it. Requirements analysis, system design, configuration (both hardware and software architectures) design, and project planning are sub-phases of this phase. A report in both hard and soft forms is required to be submitted, followed by in-class presentation, by each project group at the end of the project phase.

Project Deliverables:

Phase-1

- Objectives, activities and information systems needed for the area chosen by the participants

- As-Is model: Description (in the form of a flow chart, or pseudo-code) of some key processes, as they are performed now, in the above area.

- To-Be Model: Description of the above processes after re-engineering, if possible.

- A table of costs and benefits, for the information systems that are needed to support the key activities.

- A prioritized list of information systems for the area.

Phase-2.

- All diagrams covered in the class under both structured analysis and design, and Object Oriented Analysis and Design. These include: event partitioned logical model, context diagram, leveled DFDs, ERD, a list of normalized relations, Structure Chart, Pseudo-codes for important modules, screen and report layouts, Use case diagram, object diagram, event chart etc.

- Estimates of size, effort and time using the approaches discussed in the class

- Testing scheme

- Project activity list, and schedule (bar) chart

- System Requirement Specification

- Network configuration and software architecture

Methodology

The size of a project group should not exceed four.

In the initial part of the project, the team will collect data from the department chosen by them by field visits, observation, interviews of the officers in charge, and discussions with all stake holders. Approaches like critical success factors analysis can be used in identifying the critical IT applications. In analyzing costs and benefits some aspects can be quantified and others cannot be. Financial appraisal of the proposed applications can be carried out, where possible.

The second phase involves mostly analysis and design of an application. Even here, especially during the requirements analysis phase, discussions with the users will be needed. For the rest of the work, the material covered in classes, the material in text-books and the material available on Web will be useful. For producing the diagrams participant can use any of the standard packages or even a scanner. Use the MS Project package for project planning and scheduling.

Conclusion

Application of software specialisation in Human Resource Development has become a highly contributing factor in timely and methodically discharging the functions of administration and rendering services to the public. Of late, the software training has become speciaised training and as an integral part of management training programmes. The apex training institute -- Dr. MCR HRD Institute of AP is organising specialised software training programmes both at the Secretariat level as well as at the District Training Centres. Further, the Institute sponsors candidates for training to highly reputed institutes such as Indian Institute of Management, Ahmedabad. One could see over a period of time, increased attention paid to software training to all the personnel in the State Government.

LET'S ADOPT
INFORMATION TECHNOLOGY
FOR
ADVANCEMENT OF MANKIND IN ALL SPHERES OF LIFE