White Paper

Cost Benefits of using a GIS-Centric Asset Maintenance Management System

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Cost/Benefits of using a GIS-centric Asset Maintenance Management System

Organizations most often relate cost savings to when a process or task requires less time to complete or when fewer employees are needed to complete the task, thus a tangible economic measure can be clearly denoted. Though this is indeed the case, it is important to review the less obvious benefits and understand the cost savings offered under these considerations.

Many agencies refer to this as cost/benefit and/or return on investment (ROI). This white paper will review the cost/benefits and ROI capable from implementing a GIS-centric asset maintenance management system.

The General Cost/Benefits of Information Technology

The introduction of computers ushered in a new era in human history enabling machines to be used for something other than strenuous, physical labor. As the industrial revolution enabled humans to perform otherwise difficult and arduous work using machines – often super-exceeding the capabilities of several men – likewise, the computer "revolution" off-loaded the menial and tedious work associated with book keeping, accounting and other tasks.

Today, computers (hardware and software) have grown into nearly every facet of human life. Some of the largest companies on the planet are rooted in the computer industry. Moreover, nearly every company around the globe uses computers in daily business. The cost/benefits of computing, in general, has been measured and demonstrated over and over. It may even be safe to say today's businesses cannot function without computer technology.

Maintenance management has been practice for decades and well before the computer age. When the practice was first automated using computers, the name Computerized Maintenance Management Systems (CMMS) was applied and for the most part, remains today. Being somewhat over-obvious, the word "computerized" has recently begun to fade away leaving just Maintenance Management System (MMS).

The Makings of a Maintenance Management System

To understand the cost/benefits a Maintenance Management System can provide, it is important to define what the system typically can do, laying a foundation upon what can be considered as a cost/benefit and ultimate ROI. More specific to this white paper, understanding the added capabilities of a Geographic Information System (GIS) and a GIS-centric solution impacts cost/benefits is equally crucial.

A Geographic Information System (GIS) is a unique system of hardware, software and data used to create, store, edit, manipulate and analyze information within a geographic area. GIS has become a predominant information system in many local governments, public works and utilities agencies. The GIS enables users to visualize models of their physical infrastructure in a map view, yet store this information in a common relational database. The power of a map view – graphical user interface – combined with the inherent power of relational database technology is truly compelling.

In essence, the GIS is used to create a model of a real world system. The model can include such elements as infrastructure (water, wastewater, streets, electric power lines, signs, etc.), land base, buildings, and trees. Virtually anything that can be delineated in a "map" view can be modeled in GIS. The GIS data created in this model represents an asset database.

Cityworks was specifically designed to exploit the benefits of both systems. Coupled with ESRI's leading GIS software, Cityworks allows users to issue, track and manage work associated to infrastructure assets. With the infrastructure assets stored in the GIS, or geodatabase, they are available to support other enterprise uses. This is referred to as an Asset Maintenance Management System (AMMS).

For example, a local government's water utility uses ESRI's GIS products to create a model of their water distribution system. The model includes all the features inherent to the water system: valves, pressurized mains, hydrants, etc. These features are described in an asset geo-data model – an industry standard catalog of the common water system elements.

Cityworks is very adaptable and we've found we can reduce the time and money associated with many of our processes. Our crew chiefs love it and retrieving information for billings and reports is a snap.

Sandy Aragon, Fort Collins, CO

Cityworks is a series of applications used to select an asset or collection of assets and issue a work order to perform some work on the selected assets: exercise valves, repair main, paint hydrant, etc. The work done is tracked in the system, including labor, materials used and equipment. The maintenance histories can then be used to optimize resources, organize work, efficiently route vehicles, and others.

The Benefits of a GIS-centric Maintenance Management System

The true benefits of a GIS and any database system are best actualized when using the data created and managed in the system in support of daily business processes. ROI can only be achieved if the data created in the system can be demonstrated to save time and/or money. Cityworks is a true GIS-centric application in that it is able to utilize both GIS data created and managed by an organization as well as the maintenance data collected and managed within the Cityworks data tables.

Together, Cityworks and ESRI's GIS products enable a powerful set of tools to manage assets and the work associated with maintaining those assets. There are myriad examples of direct cost/benefit.

Conflict Resolution

Often conflicts arise from inadequate information related to an agencies asset infrastructure. This results in a direct cost to the organization in the form of research time to investigate details about the asset in question. This information is often difficult to find, unorganized and inaccurate.

Collecting this information into a GIS eliminates repeated research and, when combined with a GIS-centric AMMS, the complete asset data is available together with the maintenance history about that asset. Staff can quickly and easily determine important information to support decisions related to resolving customer inquiries, legal issues, maintenance concerns, ownership, and asset valuation.

> *Wirebury is able to truly manage the assets in its electric distribution system with the ultimate benefit being reduced cost of ownership of the system.*
>
> Lynn Scrutton, Enbridge, Toronto, ON

Resulting benefits include decreased cost in time in repeated research, actual cost savings derived by sharing these data among multiple applications and across the enterprise.

Data Accuracy

Storing asset data has been a common practice for decades. Public works and utilities have stored asset information on paper maps, in files, on cards and a host of other inefficient sources. Though it was likely the best available practice at the time, GIS and AMMS have created a means by which to store and maintain these data in an accurate and organized method. Moreover, using a single-source asset database – the GIS geodatabase – accurate and timely information is available to not only support the maintenance lifecycle, but other business processes within the organization.

The GIS-centric approach enables fast, efficient and accurate decision support. This has been a principal driver among agencies investing in GIS and AMMS around the world.

Customer Service

Though "customer service" does not present tangible cost/benefit, it can be a measured benefit in terms of customer satisfaction. A GIS-centric approach to CMMS offers users an easy-to-use, fast and efficient means to visually locate customer inquiries. In support of call center operators, Cityworks allows call takers to deal with public concerns quickly, easy and accurately.

With a map-view interface, call takers can quickly determine if the caller is within the jurisdiction and if so, address match the caller's location and/or incident location. As a result, the call taker can easily view the geographic model of the vicinity –

buildings, streets, signs and related infrastructure that may impact the caller's situation. As well, the call taker can quickly associate related calls.

These capabilities of a GIS-centric system account for measurably faster, more complete service to customers and enable more accurate dispatch of staff to investigate the incident.

Real-Time Mobile Access to Data

Providing information in real-time to field personnel offers measurable cost/benefits. As afore mentioned, the optimal benefit of a business system is the ability to readily access the information created and managed in the system in association with day-to-day business processes. Cityworks allows field staff fast and easy access to asset data at the source of the problem. When field personnel can find data to support fast, accurate decisions, cost/benefits can be innumerable.

> *Implementing Cityworks to initiate, track and store work orders, everyone who needed to create and review information was able to from a computer at their desktop or in the field. This process has saved thousands of hours in the creation, location, retrieval and eliminated the duplication of effort related to work orders and information retrieval.*
>
> Terry Biederman, Waterford Township, MI

Keeping field atlas books accurate and up-to-date continues to be a source for time delays and errors, costing public works and utilities unneeded expenditures. Having accurate, real-time data in the field is playing a significant role in mitigating this expense. Access to digital data in the field can also reduce cost by reducing the need to return to the service center because of incomplete information or for following instructions.

Meeting Regulatory Requirements

There are a host of governmental regulatory requirements across a broad array of industries. For example, the Government Accounting and Standards Board (GASB) issued Bulletins 34 & 35 imposing new requirements for local governments related to the valuation and depreciation of their asset inventories. In order to meet these requirements, agencies must determine what assets they have, their current condition and a good idea of when the asset was first put into operation. This data can easily be stored in an asset geodatabase.

However, with this information alone, the agency is only capable of following a strict depreciation method to determine asset valuation. The preferred option, on the other hand is for the agency to follow the "Modified Approach". This requires the comprehensive asset inventory coupled with maintenance histories associated to the assets. A GIS-centric approach easily fulfills the need to locate and account for the assets as well as maintain the necessary data to support the information needed to meet the GASB requirements.

Other regulatory requirements include the EPA's Capacity, Management and Operations Maintenance program; Combined Sewer Overflow mitigation program; and the National Pollution Discharge Elimination System. These and other mandated programs can easily be managed using a GIS-centric AMMS with measurable cost/benefits: using the system to issue and track maintenance work done in support of these programs.

Efficient Dispatch

Dispatching staff to investigate customer issues and perform work has long been a source of resource mismanagement. A natural fit for a GIS-centric AMMS, supervisors can quickly and easily dispatch crews in a more organized and logical manner, mitigating overlapping schedules, misplaced and double booked crew assignments, and optimized routes. It also allows supervisors an efficient way to distribute equipment, materials and resources.

> *Critical work is easier to track and prioritize. Managers can see how much is spent on each work order and use that to improve annual budgeting for airfield and building maintenance.*
>
> Stacey Saunders, Oklahoma City, OK

The greatest costs to a Public Works and Utilities organization are its staff. Optimizing the use human resources saves time and money – a clear and measurable cost/benefit.

Using GIS With AMMS

GIS brings a wide variety of cost saving benefits to an organization. Since the early 1980's, GIS has emerged as a fundamental data source for local governments and utilities agencies around the world. Though many see the potential impact the technology can have on the way these agencies do business, few realize appreciable benefits.

GIS is a database technology with tools to create, edit and manage spatial data. In the example, the GIS is used to manage a water network. This is typical for cities, utility districts and related agencies. This practice is consistent with other infrastructure, as well. The time and effort required to create and manage the dynamic data associated with a public agency often consumes the GIS practitioners and the agency's budget. Moreover, few agencies possess the technical talent necessary to develop applications in the GIS.

> *We're now able to track work orders much more effectively and with a variety of search criteria. Our Goal and Objective reports are now automated rather than manually produced and we're able to control and can add new tasks when and as needed.*
>
> Randy Harris, Oklahoma City, OK

Cityworks is a GIS-based application. Having recognized the value of GIS, Azteca Systems developed Cityworks to meet this need – an innovative approach to blending AMMS within a GIS environment. Cityworks users have saved significant dollars by leveraging the spatial database created by their organization.

Allocation of Capitol Improvement Dollars

Capitol Improvement funds make up for much of an agencies annual budget. Appropriate allocation of these funds leads to maximizing the use of dollars over a broader array of needs. A GIS-centric AMMS allows managers the ability to quickly and easily discern where a limited budget is best spent. Knowing the maintenance history of assets saves time and money in the decision making process and allows managers to easily prioritize, propose and defend decisions. Moreover, understanding the status of each asset save time, money and sometimes property and lives when managers can easily see infrastructure that may be approaching failure.

Benefits most often occur when a process or task within an organization requires less time to complete or when fewer employees are needed to complete the task. The organization can either re-deploy the staff to other more productive jobs or the organization can reduce the staff levels.

Workload Management

GIS is being used by many organizations as a workload management tool. One of the most common complaints among maintenance crews is an apparent unbalance of scheduled work assigned from crew to crew. By utilizing a GIS-centric AMMS, the geographic assignment of crews can be balanced among staff, crews, regions and other criteria. Among the variables used to balance work include the number of customers in a region, infrastructure quality and type, distance from service centers, number of vehicles, specialty equipment and skills and others. Optimizing the use of available resources is a clear and measurable cost/benefit.

Cost/Benefits of using a GIS-centric Asset Maintenance Management System

The cost/benefit of using information technology systems is clear and evident in today's world. Public works and utilities agencies around the world continue to discover and deploy technologies to help them meet the growing need to maintain infrastructure. Many of these agencies have encountered the benefits of a GIS, and more and more realize the returns of a GIS-centric AMMS. Independently, CMMS and GIS offer cost/benefits, though together they can provide a greater return, leveraging their inherent capabilities in a unified system.

Cityworks is a powerful, flexible and affordable GIS-based Asset Maintenance Management System. Built exclusively on ESRI's leading ArcGIS software, Public Works and Utilities can inventory assets; issue and track service requests and work orders; and manage customer needs. Proven technology from Azteca Systems, Cityworks is scalable, easy-to-use and based on open technology.

Since 1986 Azteca Systems has been helping agencies effectively manage their infrastructure. Azteca introduced Cityworks, the only GIS-based software solution for assets and maintenance. As a top tier business partner with ESRI and a proven industry leader, Azteca's solutions are designed to increase productivity, improve customer service and lower operational costs.

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