NWCMC Udaan iMEGA
GIS based eGovernance project under JNNURM

Submitted by

Nanded Waghala City Municipal Corporation

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Abstract

The Udaan-iMEGA is an eGovernance project implemented by the Nanded Waghala Municipal Corporation under JNNURM. The project was named Udaan iMEGA – Udaan referring to the GIS dependence and iMEGA referring to Integrated Municipal eGovernance Application which has been deployed with an objective of delivering efficient, transparent and high quality Citizen Services at the Municipal Corporation. Corporation Officials, Employees, Vendors and Service Providers are the direct beneficiaries of this application with Citizens of NWCMS as their esteemed Clients. The core ideology behind this Project is not to complete just another eGovernance implementation but to act as a key enabler for rapid development and growth.

Key Differentiators of UDAAN-iMEGA:

- Udaan-iMEGA is a web hosted, localized application with robust functionality
- Web-based n-tier architecture
- Open Standards + Open Source
- Mobile Governance
- GIS Integration at the Application level
- Single technology platform for the users

This project is dedicated to all the citizens of the Nanded Waghala Municipal Corporation.

Contents

Coverage – Geographical & Demographic

The Nanded city, with a jurisdiction of about 51.76 km, is the headquarters of the Nanded District in the Marathwada Region of Maharashtra state. It is the second largest urban center in the Marathwada region after Aurangabad. The district of Nanded lies in the border of Maharashtra and shares boundaries with Yavatmal District in the north, Parbhani, Latur and Osmanabad Districts in the west, Bidar District of Karnataka in the south and Nizamabad & Adilabad Districts of Andhra Pradesh in the east.

Nanded Waghala City Municipal Corporation (NWCMC) was established on 26th March 1997, by merging Nanded Municipal Council and adjoining Waghala Municipal Council. The Corporation is constituted under the provisions of Bombay Provincial Municipal Corporations Act, 1949 and is also governed by the provisions of 74th Constitutional Amendments Act 1992(CAA). In addition to the Waghala Municipal Council, Vasarni Village, Kautha Village, Asarjan Village, Fatehjangpur Village, Asadwan Village and CIDCO and HUDCO colonies areas were merged with the NWCMC.

The total area under the NWCMC jurisdiction is 51.76 Sq.km, (5,176.66 Ha). Nanded City is divided in two parts i.e. Old Nanded (20.62 Sq.km) north of the Godavari river (on the left bank) and New Nanded (31.14 Sq.km) comprising of Waghala and six other newly merged villages and CIDCO area, south of the Godavari river (on the right bank).

As of the 2011 census, Nanded had a population of 550,564. The municipality had a sex ratio of 924 females per 1,000 males, and 12.4% of the population were under six years old. Effective literacy was 87.40%; male literacy was 92.68% and female literacy was 81.74%.

Project Introduction

Scope of Services

NWCMC has embarked upon the National E-Governance plan for introduction of IT and e-Governance in the local body. The Proposed Integrated E-Governance initiative seeks to redefine governance in municipalities with the focus on citizens. The vision of the project is to establish people centered, responsive, financially sound, well governed, viable and sustainable municipalities, touching upon the lives of the citizens. Specifically, NWCMC seeks to use the proposed eGovernance solution, as the primary delivery channel to provide a single, easy, secure, integrated, and reliable means of access to municipal information and services in order to continuously improve the quality of services provided to residents and businesses in Nanded.

The mission of the project is to provide a unified information communication technology platform for transparency and participative good governance. The Mission is seen as a method of applying Information technology to sort the problems faced so far making good the deficiencies and filling up gaps. It is also seen as a critical instrument for upgrading the quality of the service deliverables across NWCMC.

The objective of E- Governance Mission is to arrive at an integrated application suite by way of redeveloping and enhancing few of the existing modules, addition of few departmental activities by way of completely new software application covering all aspects of urban local body functioning, which can facilitate efficient and effective eGovernance. The mandate of the project is to consolidate the learning and achievements and the previous implementation of the E-governance applications to reposition the mission group and its program strategically among the stake holders, and eventually to radically transform the government to citizen (G2C) and Government to Business (G2B) in the Nanded Waghala precinct.

Activities Covered

The following are the core objectives of the eGovernance mission at NWCMC:

- Integrating the departmental activity with a common application platform
- Improving the Citizen (front end) services and expanding the delivery Channels
- Instituting the community system for sustaining and strengthening service Delivery
- Establishing Back end system for office management and accounting
- Creating Community Information System
- Handling Standardization of data and quality of legacy data
- Building Integrated Back end database
- Creating Resource Information System and providing developmental services
- Undertaking Capacity Building
- Arriving at Business Delivery Models
- Integration with Other existing modules
- Confirming With Standards

Innovative use of ICT for Development

Initiation, Process Re-Engineering

- In February 2011, the corporation engaged an external consultant, MIPL to guide the corporation through the entire process.
- A review of the existing application (Mainet) was conducted and it was concluded that the application was unsuitable for the modern requirements of the corporation.
- A detailed process reengineering exercise was conducted to verify and streamline processes related to citizen and non-citizen centric services of the corporation. The accent was on simplification. All user departments were involved in the same and there was a significant stakeholder buy-in during the process.
- Subsequently, a comprehensive tendering exercise was undertaken to select a new system integration partner and a new application – 11 companies participated.
- The new tender focused on
    - Integration at all levels to avoid duplication of data and data entry
    - Localization
    - Ease of use and user friendliness
    - Tangible usage of GIS in daily work
    - Web-based application
    - Open source system and database
    - Mobile governance
    - Advanced platforms
    - High level of application security
    - Ready availability of software for faster deployment
- After a thorough due diligence and techno-commercial evaluation, the consortium of M/s Vayam Technologies Limited (GIS) and M/s Elbiz Systems (eGov Application) was selected. Important user departments were involved in the selection process
- Immediately after selection, the SI was asked to deploy citizen centric applications (B&D, property etc.) so that benefits of the system start rolling in immediately and user confidence in the system is also quickly established.
- Accordingly, this was achieved and from August 2012 itself, the new software began yielding results for the users and the customers
- Subsequently, there were detailed interactions with each department in terms of deploying the respective application at the earliest.
- The portal (www.nwcmc.gov.in) was also revamped and the new portal was launched in January 2013.
- It was conveyed to the SI by the PMC and the Corporation that the application development has to be such that value additions such as GIS and mobile governance need to be built into the application. This has been achieved.

Technology

Udaan-iMEGA is a web-based application. The system provides a consistent look and feel for data entry and is user-friendly. The focus is on 'Simple and Straight' presentation of the application.

The system is a multi-lingual (English & Marathi) application where user can make a preference for the language to work with - enabling better adaptability of the system to its users.

The application works on form based authentication security. Every user is assigned to a predefined User Group depending on his Role/Profile which grants him/her to access the allocated area of the system.

The main features in the new platform are:

- Web-based n-tier architecture
- Open Standards + Open Source
- Mobile Governance
- GIS Integration & application
- Single technology platform for the users

The following software's are being used:

- eGovernance
  - Java 1.6
  - JBoss AS 7
  - PostgreSQL 9
  - Map Server 3.0
  - Quantum GIS 1.7
- GIS
  - Operating System: Linux SUSE
  - Database: PostgreSQL 9.2, PostGIS Extn.
  - Development framework: PHP

GIS Web server: Map Server 3.5, GeoMoose

Interoperability and Security

The solution is based on Open Source platforms and technologies, so there are no vendor specific lock-in requirements.

Also, application has been hosted with a leading hosting partner to ensure maximum IT infrastructure uptime/availability at the same time keeping in mind application security.

Users are created/managed centrally and module access is restricted as per actual use cases and requirements. Additionally, all used profiles are password preotected.
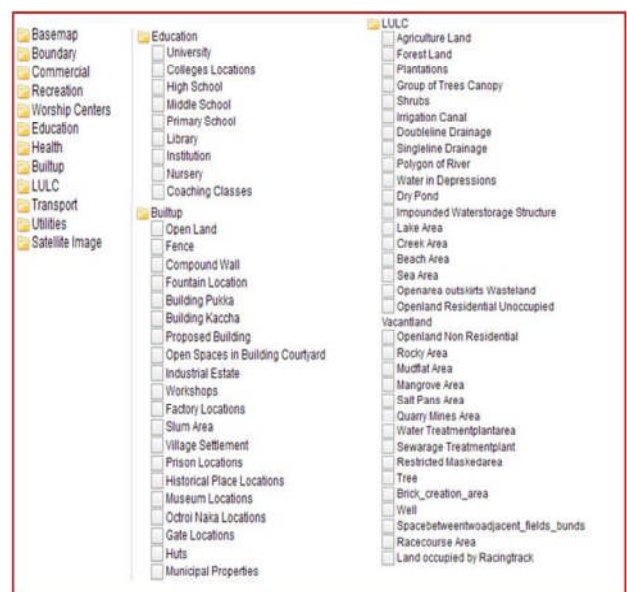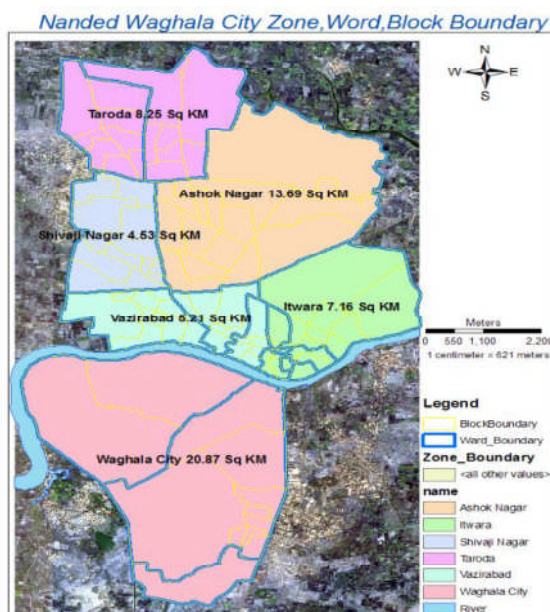
GIS Enablement

Municipalities in India face typical problems of low tax generation and demand supply gap of municipal services due to the unawareness of "What Lies where?" It is a huge task to manage Property Tax, Birth and Death Registration, Socio Economic Data management and Holding registration.
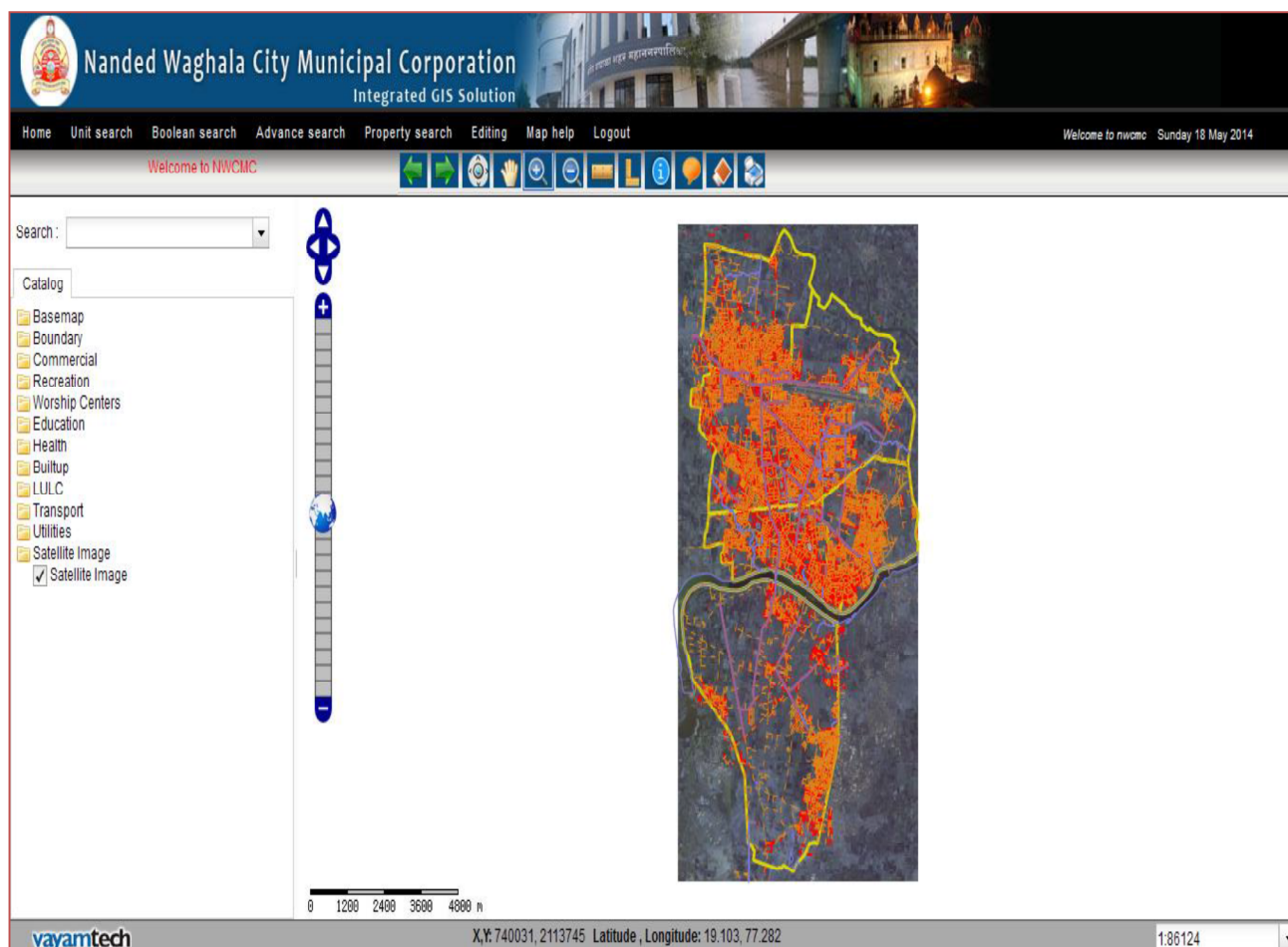
GIS technology aids Municipal Corporations through visualization and linking of various records. In GIS, the database holds attributes of each individual property with information such as land owner, co-owner, mailing & permanent address, house style, built year, individual room measurements, compliance with the regulations of the building authorities, public/private utilities mapping to the plot, street characteristics and amenities. Similarly the utility and infrastructure are mapped with attributes like location details, engineering details, flow details, connectivity details.

GIS system provides a graphical display of the assets integrated with its attributes to do a spatial analysis of the property and assets through querying and subsequent thematic representation by custom built reports.

This helps in revenue collection by location based tracking of taxes and brings significant level of transparency and efficiency in the working of municipal bodies. The spatial representation also results in a better decision support system through visual analysis like where the schools and health facilities are required in the city, where parking facilities are clogged, which part of the city has traffic problems because of narrow roads, how the water supply can be optimized to meet the demand in all parts of the city.

For NWCMC a total of 274 layers has been captured under 11 categories for Management through Spatial information about the city.

Nanded Waghala City Zone,Word,Block Boundary

Left panel - Transport layers:

Basemap | Boundary | Commercial | Recreation | Worship Centers | Education | Health | Builtup | LULC | Transport | Utilities | Satellite Image

Transport
- Express Highway
- Express Highway Centerline
- Ring Roads
- Ring Road Centerline
- Bypass Road
- Bypass Road Centerline
- Link Road
- Link Road Centerline
- Service Roads
- Service Road Centerline
- Other City Roads
- Centerline City Roads
- National Highway
- National Highway Centerline
- Road Divider
- State Highway Centerline
- State Highway
- District Road Centerline
- District Road
- DP Proposed Road Centerline
- DP Proposed Road
- Streets by Lanes Centerline
- Streets by Lanes
- Flyover Centerline
- Flyover
- Bridge over River
- Culverts on Streams
- Area Under Railway Property
- Railway Tracks Broadgauge
- Railway Tracks Metergauge
- Railway Tracks Narrowgauge
- Railway Yard
- Railway over Bridge
- Subway Below Road
- Footpath
- Railway Station
- Railway Shed
- Airport Land Property

Column 2:
- Land Aircraft Parking
- Airport Taxying Bay
- Aeroplane Hangar
- Any Other Airport Land
- Marine Port
- Jetties
- Bus Station
- Bus Agar
- Truck Terminus
- Taxi Stand
- Open Parking Lot
- Traffic Island
- Open Parking Lot
- Traffic Island
- Weigh Bridge location
- Jnnurm Roads
- Nagrotthah Roads
- Transport Routes
- Cycle Track
- Open Layout

Utilities
- Electric Pole
- Manhole
- Telephone Pole
- Lamp Post Street Lights
- Area of Open Nalla
- Water Infrastructure
- Water Pipeline
- Small Water Tank
- Covered Nala
- Open Drainage
- Covered Drainage
- Power Station Mseb Locations
- Transformer Locations
- Mobile Telephone Tower Locations
- Police Station Area
- Area of Sewer line covered
- Court Locations And Area
- Electrical Substation

Satellite Image
- Satellite Image

Right panel:

Basemap
- GPS Points
- BS Buildingfootprint
- ✓ BS Railwayline
- BS Railwayproperty
- ✓ BS Roadcenterline
- BS Roaddivider
- BS Roadedge
- ✓ BS Waterbodies
- BS Cadestral Boundary

Boundary
- ✓ City Boundary
- City Municipal Limits
- City Survey Boundary
- Revenue Survey Boundary
- DP Boundary
- Municipal Boundary
- Mouza Boundary
- Cantonment Boundary
- Block Boundary
- Locality Boundary
- Revision Survey Boundary
- Hissa Boundary
- Inam Revision Boundary
- Non Agriculture Area
- Gaothan Boundary
- Encroachment Boundary
- ✓ Zone Boundary
- ✓ Ward Boundary
- Individual Plot Boundary

Commercial
- Dispensary Hospital
- Pathological Laboratory
- Blood Bank
- Bank Area
- Non Banking Financial Institute
- Insurance Company Corporations
- Stock Exchange
- CO Operative Credit Societies
- ATM
- Rest House/Circuit House
- Fountains
- Statue
- Markets Area
- Slaughter House
- Kabrasthan/Grave Yard
- Cinema Hall
- Club Houses
- Garages
- Hoardings
- Dharmashala
- Crematorium Area
- Pump House

Worship Centers
- Mandir
- Mosque
- Gurudwara
- Church
- Idgah
- Dargah
- Budha Vihar
- Jain Temple
- Heritage

Health
- Clinic
- Hospitals Locations
- Nursinghomes Locations
- Super Speciality Hospitals
- Government Hospitals
- Cowsheds Locations
- Stable Locations
- Poultry Farm Locations

Recreation
- Park/Garden
- Playground
- Waterpark/Amusementpark
- Swimmingpools
- Stadium
- Sports Complex
- Zoological Park/Botanical Gardens
- National Park
- Planetarium
- Aquarium
- Gymkhana
- Ranga Mandir
- Cinema Hall
- Unstarred Hotel
- Four Star Hotel
- Five Star Hotel
- Cultural Community Centre
- Marriage Hall
- Town Hall
- Radio Station
- TV Station
- Film Shooting Studio
- Open Air Theatre

Nanded Waghala City Municipal Corporation
Integrated GIS Solution

Home | Unit search | Boolean search | Advance search | Property search | Editing | Map help | Logout | *Welcome to nwcmc* Sunday 18 May 2014

Welcome to NWCMC

Search:

Catalog
- Basemap
- Boundary
- Commercial
- Recreation
- Worship Centers
- Education
- Health
- Builtup
- LULC
- Transport
- Utilities
- Satellite Image
  - ✓ Satellite Image

0 1200 2400 3600 4800 m

vayamtech

X,Y: 740031, 2113745 Latitude , Longitude: 19.103, 77.282

1:86124

- Procurement of high resolution pan-sharpened QuickBird/comparable Satellite Images (0.6 Mts Resolution) for the area under NWCMC, to capture buildings/Properties.
- Collection of reference maps – existing base maps, Revenue maps, SOI Toposheet including municipal zone (existing and proposed)/Tax Zone/Ward boundary map/utilities area (like water, drainage) approximately covering 60 sq.km
- Evaluation of Input data such as source and reliability, positional accuracy, attribute authenticity etc.
- Collection of adequate number of (e.g. 2 per sq km) Ground Control Points (GCPs) through Global Positioning System (GPS) survey and from Public Domain
- Post processing of ground control data
- Geo-referencing of satellite imagery using sufficient number of Ground Control Points (GCPs) collected through GPS survey/from Public Domain
- Scanning and geo-referencing of Cadastral (Revenue) and reference maps
- Interpretation and digitization of satellite data in the different layers. The digitization process shall include vectorization, symbolization, layering, edge matching, topological integrity, and data base linking
- Generating of GIS base map using high resolution satellite images
- Field verification to update the features, which are not visible on the satellite images
- Production of draft base map with different layers (e.g. property layer along with unique IDs.)
- Incorporation of tax zone, ward, municipal area, electoral area existing and proposed planning area boundary etc.
- Preparation of final GIS base map incorporating corrections
- Developing a Web GIS Application for integration with different modules of eGovernance:
    - Property Module
    - Water Tax Module
    - Grievances Module
    - Solid waste Module
    - Assets Management
    - Works Management
    - Trade Licenses

GIS Integrated e-Governance

We take the case of Property and Water Tax to describe how GIS integration with property has provided value addition and a decision support system.

There are two ways to explore into Geospatial data for Property Tax management system – It can be accessed through either e-Governance application or through GIS portal.

Property Module:

In property module, provision has been made for citizens to access eGovernance application by spatially locating their properties from property location map and pay Taxes, Citizens may search their properties using PIN or Plot Number or Name.

NWCMC officials can locate Property Owner on the basis of:
- Administrative boundary
  - Zone
  - Word
  - Block/Locality
- Property Index Number
- Property Tax Range
- Property Tax Period
- Payment Status

Water Tax Module:

In Water Tax module Citizens can be directed to access:
- Water Charges-> Search Connection Page
- Water Charges-> Search online receipts
- Water Charges-> Search Ledger
- Water Charges-> Pay online Page

NWCMC officials can select the water consumer on the basis of:
- Administrative boundaries
    - Zone
    - Ward
    - Block/Locality
- Property Index Number
- Service No
- Property Owner
- House Number

On the basis of fields provided, selected Properties integrate with Water Tax Module (database) and highlight the search output (Spatial Highlights) in GIS application.

Dues report populated in tabular Grid will consist of:
- Details of Property owner like Name, Address, PIN
- Details of Arrears

The Map Output will be range wise Tax Dues, in particular period.

Modules Implemented

Property Tax
- Building assessment for taxation
- Demand notice & tax collection management
- Appeal and revision petition management

Payroll Management
- Employee management
- Attendance integration
- Loan management
- Pension management
- Pay slip generation

Financial Accounting
- Ledger accounts
- Fixed assets
- Bank reconciliation
- Payment, receipt and journal vouchers
- Account books
- Financial statements

Water Billing
- New connection management
- Demand notice and tax collection management
- Disconnection management

Town Planning
- New application management
- Application verification and approval process
- Issuance of NOC

Welfare Schemes Management
- Scheme management
- Beneficiary management
- Grant/ fund based accounting
- Expenditure management

Trade & Market License Management
- License application management
- Application verification
- Fee collection & license issuance
- Renewal/ closure of license

Birth & Death Certificate Management
- Birth registration management
- Death registration management
- Issuance of birth/ death certificate

Stores/ Inventory Management
- Indent preparation
- e-Tendering
- Goods receipts and distribution
- Disposal of dead stocks

Citizen Grievances Management
- Complaint/ suggestion registration
- Complaint attendee and status update
- Complaint resolution

Asset Management
- Asset registration
- Asset rental agreement management
- Rent dues management

Vehicles Management
- Vehicle Registration
- Scheduling, fuel & maintenance management
- Driver's duty roster

Works Management
- Project prioritization
- Project estimation
- Project monitoring management

Solid Waste Management
- Resource planning & allocation
- Monitoring of allocated tasks

Health Facility Management
- Patient management
- OPD/ IPD management
- Resource management
- Medicine supplies management

Inward/ Outward Management
- Inward registration
- Outward registration
- Verification of OC

Local Body Tax
- Dealer registration
- Tax collection monitoring
- Punitive actions

Management Information System

Integration with
- GIS Application
- LBT module
- e-Tendering system
- Biometric attendance system

GIS Base-map Development
- Preparation of spatial database
- Procurement of high resolution satellite image
- Collection of reference map
- GCPs collection
- Geo-referencing of satellite imagery
- Scanning and Geo-referencing of cadastral and reference maps
- Generation of GIS base map
- Survey and updation of GIS base map
- Incorporation of reference map
- Production of draft base map
- Preparation of final GIS base map
- GIS map search facility

Other Activities
- Data Migration
- SMS Gateway
- Payment Gateway

Given below are the screen captures depicting implemented modules in the live system –
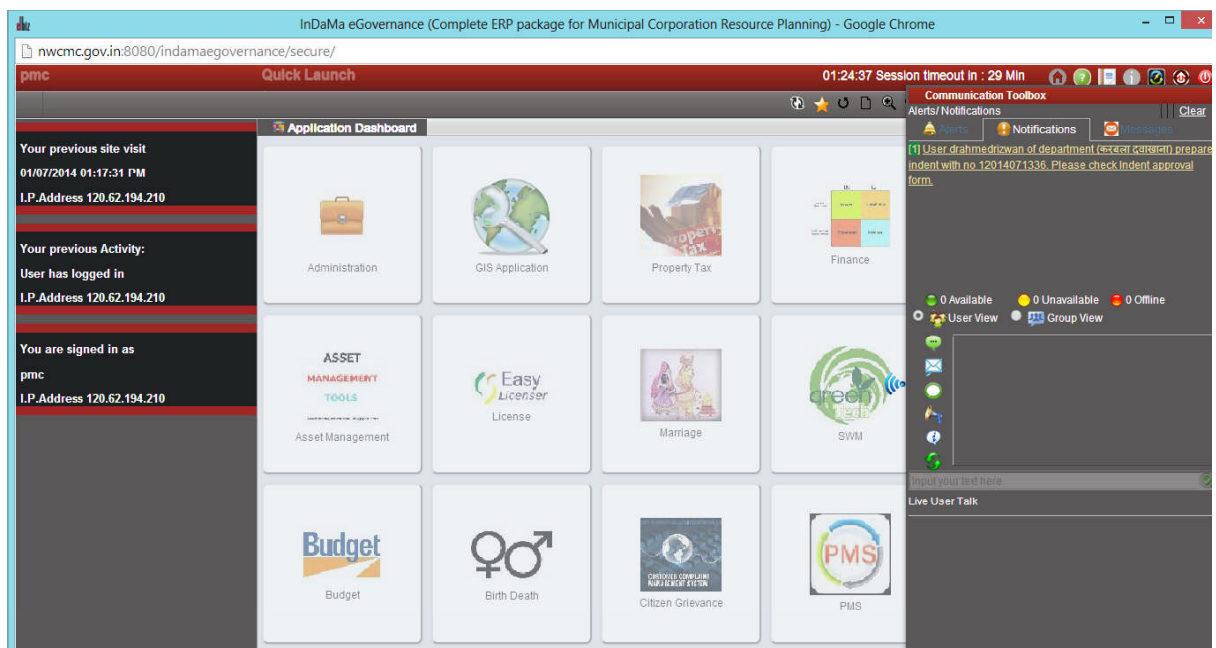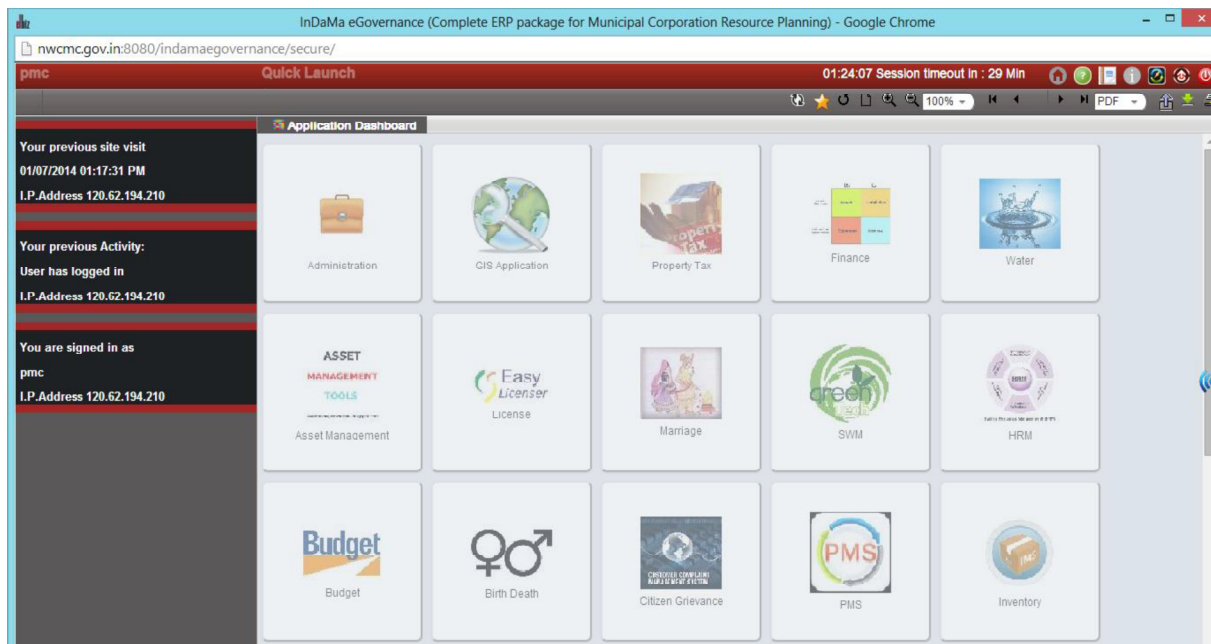
Scalability

Scope for scale – The selected platform can be used for adding of more modules as well as for scaling up at any point in time because of the open Architecture and use of open source technologies.

Integration with other/external is also convenient (via APIs, WebServices) due to the use of open, non-proprietary technologies.

Adaptability

- Redundant Processes – An initial review had indicated that there was a lot of redundancy, overlap and repetition in the various processes. This had to be tackled through a thorough process reengineering, without compromising the essence of the Corporation's service delivery models.
- User Acceptance – Since there was already an existing application, getting user on-board for the new application was the first challenge. It was overcome by making the application selection and deployment a participative process, by convincing users at all levels that the new application is better for them, the corporation and the citizens.
- GIS data collection – A significant challenge for the SI was the door-to-door survey wherein initially the response was less than satisfactory. However, the property and Tax Inspectors form the corporation were involved actively which led to better confidence building and eventually the survey was completed.
- Data migration & Master Data – This is one of the biggest challenges of any IT project – however for Udaan iMEGA, data migration from legacy systems and master data entry was included in the scope of the SI.
- Availability of manpower – The SI was asked to deploy a capable IT engineer at NWCMC, from the beginning of the project, so that user feedback and interaction can happen in a continuous manner rather than discretely.

Sustainability

The focus of Udaan-iMEGA is to create an enabling environment for the corporation to deliver its services better and faster. At the same time, care has been taken that the project does not become an end in itself, but a tool for reengineering and growth. Also, the key requirement has been to ensure that project gets a self-momentum for sustainability. This has been achieved through a combination of various factors:

- During the project lifecycle of 5 years, the SI will support the corporation
- The application hosting has been outsourced to save on capital costs as well as to ensure best in class and scalable infrastructure
- The user buy in has ensured that the users themselves are requesting augmentation of various modules
- The top level (from the Hon. Commissioner) commitment and drive has been

an important and significant factor – this has ensured that the message has been firmly conveyed to all the levels in the organization that the software must be used.

New Model for Service Delivery

The Udaan iMEGA project has achieved several things for the corporation and the citizens of Nanded:

- Better service delivery – citizens are able to received faster service and information pertaining to all activities of the corporation
- Better outreach – the citizens can reach out to the corporation through physical visits to the CFCs, through the website and through the mobile application Similarly, the corporation can communicate with the citizens on a more organized and regular manner
- Integration – the use of a single platform across departments enables better coordination, elimination of data duplication and faster availability and reconciliation of information
- Stronger security – the application protocol and database has ensured that all the information is stored and transferred in a secure manner
- Standardization – Data is now being stored in a uniform manner across the corporation

Efficiency Enhancement

- Generation of an efficient MIS for better and speedier decision making.
- Faster delivery of services aided by retrieval of records from computerized databases and networked sections within e-Governance.
- Improvement in efficiency of the employees and reduction in workload.
- Better transparency in the delivery system.
- Faster processing of files and information resulting in efficient working of the Municipal Corporation.
- Feedback analysis through grievances.
- Reducing the interdependency.
- A holistic citizen centric approach.

Citizen Convenience

- Citizens benefit because of the ease in information access due to number of CFCs.
- Convergence of services and delivery mechanism extend administration outreach providing beneficial services.
- Service delivery is faster as payment of Property Tax, Water bills is online cutting down any redundant waiting time.
- Online status of Citizen Grievance queries and resolution within a stipulated time frame.