Mobile GIS Based Asset Management

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SECTION 1: SOLVING YOUR PROBLEMS

Issue: Human Based Knowledge

- Your past or current resources may have certain unique operational and institutional knowledge from the past numerous years in the organization, and extensive history on strategic decisions and other factors driving maintenance and replacement work including any special conditions and permits e.g. why and when and why an asset was replaced, history and costs associated with the asset, and associated documentation.

- Reports and anomalies on any given contract or project stays on paper file or the resource and may have "no system" to get stored. For example, when you added or removed assets under capital replacement program or regular maintenance, no system or report may readily identify affected customers or such work history. Letters were sent to each customer but no other record was put in the customers file or separately maintained on the physical assets itself.

- Your Preventative Maintenance (PM) programs may require extensive human based knowledge to prepare each program/ work order. Your team makes assumptions, accesses available assets, determines impact on customers, plans the route, calculates potential impacts etc. As the program is revisited each year those thoughts, assumptions, notes and experiences (especially those that are location specific) are lost and the field crew basically starts over. People may leave the job with the knowledgebase and experience, and new workforce faces tremendous challenges. This is further complicated by new developments or new services changing the assumptions of the previous cycle.

- You may be operating based on "gut" feeling. You have assets (pipes, valves, prv's, lights, streets, transformers etc.) but other than two-dimensional AutoCAD drawings or some GIS data and Excel spreadsheets, you have nothing to go by. There is no comprehensive system where data about labor, parts, and materials are captured in a systematic way that can be rolled up to make estimates and decisions later. Your estimate on your total assets may be an educated guess now.

- During a crisis, you may rely on human based or paper based knowledge. No scenarios can be readily analyzed to support prompt decision making for the emergency response due to lack of systematic access to data. This often results in lost time and poor unprepared response that may lead to other issues and more costs as ripple effect.

Solutions :

- All human based knowledgebase will be stored in our system related to Work Order, Service Requests, Time Cards, Reports, Dashboards and associated documentation, labor, materials, parts, time, pictures, manuals, inspection records with videos etc. All information will be electronic and no paper based filing. You will never again chase someone over email or phone calls, not worry about who is not available or on vacation..

- ❖ Your resources may retain some information on reports, surveys, permits, licenses, and other ongoing tasks completed over the past years that only they know about. All that information can be linked to assets and stored in our system.
- ❖ Our system will allow you to move away from "gut" based to "data" based decision making supported by historical data. Projections and estimates will be better as it's based on real data stored in the system.
- ❖ Our system allows you to access any information instantly and make effective and timely decisions to handle emergencies. Related documentation on assets e.g. pictures, videos, service manuals, detail drawings, survey etc. can be attached.
- ❖ Over time, the system will house enough data and accurate information based on which you can strategize loans and grant applications with properly documented system level information and justifications. Strategic and tactical plans can be developed to support executive decisions and acquire corporate sponsorships.
- ❖ Proper recordkeeping will help you comply with industry regulations and standards, saves time, and guarantees complete records. Documents, inspection reports, maintenance records, photos, videos etc. are stored in a secure digital database simplifying retrieval of information. Over time, as you are able to collect system based, real, computed, auditable, traceable data, this improved information will lead to better operating budgets and capital planning.
- ❖ Information will be available to both office and field staff instantaneously as it gets collected in the office or recorded on-site; errors are fixed as and when identified. This allows for faster follow-up and reduced risk of lost paperwork.

Issue: Customer Service

- ➢ Looking up information for customers and developers is very time consuming and sometimes inaccurate. You may use base maps, third party maps and programs, Google Earth maps, other viewers, other business systems, Excel files etc. to get information to provide appropriate answers on a project. You may not have a web or mobile based or GIS based integrated system that can be accessed over internet or mobile devices e.g. smart phone, tablets to answer questions.
- ➢ Customer account related data may not also be accessible instantly on your fingertips to answer customer questions.

Solutions :

- ❖ Our system would provide instant information at your fingertips with quicker response and better information than can currently be provided with paper or human based systems.
- ❖ Our system would also allow for better follow-up (response tracking) regarding customer issues like water quality, leaks, repairs, power outage, service pipeline work etc. Many customer questions could be answered from a computer screen or mobile device rather than finding a

paper work orders or going through a number of paper files or Excel reports or logging into a number of other business systems. This leads to tangible customer satisfaction.

Issue: Integrated System

- ➢ You may be forced to enter same data in multiple systems now as there is no integration between the business systems you use. Each system work separately and behave like an information silo, also vulnerable to multiple points of failure.
- ➢ You may not have on demand or instant access to your other important business systems e.g. backflow, scada/ telemetry, utility billing, financials, CIS etc. You may have to enter into each system separately, and spend lot of effort to collate and present data in a format that is consumable in meetings and presentations. This may also be the case for even regular monitoring of the health of your infrastructure and services that you provide.

Solutions :

- ❖ Systems, as desired by you, will be integrated and results will be presented in dashboards as charts, graphs or reports. We can configure data and information from multiple systems in one spot on our system that can be accessible to you on your mobile devices and computers from anywhere anytime to answer any question without logging into separate systems.
- ❖ Our dashboards can also be configured to present integrated data (integrated from all business systems in the backend) in the form of Key Performance Indicators (KPIs) that you may be tracking or monitoring based on your assigned criteria for your regular work and reporting. KPI's are used to provide instant feedback and track how well you are meeting particular goals and business objectives. Having this information will allow you to make better strategic planning, comprehensive planning, budgetary decisions, and improve staff productivity and customer service.

Issue: Limited Resources

- ➢ You may be resource constrained or existing resources have limited bandwidth or knowledge on your infrastructure.
- ➢ Knowledge transfer may not occur properly during resource changeover or attrition. Moreover, human-to-human knowledge transfer will lead to multiple issues as mentioned above.
- ➢ Your productivity may be negatively affected as you may hunt for the actual assets and information about the asset in paper files, spreadsheets, pdfs, CAD drawings, and multiple other systems. Your existing system may not provide for intelligent search, retrieval or management of assets and related collated information, and your staff productivity is lost in the process. This may also lead to staff frustrations, bad customer service, and loss of vital resources.

Solutions :

❖ Information will be stored in our system where it will not be lost, forgotten, translated, misunderstood, or misinterpreted. This information will be there for future users to build on it by adding, editing and modifying. No ramp up time, no information lost, no paper trail, no rigorous human-human knowledge transfer required.

Issue: Secured Access to Spatial and Aspatial Data

➢ You may be using paper filing system and relying on human knowledge to track and find information and data.
➢ You may be working with engineers or surveyors who create and/ or store your asset related data in their CAD (or may be GIS system). You only get milestones deliveries when you finish a project or request for particular data. You may not have instant 24 hour access to your own data and information though you already paid for creating or updating your own data. Moreover, you may get charged for getting our own data when engineers work on your request to find your data (that you already paid for) and provide it to you. Being billed for multiple times in several ways for the same data and not having access to own data is common scenario for many organizations.
➢ If your data is stored in a GIS system, that may be just a basic desktop system within your organization or with your engineers. You may not have access to modern web or mobile based systems providing 24 x 7 secure access to data.

Solutions :

❖ All data and information will be stored in our system that you can access 24 hours instantly on your handheld device or laptop/ computer from anywhere. You will not pay multiple times for your own data and will not have to request anyone to find your data and deliver it to you. All your email and phone follow ups and unproductive waiting time for getting access to your own data are history.
❖ Role based authenticated access is provided to users; based on user roles in the organization, user will have access to certain data and information.

Issue: Data Format and Data Update Cycle

➢ You may experience huge lag for data updates from your engineers who are maintaining your asset related data in CAD or GIS. Data and drawings may still be in production while your assets are physically on the ground and you have no information on them to perform maintenance management activities.

➤ You may work with engineers who maintain your asset related data in CAD format. CAD is not the correct format for maintaining spatial information about assets.

➤ You may not have a web or mobile based GIS system that can be accessed over internet or mobile devices e.g. smart phone, tablets.

Solutions :

❖ You will have instant access to your most recent versions of your data in our system through internet or mobile devices. You will never experience the "lag" again.

❖ You will have access to GIS based asset data and information and not CAD files. GIS is the correct and required type of information system for managing assets spatially. We will also help you migrate asset data and layers from CAD to GIS.

❖ You will be using our web and mobile based GIS for your asset data and information to perform maintenance management on assets. If you do not have web GIS, you do not need to invest in web GIS but use our web GIS that comes bundled with the solution. You will save infrastructure and resource costs.

Issue: Reporting

➤ Reporting and investigating anything is a complex and cumbersome process as you may need to go through a number of systems, files, intermediary reports etc. Even then at times, appropriate information cannot be found or reported. Also, the time factor to find information and generating reports often introduces delays in processes and schedule.

➤ Several MS Excel files, MS Word documents, MS Access, PDFs etc. may be used in your organization in lieu of appropriate databases. Reporting can be labor intensive and cumbersome.

Solutions :

❖ You will have instant access to all your regularly used reports in our system on your mobile device or computer. New reports can be configured, and custom reports can be built to address your reporting needs. Information and data in the report can come from GIS, Asset Management or any other business system you use e.g. utility billing system, financial system, backflow etc.

❖ You will have enhanced ability to track the actual cost of projects; not just total costs at project end, but detailed tracking of both short and long term projects or phases of project, itemized and rolled up. For example, you will be able to track how many total hours and what parts/ materials, equipments/ rentals etc. were used on a particular job or emergency event and by whom on what tasks on that job.

Issue: Legal Issues and Risks

➢ You may not be able to trace or audit data in your system to justify or substantiate who did what and when. There may not be any automatic capture of user id and date/ time stamp on events occurring or work being done in your system.

➢ Compliance to IT standards, security standards and industry best practices are becoming norms now. Your system may not be currently ready to comply with the industry requirements.

➢ Your current system may not prevent lawsuits and litigations, or at the least, make it easy on you to provide justification and evidence. This is most important for traceable and auditable maintenance work. You may be depending on paper files, human knowledge etc. Moreover, evidences may not be unfolded and presented in the right time to support a lawsuit.

Solutions :

❖ Every action, event, input etc. in our system is traceable, auditable, detectable, and reportable by user id, date and time. This is immensely helpful to report required information and also support legal processes. Audit trails can be traced and information on who did what and when can be unfolded. History and archival options can also be configured.

❖ We comply with industry best practices and standards so that you are inherently secure in your operations and services.

❖ Liability reduction and prevention is probably the most important thing to the longevity of any utility. Through our system you will be better able to track the maintenance records and activities. This could be a significant defense if you ever receive a damage claim and someone attempts to cite negligence from lack of maintenance as an issue.

Issue: Asset Inventory and Condition Analysis

➢ You may have it in parts, but not a total inventory of all your assets. Moreover, your partial inventory may again live distributed in CAD, Excel files or other reports.

➢ You may have minimal to null data on asset conditions; existing condition data may be inaccurate or dated.

➢ You may find it always challenging to develop Capital budgets as you trying to decide what assets need replacement vs. repair, and how to plan for any future failures or breaks or outages. Assessing asset conditions and deciding between replacements vs. repair cannot be made depending on non-traceable and un-auditable cost or work history.

Solutions :

❖ With our mobile GIS based asset layers, you will have a full inventory of assets and their locations in the ground.

- ❖ All asset related costs and data can be rolled up and cost estimates for future projects and capital planning can be done.
- ❖ Maintenance and service records will provide asset conditions data and analysis. Over time, it will lower capital and maintenance costs and provide an enormous Return on Investment (ROI) on the huge investments you already made to procure and install such high value assets to provide your services.
- ❖ Condition reports based on accurate, integrated historical information is the best predictor of future maintenance needs. This information can be provided by our system that is needed for the financial planning and the tactical planning of repair and maintenance activities.
- ❖ You should also be able to use our system to help identify deficiencies or liabilities in the system and move toward preventatively addressing them though Comprehensive Planning. You should also be able to integrate the data in other software that you use for asset health and conditions analysis and planning e.g. hydraulic models, telemetry, distributions, transmissions, network analysis etc. and use the combined data to expose deficiencies or liabilities that you were not even aware of.
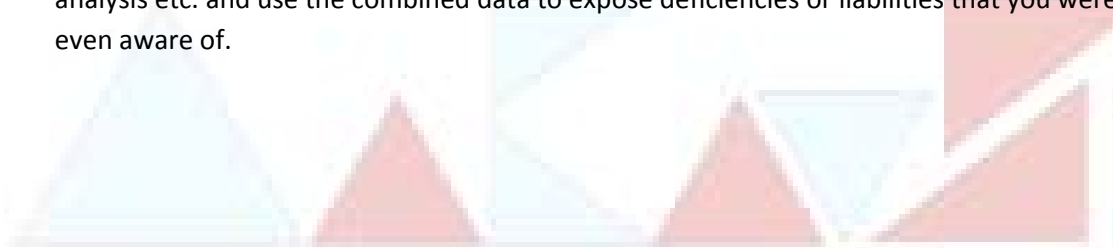
SECTION 2: MAJOR FEATURES BY MODULE

Our product is mobile based, and hosted out of the cloud. You can also have it installed on premises on your infrastructure, or just subscribe to it as a service (SaaS). Purchase of modules and pricing can be customized to fit your needs. Contact us for trials and modular pricing options.

Our Unique Propositions

- ❖ Authenticated Role Based Access
- ❖ Features and Functions exposed based on user role
- ❖ Only pay for the modules you need - never ever pay for software features and functions that you never use or need.
- ❖ Use both ESRI or Open Source GIS - both can be integrated with our product for GIS based asset management
- ❖ Mobile architecture - our product has been developed using mobile architecture as the core, thus leveraging and optimizing mobile hardware and features for performance and usability. We are radically different from any other asset management product in the market; while other products started with the desktop, expanded to web, and now trying to go mobile - we started with mobile as the heart of the architecture, and extending it to the desktop as needed. We observed many products and their weaknesses, started late, and have the blessings of hindsight. We decided to build around mobile architecture core as the app will be mostly used in the field on mobile devices. Desktop interface is provided for in-office usage.
- ❖ Multiple mobile OS versions available- we can deploy on Android, iOS, or Windows mobile based on your standards and needs.
- ❖ Dashboard with Key Performance Indicators

Module: Work Request (WR)
- Create new WR by staff in office - internal reporting or external calls/ emails
- Create new WR by crew on site when they see a problem
- Automatic WR# generation upon creation
- List of existing WR in a list view
- List of existing WR in a map view
- Display summary of WR in list view
- Display summary of WR in map view
- Details of a WR can be seen by clicking on a WR item on list view
- Details of a WR can be seen by clicking on a WR item on map view
- Mark the WR "urgent" if required
- Color code WR if "urgent" while displaying WR in list view
- Color code WR if "urgent" while displaying WR in map view
- Assign Name to WR – requestor

- Manage Name database – requestor and emloyees
- Assign Source to WR
- Assign Location to WR
- Relate other WRs if similar problems are reported
- Add Description to WR
- View pdf files – any associated documents
- Add/ Delete pictures (native from Android mobile devices)
- Add/ Delete videos (native from Android mobile devices)
- Show if a WR has related WO
- Show how many related WO exists in a WR
- Search WR by WR#
- Search WR by parameters
- Sort WR
- ...

Module: Work Order (WO)
- Create new WO by staff in office from existing WR
- Create new WO by staff in office without any WR reference
- Create new WO by crew on site from existing WR
- Create new WO by crew on site without any WR reference
- Automatic WO# generation upon creation
- List of existing WO in a list view
- List of existing WO in a map view
- Details of a WO can be seen by clicking on a WO item on list view
- Details of a WO can be seen by clicking on a WO item on map view
- Display summary of WO in list view
- Display summary of WO in map view
- Assign priority for WO – high, medium, normal
- Display WO by color code – high, medium, normal
- Display WR Name - requestor
- Assign Employee to WO
- Assign Department/ Division to WO
- Assign Type to WO – what type of WO
- Add Description to WO
- Add Location to WO
- Assign Activity to WO
- Mark the WO "standby" if required
- View pdf files – associated documents, service manuals, documents, as-built drawings etc.
- Add/ Delete pictures (native from mobile devices)

- Add/ Delete videos (native from mobile devices)
- Show if a WR has related WO
- Show how many related WO exists in a WR
- Search WO by WO#
- Search WO by parameters
- Create duplicate WO – cyclic WO or preventative maintenance
- Invoke Timecard Module from WO
- If Timecard is invoked from WO, the WO# and Activity automatically gets populated in the Timecard module for that user under current day
- Add Start date to WO
- Add Start time to WO
- Add Complete date to WO
- Add Complete time to WO
- Add Contact Type to WO
- Add/ Delete multiple GPS locations to a WO – to perform multiple "point" location work e.g. catch basins, hydrants flush etc.
- View GPS locations on map
- Add/ Delete Contact to WO
- Add/ Delete Facility to WO
- View Facilities on Map
- Add/ Delete Police Case to WO
- Add/ Delete Waste/ Spills to WO
- Add/ Delete Parts to WO
- Scan bar codes of Parts – use secure technology to scan your custom bar code system and assign parts to a WO
- Preload a list of parts to a WO depending on the type of the WO e.g. hydrant flush
- Add/ Delete Meters to WO
- Add/ Delete Unique Items to WO
- Add/ Delete Equipments to WO
- Add/ Delete Rental to WO
- Add/ Delete Follow-ups to WO
- Sort WO
- …

Module: User Management
- User Authentication
- AD integration
- Self service for password changes
- Find User by Name

- Find User by ID
- Select User and change User level – General, Power User, Admin; Admin can only change levels. Note that users get modules by their user level.
- Assign access to modules by user role
- Add/ Modify/ Archive users
- …

Module: Time Card

- Display current pay period of 2 weeks – can be configured to match your pay period
- Select a day for time input
- Add/ Delete hours on any day
- Classify hour type – e.g. regular pay, sick leave, vacation pay, premium pay or overtime etc.
- Apply different pay rates – regular, overtime, vacation, sick
- Add/ Modify Projects
- Add/ Modify Activities
- Additional 2 hours provisioned for users to submit time card i.e. the timecard for the current pay period will work till 2am after the last day (midnight) of the pay period
- Access from Work Order directly while on job, or from Home page
- …

Module: Reports

- Configured reports for your daily operations
- Configured reports for your state or federal submissions
- Internal meetings reporting
- Track progress reports
- Summary reports – WO/WR activities and cost roll ups
- Additional Custom reports
- …

Some report examples are provided below:

- Meter reading data
  - Time to read meter
  - Number of WO
  - Order of meters read
  - Time Spent on Striping
  - Time Spent on Winterizing
- Operations Programs
  - Start date
  - End date

- o Assigned to
- o PM program
- Capital Improvement Planning Reporting (existing leaks, repairs, water loss)
  - o Projects to be done
  - o Projects completed
- Project tracking
  - o Costs
  - o Start and End
  - o Project name
  - o Contract name, contact info,
- Development Project Snapshot (Phases, timeline, costs) and Permits
- Telemetry / SCADA history and snapshot
- Benchmarks – how long of how much it takes to complete a job
- Leak repair
  - o Water loss
  - o Cost
  - o Equipment use

Module: Dashboard

- Graphs and Charts for KPIs (Key Performance Indicators)
- Track Progress by KPIs
- Track backlog, performance etc.
- View data and information from other business systems integrated with our asset management system
- Operations and Maintenance program activities
- Financial Parameters
- …

Some example KPIs are provided below:

- Budget – Expenditures YTD vs. yearly budget by job/ work/ activity type – this is handy for routine pro-active preventative maintenance and one-off reactive maintenances too.
  - o Scheduled vs Unscheduled work – hours spent, budget spent etc.
- Age of WR or WO – how long is it taking for WR or WO to get closed? Illustrate by 0-30 days, 30-60 days, 60-90 days, more than 90 days, median time to close etc.
- Labor hours per job or work – planned vs. actual
- Operations Programs
  - o Water Quality
  - o Hydrants

- - - o Valving
    - o Flushing
    - o Leaks, Mains and Service
    - o Treatment Plant Operations
- Finance –
    - o Budget vs. Actual
- Water Quality
- Backflow data
- Water loss tracking
- Construction Project costs
- Summary of Work Requests / Work Orders

Module: Inventory / Storeroom

- Check in / Checkout parts from/ to Work Orders
- Check stock and inventory – annual, bi-annual
- Check in parts as new parts come in or restocking happens
- Automatic notification for parts reorder
- Automatic ordering of parts
- Valuation of inventory
- Stock tracking

Module: Inspections

- Job list and descriptions
- List of inspection types
- List of tasks per inspection
- Pass/ Fail / NA - with scores if relevant
- Comments
- Pictures
- Videos
- Digital signature on site while doing the inspection with 3rd party
- Will show GIS map to create or view inspections
- Inspection reminders on follow up cycles
- Punch list progress
- …