White Paper

The Benefits of using a GIS-Centric for Asset Maintenance Management

June 2005

Azteca Systems, Inc.
801-523-2751
www.azteca.com

The Benefits of using a GIS-centric Approach for Asset Maintenance Management

Nearly 10 years ago, Azteca Systems pioneered a truly innovative and unique approach to managing capitol assets and infrastructure and the maintenance associated with such features. Coining the terms GIS-centric and GIS-based as it applies to maintenance management, Azteca introduced Cityworks, the only system that truly utilizes a geodatabase as an asset inventory. This white paper outlines a comparison of the GIS-centric approach against other, more traditional flat database centric approach, supporting a litany of benefits.

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.

Single Source Asset Inventory

The Cityworks GIS-centric approach for asset maintenance management relies on a GIS to build and maintain an inventory for infrastructure assets. This approach is more accurate, more reliable, less complicated, and it less costly – leveraging an agency's investment in GIS data.

In the article *Integrating Infrastructure Information*, published in GeoSpatial Solutions, February 2003[i], the author offers a discussion about integrating a maintenance management systems and GIS. An employee of the city's Public Works Department GIS/IT group, he explains how the department developed a "very large and complex DBMS" process to integrate their GIS and Infrastructure Management System (IMS). The author details how the GIS interface corrects deficiencies in the infrastructure asset inventory maintained in the IMS. The agency is relegated to using two asset inventories, one in the IMS and the other being the GIS database.

"The existing IMS, though used regularly, had inconsistent data in comparison with the spatial database," explains the author. Why does this so often occur? Unlike the IMS, the GIS software contains robust tools for assuring data integrity.

The city's GIS/IT group developed an elaborate QA/QC process to mitigate the "inconsistent" data in the IMS by checking it against their GIS. This begs the questions; if the GIS is a demonstrated superior tool for building and maintaining infrastructure assets, why not just use the GIS for the inventory of assets? Most maintenance management systems are designed around a primary inventory of infrastructure assets residing within the maintenance management system, resulting in the need for expensive integration, inconsistent data linking and/or risky data synchronization.

Cityworks uses the GIS as the asset infrastructure inventory. With Cityworks, an organization does not need to build and/or

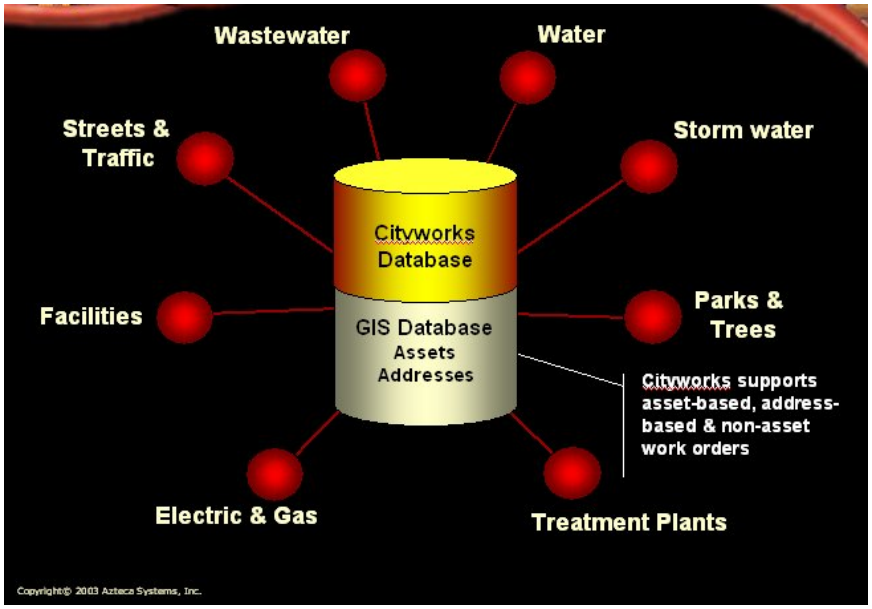
maintain a duplicate inventory for infrastructure assets that in a disparate system, thus eliminating the data inconsistencies and elaborate QA/QC process. The Cityworks GIS-centric approach is more accurate, more reliable, and less complicated. This translates into a less costly solution notwithstanding the notion of using a single source database (GIS) for multiple, business process applications.

Leveraging Your GIS Investment

The Cityworks GIS-centric approach for asset maintenance management leverages your organizations already existing and ongoing investment in GIS.

Many organizations already have an existing and ongoing commitment to GIS. As well, many are realizing the benefits of using the GIS data as an integral and scalable data source throughout the enterprise. An infrastructure asset inventory built and maintained in a GIS allows an organization to leverage the investment without costly duplication of data.

Referring again to the Geospatial Solutions article titled *Integrating Infrastructure Information*, the author further explains how the city GIS/IT staff had spent a significant amount of time designing a interface to "bridge the gaps between (the) GIS and IMS inventories by linking both to a very large and complex DBMS." An obvious critique of this approach is the time spent by the GIS/IT staff integrating the two systems. This time, of course, deferred from other projects and perhaps from maintaining and improving the GIS. Moreover, the "large and complex DBMS" interface will require maintenance with upgrades and changes in system platform, resulting in a further dilution of resources in the future.



Distributed Geodatabase Approach

In this scenario, maintenance and operations staff create and maintain the IMS asset inventory while concurrently, the GIS/IT staff create and maintain a more accurate asset inventory in the GIS – clearly a duplication of effort. With Cityworks, this is avoided.

Oracle Corporation, a major player in the relational database and EAM (Enterprise Asset Management) solutions market began to offer asset management tools for facilities. In a white paper published by Oracle's EAM team[ii] they discus the implementation of an EAM, including defining assets.

Regarding defining assets, the paper states, "this is where the bulk of the EAM specific setup work must be done. Remember: the asset is the thing to be maintained. It will reside within an asset hierarchy, groups and classes above it, and components below it." Oracle's authors a clear about the amount of effort and time needed to create and maintain an asset inventory. This suggests that when the time and effort spent on what is "the bulk of the…setup work" for a maintenance management system is already schedule to occur in the GIS, why expend the effort and resources on a duplicate database in the IMS?

Define Assets

This is where the bulk of eAM-specific setup work must be done. While it bears similarity to inventory item setup in ERP, eAM has its own vocabulary and processes. Most of the screens will be identical to those used in discrete ERP. Remember: the "asset" is the thing to be maintained. It will reside within an asset hierarchy: groups and classes above it, and components below it.

Define Asset Groups

At the top of an asset hierarchy is the asset "group". It is the first of three eAM specific item types. It has a prescribed item template that should be used in its definition. You may have as many asset groups within an eAM org as you wish. They may be used in multiple eAM orgs. The purpose of the group is the creation navigational category of assets. The group will be at the top of the tree structure. It is also used for reporting purposes.

Define Asset Areas (Locations)

A user defined value representing the physical, or virtual, location of the asset. This value will be assigned to the individual assets, and be used in asset look-up.

Define Asset Classes (optional)

In between the asset group, and the asset item(s), you may define intermediate levels for ease of navigation and reporting. If you choose to define classes (and sub-classes), you must use eAM's Asset Management Category flexfields. This is a pre-compiled, two-segment flexfield.

In a meeting at the city of Stevens Point, Wisconsin (population 25,000), a colleague asked the Director of Public Works how much money had been spent on GIS data creation – not the GIS hardware and software, but the data alone. The director turned to her GIS manager to hear the response. The manager did some quick mental math and responded with a

number near $750,000. Does it make sense to use that data in day-to-day business applications?

Cityworks uses the GIS database as the asset inventory, issuing and tracking work orders against capitol assets and infrastructure stored as features and related devices in the GIS. This unique GIS-centric approach leverages an organizations investment in GIS.

GIS-centric Means Built on GIS Technology

Cityworks is the only GIS-centric asset maintenance management system. Other systems require costly interface products, add-ons, integration efforts or risky data synchronization processes. With Cityworks, GIS integration is inherent in the design of the system.

Westin Engineering of Sacramento, CA published a study about integration methods between GIS and CMMS[iii]. The author, Jim McKibben classifies CMMS according to two categories based on where the asset data is stored: an ***interface group*** that "maintains the asset data in the CMMS database" and a ***second group*** that "actually stores the asset data in the GIS database." McKibben reviewed every major system on market and concluded that "the ***second group***...includes only Azteca Systems (Cityworks)..." All other vendors utilize the ***interface group*** approach.

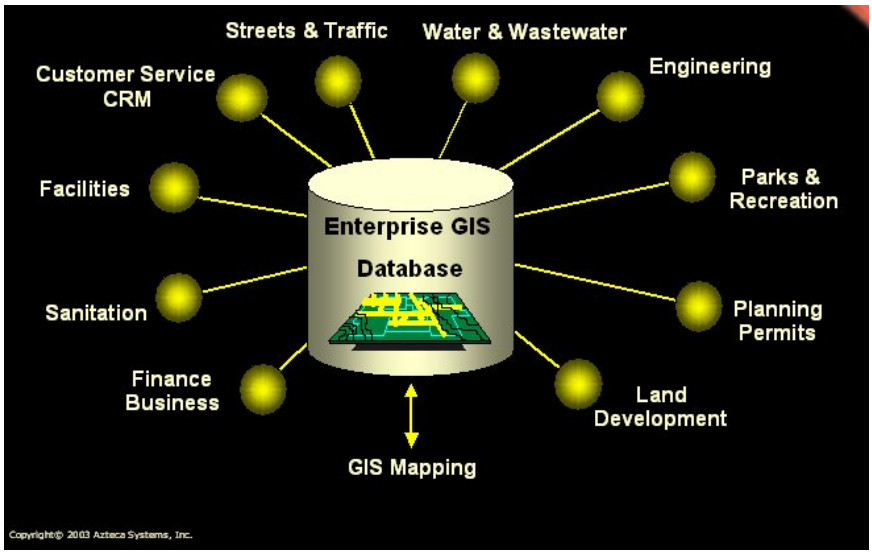
Integration Methods

The identification of CMMS solutions that have been linked or integrated to ESRI software was based on information supplied by Lori Armstrong of ESRI and by system vendors the authors have identified during their work. Most of the software venders developing GIS/CMMS links are business partners of ESRI. The list of the GIS and CMMS links presented above are all of the ones that the authors know about. However, new ones could be under development.

The methods of integrating GIS with CMMS can be grouped into two major categories based on where the asset data is stored. Asset data can be stored in the GIS data base or in the CMMS data base. The first group, which includes most of the GIS/CMMS interfaces, maintains the asset data in the CMMS database. GIS software is used to access the asset data or provide information that is stored in the CMMS database. GIS features are linked to assets in the CMMS database. Adding a new asset requires the addition of the asset in both the CMMS database and the GIS database. The work order and maintenance data is stored in the CMMS.

The second group, which includes only Azteca Sysems, Inc. actually stores the asset data the GIS database. All assets and their related data are maintained in the GIS database. The addition of a new asset in the GIS database does not require an adjustment in the Acteca's Cityworks database. The work orders and maintenance management functions are maintained in a series of Cityworks tables. Work and maintenance data are linked to assets. All of the maintenance management functions are provide as extensions to ESRI's GIS software.

The Cityworks GIS-centric approach is often referred to as a "shared database" approach or as an "enterprise GIS database." In this approach, the inventory of assets resides in one place and is shared by any other system that needs to utilize the data. These systems include GIS mapping, Operations & Maintenance, Engineering (Design Construction and Modeling), Land Records, Permitting, Public Safety, Management, etc. Inherent to the design, an interface or integration is not required. There are no costly add-ons to view or access data in the GIS or to integrate with other business systems in the enterprise.



Enterprise GIS

Cityworks is Non-Proprietary and Open

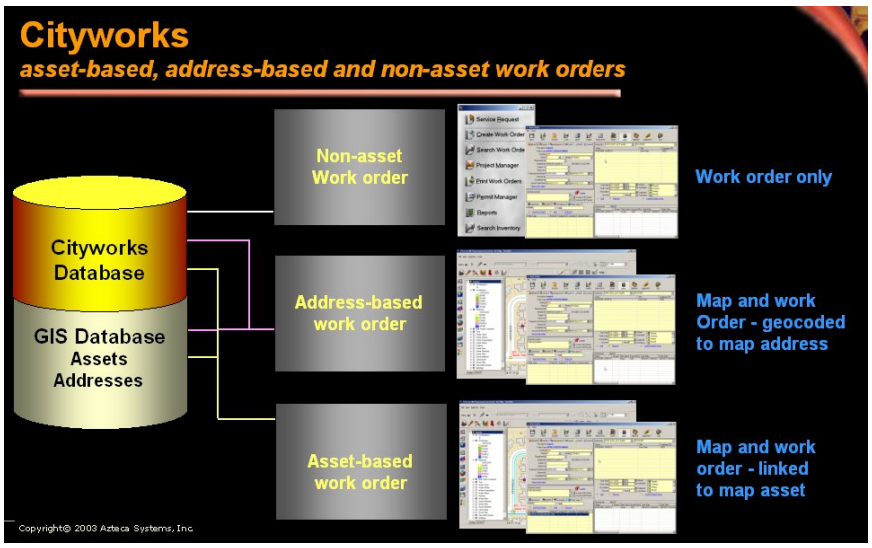
Cityworks is built on open standards and technology, utilizing a unique approach among other MMS suppliers. With a non-proprietary inventory of assets and an unmatched open data structure, it may be difficult to discern which is most important. The model defined for storing data is non-proprietary and belongs to the customer. Any system can freely utilize the data, including Cityworks.

For example, InfoWater is a commonly used hydraulic modeling system from MWH Soft that utilizes the GIS as the infrastructure model of assets. Cityworks and InfoWater share a common data source in the GIS. Neither can claim the underlying spatial data as a proprietary model and prevent other systems from utilizing it. The same is true for other software systems that utilize the GIS data. The GIS is non-proprietary and open. This is what is meant by Cityworks is non-proprietary and open.

Configurable and Flexible to Meet a Wide Array of Needs

With Cityworks, the underlying model is flexible and can be designed for your particular needs. Cityworks can be configured to perform the maintenance management needs of any organization, from water, wastewater and electric utilities to facilities, buildings and urban forests.

Assets are modeled in a geodatabase as features. Cityworks is used to track the maintenance activities associated to these features. This is referred to as asset-based work orders management.



Cityworks can also track maintenance activities that are not associated to an asset feature and/or occur at an address. These are referred to as address-based work orders. As well, Cityworks can track activities for a general work order (work orders that are not for an asset or at an address). This flexibility enables a wide array of uses for Cityworks.

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[i] *Melick, GeoSpatial Solutions, Integrating Infrastructure Information, February 2003.*

[ii] *Oracle Enterprise Asset Management: EAM; An Oracle White Paper, July 2002.*

[iii] *McKibben, Proceedings ESRI International User Conference, Integration of GIS with Computerized Maintenance Management Systems (CMMS) and Asset Management Systems, July 2002*

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.

Azteca Systems, Inc.
11075 South State Street
Suite 24
Sandy UT, 84070
801-523-2751

On the web at: www.azteca.com