GeoWorx Sync for Maximo

Enabling the Loosely Coupled Data Model for IBM's Maximo Spatial

White Paper

April 22, 2013

Contents

Introduction

What is GeoWorx Sync?

GeoWorx™ Sync for Maximo® is an autonomous enterprise software program that synchronizes data between an IBM® Maximo database and an Esri® ArcGIS® geodatabase. GeoWorx Sync communicates with Maximo and ArcGIS systems via vendor-supported Application Programming Interfaces (APIs), including Maximo Business Objects and ArcObjects.

GeoWorx Sync does not run "in process" with either the IBM Maximo or the Esri ArcGIS system. The independent installation of GeoWorx Sync means that:

1. GeoWorx Sync is very easy to install and configure.
2. GeoWorx Sync can support software upgrades and version changes to the Maximo and ArcGIS software platforms.

The loosely coupled nature of GeoWorx Sync ensures the highest degree of stability and flexibility, so that organizations can rely on GeoWorx Sync for safe, consistent, dependable synchronization of data between Maximo and the ArcGIS geodatabase.

GeoWorx Sync is a fully supported software product, complete with robust documentation and installation programs and procedures. As a software product company, GeoNexus Technologies is 100% committed to the support and continual improvement of GeoWorx Sync. GeoNexus will release regular updates to ensure compatibility with current versions of Maximo and ArcGIS.

IBM's Maximo Spatial delivers the full power of EAM and GIS combined in a single, streamlined solution. GeoWorx Sync for Maximo helps enterprises maximize their Maximo Spatial investment by ensuring that GIS and Maximo data are properly and reliably synchronized.

More detail about the specific features of GeoWorx Sync can be found in **Part II** of this paper.

Purpose of this Paper

Organizations commonly recognize two approaches for integrating Maximo and ArcGIS from a database perspective. These are: (1) the tightly coupled approach, which combines GIS and Maximo data through the use of database links and views; and (2) the loosely coupled approach, which maintains separate GIS and Maximo databases, leveraging software to synchronize data between the two databases. The purpose of this paper is to compare these two integration approaches, showing that many organizations can benefit from the advantages of the loosely coupled approach.

This position paper consists of the following three main parts:

Part I compares the advantages of the loosely coupled and tightly coupled models. It will demonstrate that the loosely coupled approach is often the best path for organizations because it offers (1) the highest degree of flexibility; (2) reduced impact on existing workflows and data models; and (3) a lower total cost of ownership.

Part II examines the benefits of implementing GeoWorx Sync for Maximo as a "commercial-off-the-shelf" (COTS) product rather than relying on in-house resources to build a custom GIS–Maximo data synchronization system.

Part III discusses the reasons that standard enterprise database synchronization tools do not provide a comprehensive solution for synchronizing data between Maximo and ArcGIS software platforms.

About GeoNexus Technologies

GeoNexus Technologies™ Inc. is a software product and solutions company focused specifically on the integration of GIS and Enterprise Asset Management (EAM) systems. GeoNexus provides *front-end* ("client-side") and *back-end* ("server-side") technologies designed to enhance productivity and the end-user experience in addition to improving the reliability, manageability, and performance of integrated GIS–EAM databases. GeoNexus has more than 25 years of combined experience with Maximo–ArcGIS integration with several public and private utilities in the United States and Canada.

Summary

Part I: Tightly Coupled Versus Loosely Coupled Integration

Part I of this paper will point out the benefits and limitations of the tightly coupled approach versus the loosely coupled approach for Maximo–GIS integration. This section will also demonstrate that, while the tightly coupled approach initially seems simpler, it may in fact be more complex and challenging to maintain in the long term.

Experience has shown that the best way to maximize the inherent capabilities of the Maximo and ArcGIS platforms is to keep the Maximo and ArcGIS systems aligned with their native data models. This approach reduces the level of custom configuration, and ensures that the full range of Maximo and ArcGIS functionality remains available. The Maximo Spatial architecture allows the back-end data models to be maintained separately (using their intended native data structures), while offering end-users the fully integrated functionality of the Maximo Spatial map viewer.

Part II: Build Versus Buy

Part II will compare the benefits of using COTS software such as GeoWorx Sync for Maximo rather than relying upon in-house resources to build software for synchronizing Maximo and GIS data. In some cases, the costs associated with developing and maintaining complex enterprise-class, mission-critical software are not immediately apparent. This paper will highlight the advanced features of GeoWorx Sync, showing that it is a comprehensive, carefully architected system for synchronizing Maximo and GIS data. With GeoWorx Sync for Maximo, an organization can be up and running very quickly and have peace of mind knowing that the software will be supported, upgraded, and maintained over the long term.

Part III: Why Not Use Standard Database Synchronization Tools?

Part III will discuss the many reasons why standard database synchronization tools may not provide the comprehensive set of functions needed to ensure proper synchronization between the Maximo and ArcGIS platforms. These two platforms are both built upon complex data models designed specifically to support a wide range of Maximo and ArcGIS functionality. In addition, the ArcGIS versioned editing model (which conceptually equates to long transactions from a database perspective) adds another layer of complexity. End-users must address these complexities when synchronizing ArcGIS and Maximo data. Failure to do so may result in the corruption of data structures and the failure of ArcGIS and Maximo systems to operate correctly. To protect

against data corruption, GeoWorx Sync for Maximo performs updates/adds/deletes to Maximo and ArcGIS data using only vendor-supported APIs.

Part I: Tightly Coupled Versus Loosely Coupled Integration

The Tightly Coupled Model

The tightly coupled integration approach is the standard IBM approach and is described in the Maximo Spatial installation and configuration documentation. The primary goal of this approach is to reduce or eliminate data duplication. From a practical standpoint, this means that the attributes for spatially enabled Maximo entities (e.g., Assets and Locations) exist only in one system. Through the use of database links and views, the data fields become shared and may be accessed by both the GIS and Maximo systems.

For example, consider a water main asset that has the *UniqueID, Diameter, Length, Condition, Install Year,* and *Status* attributes. In the tightly coupled model, the Maximo asset database might contain only the *UniqueID* and *Status* attributes, while the *UniqueID, Diameter, Length, Condition,* and *Install Year* would reside in the GIS database (along with the geometric data). The *UniqueID* attribute needs to exist in both systems in order to allow a combined view of the data to be created and presented to Maximo or GIS as a single view.

Theoretically, this approach also results in the most current data being displayed in both systems. For example, if a GIS editor changes the *Diameter* value in the example above, then the new *Diameter* would be seen immediately from the Maximo interface. In practice, however, the real-world GIS editing workflow means that it is unlikely that GIS edits are available immediately to Maximo. This is because enterprise GIS edits typically are performed using the ArcGIS versioned editing model. GIS editors perform edits in their own "versions" of the geodatabase. These edited versions typically would not be seen by the database views used to integrate Maximo and GIS data. In reality, GIS editors may wait hours, days, or even weeks before posting edits that would be viewable by Maximo users.

An Example of a Tightly Coupled Asset Data Model
The diagram below shows conceptually how database views are used to combine data from the GIS and Maximo databases so that the Maximo and ArcGIS systems can access the asset attributes required to support the functionality of each platform.
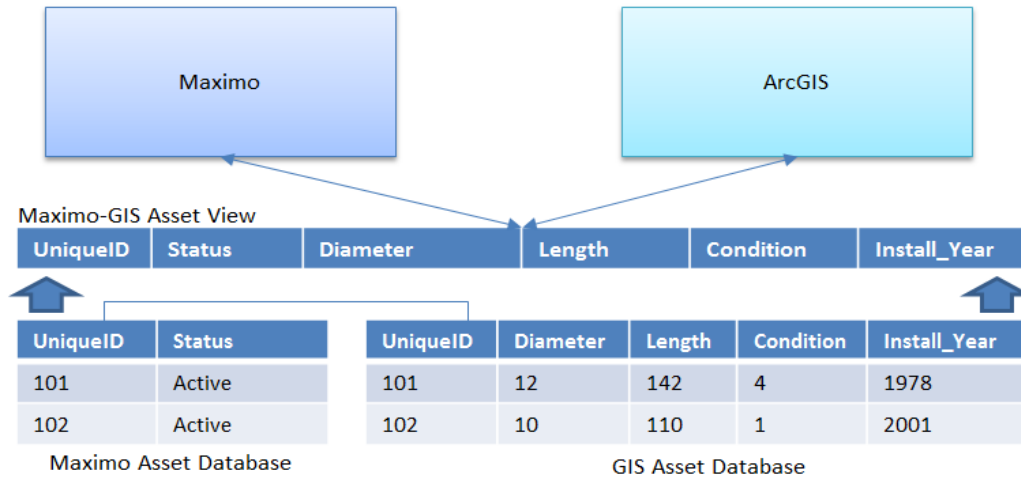
An Example of a Loosely Coupled Asset Data Model

The diagram below shows that in the loosely coupled model, each system utilizes its own native data model, while the synchronizer software ensures that data in both systems is up to date.
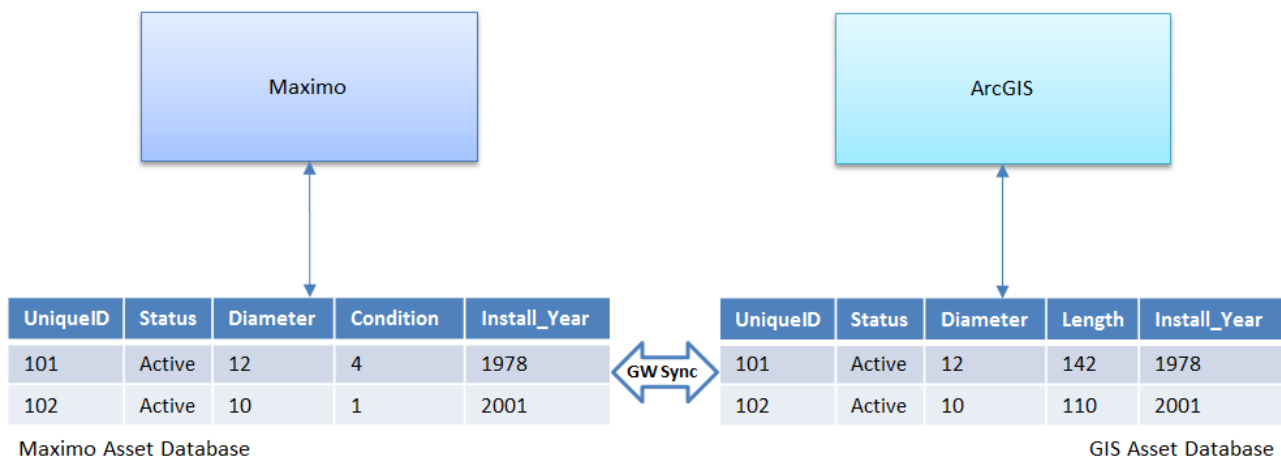
Note that the Maximo database does not contain the Length attribute, and the GIS database does not contain the Condition field, demonstrating that only required attributes need to be synchronized.

Another consideration to note is that even with the tightly coupled model, some degree of synchronization must occur. IBM has added a component called the *cron task* to Maximo Spatial that will create new Asset and Location records in Maximo when new corresponding features are created in GIS. For example, if a GIS editor creates a new water main in GIS using standard ArcGIS editing tools, the cron task will recognize this new water main and create a corresponding Maximo water main asset record. Most organizations that choose to implement the tightly coupled model will want to activate and configure the cron task, which synchronizes newly created assets in GIS with Maximo.

Advantages of the Tightly Coupled Model

The tightly coupled model does provide some notable advantages. Depending on an organization's current software/database architecture and system requirements, this model may be the preferred path.

IBM-Supported, Out-of-the-Box Solution

This model is supported with Maximo Spatial right out-of-the-box, with no need for additional software. With the proper configuration and planning, some organizations can be successful using this approach.

Decreased Data Duplication

Very little data duplication occurs with this approach. Assuming that an organization successfully establishes a system of record (that is, Maximo or GIS) for each data field and that clear lines of responsibility for maintaining data are in place, then having only one copy of each data attribute can be advantageous.

No Additional Synchronization Software

An organization using the tightly coupled approach has no need to purchase and implement additional software. All required components are delivered as part of the Maximo Spatial and Esri systems.

The Loosely Coupled Model

In the loosely coupled integration approach, the GIS and Maximo databases remain mostly independent, with each database containing the data needed to support its respective software system. This approach depends much less on cross-database views and links. Maximo uses its native data model and is not dependent on data residing in the GIS database, and the GIS will not have cross-database dependencies on data residing in Maximo.

This approach allows the Maximo and ArcGIS platforms to continue to leverage their respective native data models, while providing a completely integrated view of GIS and Maximo data to the end-users. The primary advantages of the loosely coupled approach are: (1) it ensures that the widest range of native Maximo and GIS functionality remains intact; and (2) it minimizes the need for institutional and workflow changes. Existing departmental and organizational data stewardship procedures can continue to operate because the Maximo and GIS data models remain largely intact and independent.

It is likely that some degree of data duplication will occur in the loosely coupled model. However, the experience of GeoNexus clients has been that some level of data duplication is manageable and actually can be beneficial because it allows the Maximo and GIS systems to operate freely and independently, utilizing their native data models.

While this loosely coupled model is not an "out-of-the-box" approach, it is important to note that the Maximo Spatial software is not modified in any way. Maximo operates just as it would with the tightly coupled model. The Maximo and GIS databases are simply allowed to remain more autonomous while still providing an integrated view to front-end Maximo Spatial users.

Advantages of the Loosely Coupled Model

Although data duplication and the reliance on data synchronization software may seem causes for concern, years of real-world experience show that many organizations will find numerous advantages of the loosely coupled model.

Decreased Overall Complexity

Although this approach requires the use of synchronizer software, it actually can be less complex and easier to maintain overall. The loosely coupled approach may be simpler because:

- It has less dependence on database views and cross-database links.

- It does not require use of the Maximo Spatial cron task to push new GIS assets to Maximo.
- It does not require "Conditional UI" configuration to expose data stored in GIS to the Maximo UI.
- It does not require additional fields to be added to the GIS schema for each feature class (e.g., MXCREATIONSTATE and ROWSTAMP).

Loosely Coupled Model

Tightly Coupled Model
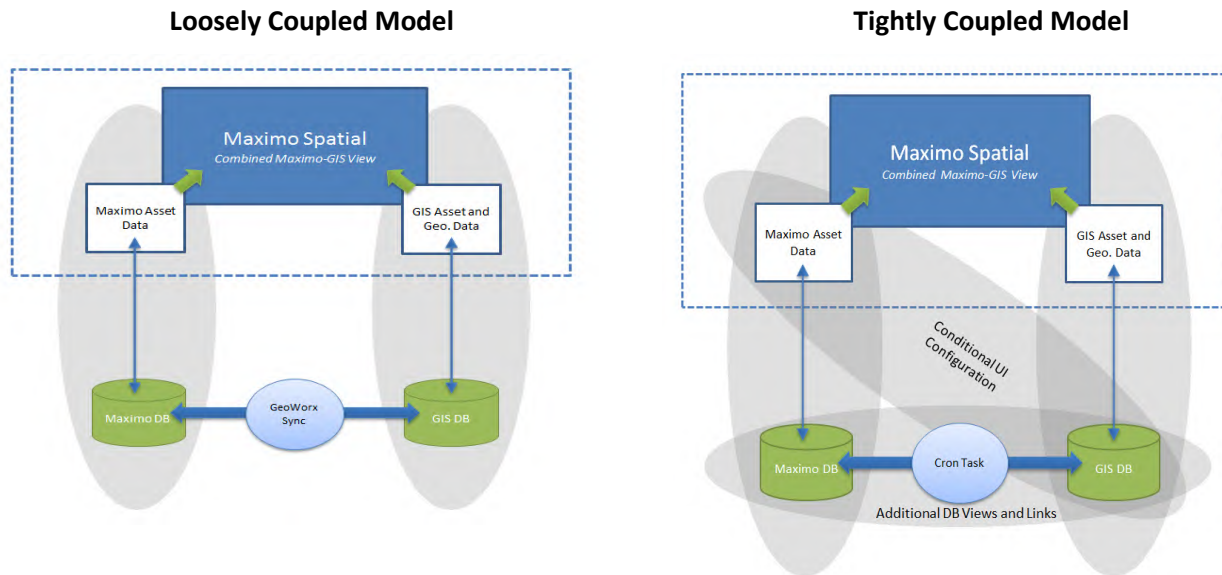
100% Transparency and Administrator Control

The loosely coupled model utilizing GeoWorx Sync allows the system administrator to configure and see all data mappings readily. There is decreased dependency on complex database triggers, Maximo escalations, automation scripts, and the like. With GeoWorx Sync, the administrator has (1) complete control of configuration and data mappings; (2) a visual status console for monitoring synchronization in real-time; and (3) comprehensive reports showing exactly which data were synchronized.

Software Version Flexibility

Because the Maximo and GIS systems remain more independent, it may be easier to install software upgrades without causing major system disruption.

Native Data Model Support

The loosely coupled approach allows the Maximo and ArcGIS platforms to continue use of their native data models. This ensures that the full range of functionality is available in both systems while still providing an integrated view of the data to end-users. Maximo and ArcGIS were architected as independent enterprise systems each with its own unique data model. The loosely coupled model recognizes this fact by allowing each system to maintain its autonomy (and all native functionality) without sacrificing the benefits of the integrated Maximo–GIS system. For example, Maximo reports are configured by default to operate with all Maximo data residing in the standard Maximo database. Significant reconfiguration is needed to create reports that require access to asset data stored in the GIS database.

Support for Mismatched Data Types

End-users may have justifiable technical, aesthetic, historical, or organizational reasons for storing certain data attributes as different data types in Maximo and GIS. GeoWorx Sync for Maximo accommodates those differences by optionally translating data types as data are synchronized between the two systems.

Mobile Maximo Solutions Compatibility

Many third-party mobile Maximo solutions operate by uploading and downloading data to and from Maximo. The research has shown that these systems assume that Maximo data are stored using the standard Maximo data model. This won't cause problems with the loosely coupled approach, because the Maximo data model is maintained. However, this is not the case with the tightly coupled approach, where much of the data actually will be stored in the GIS database.

Maximo Specifications and Classifications Compatibility

The use of Maximo *Specifications* is the standard Maximo data modeling and storage approach, which allows for differentiation between multiple asset/location types (i.e., *Classifications*) in a single Maximo *Asset* or *Location* table. A loosely coupled, synchronizer-enabled system allows data stored as Maximo *Specifications* to be synchronized with the GIS database. With the tightly coupled model, Maximo *Specifications* are only available to the GIS through complex multi-join views. This means that a primary Maximo data modeling technique may not be usable with the tightly coupled model, without increased data model complexity and additional system maintenance.

Maximo Reports Compatibility

Standard Maximo reports are configured with the expectation that *Asset* and *Location* data are stored in the native Maximo database. This is the case with the loosely coupled approach and therefore no additional report configuration or customization is necessary (beyond what would be done normally). However, with the tightly coupled model, significant customization may be required because the reports will need to access data from various tables within the GIS database.

Reduced Workflow Modifications and Institutional Changes

The Maximo and GIS systems can continue to operate independently using their native data models and maintenance procedures without sacrificing any of the benefits of the integrated Maximo–GIS system. This means that existing data stewardship practices can continue to operate as they did before the implementation of Maximo Spatial. Also, other enterprise integrations involving Maximo and GIS may be affected less, because the existing data models are not significantly modified.

Reduced GUI Customization

The loosely coupled model does not impact standard Maximo GUI configuration in any significant way. Again, this is because the standard Maximo data model for *Assets* and *Locations* is not modified. However, with the tightly coupled model, end-users must implement an approach called "Conditional UI Configuration" extensively in order to expose different screen configurations for each asset/location type. This is largely because the use of Maximo *Specifications* and *Classifications* is severely hampered with the tightly coupled model.

Alignment with GIS Editing Workflows

In practice, most end-users conduct GIS data edits using the ArcGIS versioned editing model. The result is that data edits are only posted to the enterprise geodatabase after several hours or even days. Therefore, a system that emphasizes access to data edits in "real time" may not offer significant value. The loosely coupled data synchronization system typically updates both Maximo and GIS databases on a nightly basis (or on-demand at any time). This means that the update frequency is well aligned with typical GIS editing workflows.

Reduced Data Model Alignment Effort

While the integration of Maximo and GIS always will require significant effort, organizations may experience less strain with the loosely coupled model. This is because neither the Maximo nor the GIS data models are forced to adhere to the needs of the other system. Even data types do not need to match. Instead, this approach emphasizes "data mapping," whereby fields in Maximo are mapped to their counterparts in GIS so that their values can be synchronized.

No Need for Specialized/Custom GIS Editing Tools

A robust data synchronizer, such as GeoWorx Sync, is capable of detecting complex GIS data-editing operations that can result in corruption of the *UniqueID* used to link the Maximo and GIS datasets. For example, consider a single water main that is split to add a new connection. A new *UniqueID* must be generated for one (or both) of the new main segments. In order to ensure that this is done correctly, organizations often must build (or buy) custom data-editing tools. However, the GeoWorx Sync for Maximo software can be configured to recognize and rectify these issues automatically while subsequently synchronizing the updates with Maximo with no need for user involvement.

Synchronization of Service Address Data

Many organizations are realizing the benefits of using the Maximo Service Address module. A well-maintained Service Address dataset can serve as a master address database and can help improve the accuracy of address data across the enterprise. It also protects against service address record redundancy in Maximo and with other integrated systems such as GIS.

The Maximo Service Address module is very flexible and can accommodate a variety of use cases. In order to support Service Address functionality, the data model for Service Addresses is somewhat more complex than the data model for other Maximo entity types.   Address data is stored and managed across multiple tables within the Maximo database.

The loosely coupled synchronization approach is well suited to handle the complexity of the Service Address data model. The Maximo data structures can be navigated programmatically and the address data can be pulled from the appropriate tables in Maximo and sent to receiving fields in GIS feature classes.   Using the tightly coupled approach would involve the linking of multiple data tables across disparate databases.

Employing the loosely coupled approach means that the enterprise can develop procedures to maintain an enterprise-wide Service Address dataset in Maximo, and then synchronize the address data with GIS feature classes.

GeoWorx Sync is designed to navigate the Maximo Service Address Data Model (Maximo Version 7.5.0.3 shown below).
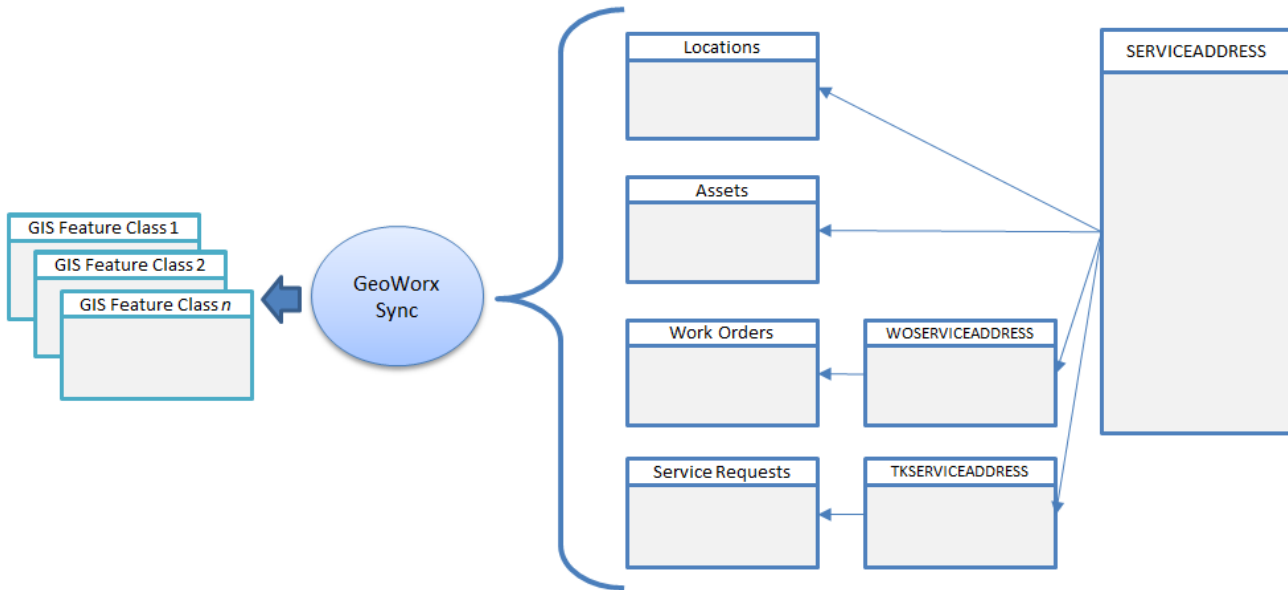
Potential for Improved System Stability

Since Maximo remains largely independent from the GIS database, Maximo is much less likely to become disabled if the GIS geodatabase becomes inaccessible for some reason. All asset/location data is housed in the Maximo database and can still be accessed.

Reduced Total Cost of Ownership

Real-world experience indicates that the cost for data synchronization software is often less than the costs associated with managing the configuration, workflows, and database integration when using a tightly coupled model, because of the reduced overall complexity associated with the configuration and maintenance of the loosely coupled approach. This becomes more apparent as the number of different GIS feature classes (and corresponding Maximo asset types) increases.
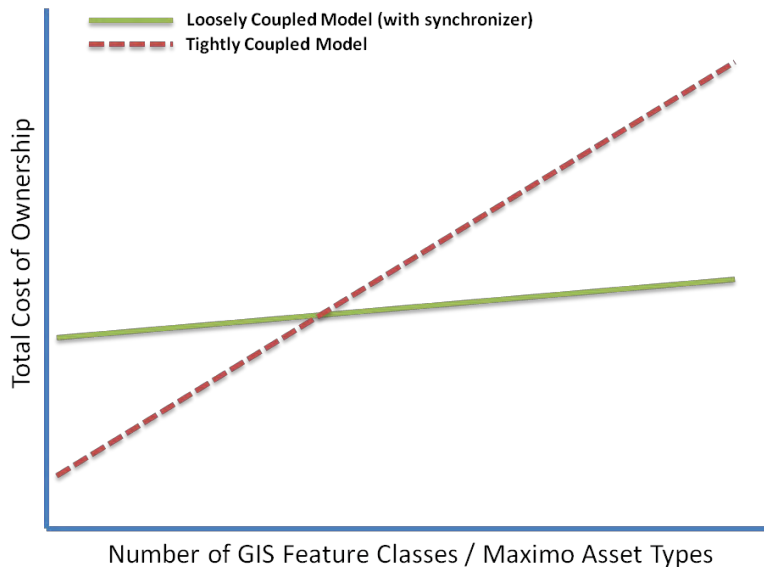
Part II: Build Versus Buy

Organizations that decide that they are likely to benefit from the loosely coupled integration approach will need to determine whether to build their own custom Maximo-GIS data synchronizer or to purchase a commercial off the shelf (COTS) package such as GeoWorx Sync for Maximo by GeoNexus Technologies.

This section describes several advantages to implementing GeoWorx rather than relying on in-house resources to build a custom solution.

Reliable Technical Support
GeoNexus provides responsive technical support via email, phone, and web-conferencing. Clients need not worry about key personnel being out of the office when they need technical support for their synchronization software.

Complete, Continually Updated Documentation
With a licensed version of GeoWorx Sync, clients have access to our comprehensive documentation, help, and FAQ system (24/7/365). GeoWorx Sync documentation is updated continuously based on product updates and on feedback from customers. This means that an organization does not need to use internal resources to keep documentation up-to-date.

Support for Future ArcGIS and Maximo Versions
As a product company, GeoNexus Technologies is committed to continually updating GeoWorx Sync for Maximo to be compatible with new releases of ArcGIS and Maximo versions. Our licensed customers have access to product updates as soon as they are available. Clients do not need to divert internal resources to upgrade custom synchronization software.

Community
The list of GeoWorx Sync customers is growing. GeoNexus Technologies will provide on-line forums to facilitate discussion among our customers. GeoNexus also will facilitate customer meetings at relevant conferences throughout the year. Open lines of communication will help customers get the most from GeoWorx Sync by learning from the experience of other organizations. These forums will also help GeoNexus get the feedback we need to continue to improve the product.

Easy-to-Use Installation and Configuration
GeoWorx Sync for Maximo is a fully supported software product. As expected, an industry-standard software installation program is used to install GeoWorx Sync on clients' servers. As soon as the installation is finished, users can open the GeoWorx Sync GUI immediately and start configuring the software for their enterprise.

Best-of-Breed Software Based on Years of Experience and Multiple Implementations
The GeoNexus team responsible for engineering and building GeoWorx Sync has over 25 years of combined experience with the integration of EAM and GIS systems. They have worked on a wide variety of Maximo–Esri integration projects for over a decade. Many of these projects involved the development of Maximo–GIS synchronization systems. The GeoWorx Sync development team leveraged the experience gained in all of these projects to design a "best-of-breed" enterprise-class synchronization platform. Our goal is to provide a fully supported software package that is flexible enough to meet the specific needs of our customers.

1,000+ Hours of Development Time

Organizations responsible for managing several complex enterprise systems may have the internal technical resources required to build a synchronization system. However, before they choose that path, GeoNexus recommends that they consider the time it could take to build many of the features that come right out-of-the-box with GeoWorx Sync for Maximo.

Advanced User-friendly GUI

All configurations, reporting, alerting, and other operations are handled from the intuitive GeoWorx Sync desktop GUI. There is no need to edit complex configuration files and database tables.

Comprehensive Reporting Module

GeoWorx Sync produces comprehensive reports each time it runs. Reports are produced in PDF and XML formats. These reports may include data regarding synchronization performance, updates, adds, deletes, orphans, processing errors, and more.

Final Status Report

Dataset / Step	Phase	Errors	Total Records	% Complete	Elapsed Time (H:M:S)	Complete	Success
Load Configuration					00:00:38	true	true
Validation					00:00:00	true	true
gasValves							
	EXTRACT_LOCATIONS	0	8375	100%	00:00:18	true	true
	EXTRACT_EDIT	0	8357	100%	00:00:27	true	true
	EXTRACT_PUBLISH	0	8375	100%	00:00:17	true	true
	DETECT_DUPLICATES	0	4	100%	00:00:00	true	true
	RESOLVE_DUPLICATES	4	4	100%	00:00:00	true	true
	KEY_GENERATION	0	0	100%	00:00:00	true	true
	CREATE_PUBLISH_RECORDS	0	0	100%	00:00:00	true	true
	CREATE_LOCATIONS	0	0	100%	00:00:00	true	true

Detection of Updated, New, Deleted, and Decommissioned Assets/Locations

GeoWorx Sync detects and resolves (or reports) the following database changes or conditions:

- o Updated GIS attributes
- o Updated Maximo attributes
- o Pending Decommissioned Maximo Assets/Locations
- o New Assets/Locations created in GIS
- o Deleted Assets/Locations in GIS
- o Orphaned Maximo Assets/Locations
- o Orphaned GIS Features

Automatic GIS Feature Split and Copy/Paste Reconciliation

GeoWorx Sync can be configured to detect GIS features that result from split or copy/paste operations in GIS. New unique identifiers are generated automatically and the new or updated features are automatically synchronized with Maximo without any need for user involvement. No custom GIS editing tools are required.

Bidirectional Data Synchronization

GeoWorx Sync can be configured to handle "bidirectional" synchronization. This is useful when no absolute "system of record" exists for a given attribute. That is, the attribute may be edited in either the Maximo or the GIS system. In these cases, GeoWorx Sync data updates need to flow in both directions between GIS and Maximo.

Mismatched Data Type Translation

With GeoWorx Sync, the Maximo and GIS systems are free to utilize their optimal data formats for each asset/location attribute. For example, an attribute such as *InstallYear* may be stored as a *String* in Maximo (e.g., *'1968'*) and as a *Numeric* type in GIS (e.g., *1968.0*) and the synchronization software will

handle the data type translations as necessary. This is often done for aesthetic reasons, because a numeric value of 1968 for a Maximo attribute would be displayed as 1,968.

Real-time Synchronization Process Status Console

The GeoWorx Sync status console connects to the synchronization process that is currently running. It allows visual monitoring of the synchronization process in real time, and even permits users to stop the process if necessary.

Dataset / Step	Phase	Errors	Current Rec	Total Recs	% Complete	Time (ms)	Time (H:M:S)	Rate (Recs/Min)	Remaining (E...	Complete	Success
Load Configuration		0		0		4758	00:00:04			true	true
Validation		0		0		0	00:00:00			true	true
waterHydrant		0		0							
	EXTRACT_LOCATIONS	0	804	804	100%	1248	00:00:01	38653/min.	00:00:00	true	true
	EXTRACT_ASSETS	0	802	802	100%	546	00:00:00	88131/min.	00:00:00	true	true
	EXTRACT_EDIT	0	804	804	100%	6755	00:00:06	7141/min.	00:00:00	true	true
	EXTRACT_PUBLISH	0	805	805	100%	1155	00:00:01	41818/min.	00:00:00	true	true
	DETECT_DUPLICATES	0	1	1	100%	62	00:00:00	967/min.	00:00:00	true	true
	RESOLVE_DUPLICATES	1	1	1	100%	47	00:00:00	1276/min.	00:00:00	true	true
	KEY_GENERATION	0	0	0	100%	16	00:00:00			true	true
	CREATE_PUBLISH_RECORDS	0	0	0	100%	15	00:00:00			true	true

Comprehensive Synchronization Configuration Validation Console

As the number of feature classes and asset types being synchronized grows, the configuration can become very complex, and therefore the chance for configuration anomalies can grow. GeoWorx Sync allows users to run a complete validation of their configuration before processing begins.
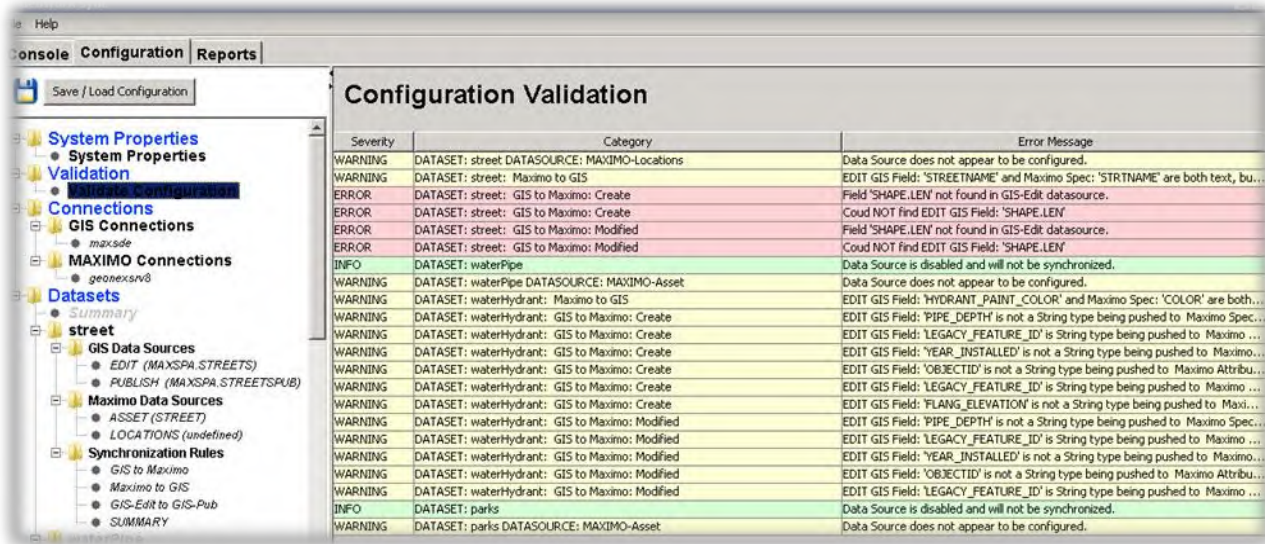
Error Detection and Alerts

GeoWorx Sync has built-in mechanisms for alerting administrators via email and text messages if errors are encountered during the synchronization process.

GIS Edit and Publish Database Support

GeoWorx Sync for Maximo can be configured to create and manage a Publish geodatabase specifically for use with Maximo Spatial. Experience has taught us that Maximo Spatial performs best with a geodatabase that is unversioned and that has only the fields required for Maximo. That is, the Maximo Publish geodatabase is tuned specifically for optimal performance with Maximo Spatial. Another benefit is that the GIS edit geodatabase will not be affected directly by Maximo operations.

GeoWorx Sync for Maximo Is Ready Today

An organization that chooses to build the synchronization software in-house will need time to architect, design, build, test, and debug the system. Depending on how complex the system becomes, this could take many weeks or months to complete. GeoWorxs Sync for Maximo from GeoNexus Technologies is ready to install and configure immediately.

Part III: Why Not Use Standard Database Synchronization Tools?

Why does synchronizing data between Maximo and the ArcGIS geodatabase require specialized software such as GeoWorx Sync? On the surface it would seem that typical enterprise database synchronization tools, available from a variety of vendors, would work fine.

Listed below are several reasons, gleaned from our real-world experience, that explain why standard data synchronization tools , especially those that do not use vendor-supported APIs for data updates, will not provide a comprehensive solution and ultimately may not be successful.

Software Warrantee Protection

Software warrantees for both Maximo and Esri products assume that users/developers do not edit data tables directly. Custom applications and tools should always use vendor-supported APIs when modifying Maximo and Esri data. Examples for Maximo include the Maximo Integration Framework and Maximo Business Objects. Examples for Esri are the ArcObjects and Esri SOAP and REST web services.

Data Corruption

Editing tables directly could cause Maximo or ArcGIS data to become corrupted. The Maximo and ArcGIS data models are both relatively complex and the developer should not assume that he or she is certain about which tables and records need to be updated in all cases. *Vendor-supported APIs should always be used.*

Data Validation

Bypassing the vendor-supported APIs and editing tables directly means that end-users will not be leveraging the built-in data validation layer provided by both the ArcGIS and Maximo APIs, which increases the chance for data corruption and software failure.

Complex Data Structures

The Maximo and ArcGIS data models are more complex than they may seem at first glance. Reverse-engineering the table structures in an effort to determine exactly which tables and columns need to be updated requires a significant investment in time.

Future-Proof

The GeoWorx Sync for Maximo software is protected from changes that Esri and IBM may make to underlying table structures by using the vendor-supported APIs. This will not be the case if the system interacts directly with the data tables.

Proper Handling of New, Deleted, Decommissioned, and Orphaned Assets

Making updates to attributes in Maximo may be relatively straightforward. However, synchronization complexity rapidly increases when the synchronization software must also detect, reconcile, and report newly created assets, deleted assets, decommissioned assets, and orphaned assets in either the GIS or Maximo databases. For example, the creation of a new asset in Maximo is *not* a simple matter of adding a record to a data table. Multiple tables and columns and indices need to be updated in a specific order. The bottom line is that these types of operations should never be handled by editing the tables directly. *Vendor-supported APIs should always be used.*

Geodatabase Versions and GIS Editing Workflows

The ArcGIS geodatabase utilizes a powerful and highly versatile architecture called "versioning." This allows multiple GIS editors to edit the geodatabase simultaneously using long transactions that can last hours, days, or even weeks. One side effect of this versioning model is that no "base" table typically exists that standard data synchronization software can access and rely upon for the most current GIS data. GeoWorx Sync accounts for this versioned model and always uses Esri's ArcObjects API to ensure that GIS data are interpreted correctly.

GIS Feature Split and Copy/Paste Detection and Resolution
It is highly unlikely that generic enterprise data synchronization tools will handle situations where GIS feature editing results in duplicate or nonexistent *UniqueID* (that is, the ids that link the GIS and Maximo asset data). For example, consider a single water main line that is split to add a new connection. A new *UniqueID* must be generated for one (or both) of the new main segments. GeoWorx Sync software can recognize and rectify these issues automatically, and also can synchronize the updates with Maximo with no need for user involvement. Standard data synchronization tools will not be capable of doing this.

Support for a Publish Database
GeoWorx Sync for Maximo is a specialized synchronization system designed specifically for the support of Maximo Spatial. Support for a Maximo Spatial Publish geodatabase is a great example of this. GeoWorx Sync can be configured to populate, manage, and maintain a geodatabase that is tuned specifically for use with Maximo Spatial. The Maximo Spatial Publish geodatabase only contains the data necessary for Maximo Spatial, so it typically results in improved performance for end-users.

Streamlined Address/Intersection Management and Searching
 Maximo users expect a simple, efficient mechanism for locating addresses, whether searching for street addresses (e.g., "100 Main Street") or for intersections (e.g., "Oak & Main"). In practice, this requires a single search box in which the user can enter any type of address.

However, this "single search box" approach is typically not achievable in Maximo because of the way in which organizations manage their address and intersection data. Most organizations store street addresses and intersections as separate data sources, and a single Maximo search field cannot point to multiple data sources.

Street addresses and intersections often are stored as separate feature classes in the geodatabase, or they may even be stored in completely separate databases. For example, intersections may be managed in the GIS, while street addresses are managed by the customer care or asset management system.

GeoWorx Sync solves this problem by combining multiple address sources automatically into one address data source. Then, a single, intuitive address search field can be configured in the Maximo GUI, making address searching simple and intuitive for Maximo users.

Handling Service Address Data
The Maximo Service Address database structure is relatively complex, with address data stored and managed across multiple tables and linked using a unique code (ADDRESSCODE). Using Service Address functionality with Service Requests and Work Orders introduces two new tables (WOSERVICEADDRESS and TKSERVICEADDRESS) adding to the complexity. Using standard database tools to synchronize Address data with external sources will undoubtedly require the creation and maintenance of custom scripts. GeoWorx Sync supports synchronization of Maximo Service Address out of the box, eliminating the need for custom interfaces.

Conclusion

A core mission of GeoNexus Technologies is to provide software solutions that help organizations manage and maximize their investment from the integration of Maximo and ArcGIS platforms. We want our customers to be successful! Based on our experience in designing, building, and implementing EAM–GIS integrations, GeoNexus

believes that GeoWorx Sync for Maximo can be a valuable tool for managing and maintaining the data integration tier for Maximo Spatial implementation.

This conclusion is based on three main points:

1. The Maximo and ArcGIS platforms were architected and built as separate enterprise-class systems with different core purposes in mind. By using GeoWorx Sync as part of a "loosely coupled" integration model, an organization can allow the Maximo and ArcGIS platforms to operate independently using their purpose-built native data models. This approach ensures that the full range of functionality remains intact in both systems, while still enabling the integrated view of GIS and Maximo data that is provided through Maximo Spatial.

2. GeoWorx Sync for Maximo is a fully supported software system with an architecture based on years of experience with a variety of Maximo–Esri integration projects. Building a similar system with in-house resources would be a significant undertaking and may prove more costly to build and maintain over the long term.

3. GeoWorx Sync for Maximo was designed and built specifically for synchronizing data between Maximo and the ArcGIS geodatabase and for supporting Maximo Spatial implementations. Generic enterprise data synchronization software cannot handle the complex synchronization scenarios associated with updating, deleting, creating, and decommissioning assets and locations in Maximo and ArcGIS. Additionally, GeoWorx Sync always uses Maximo and Esri APIs for updating asset data, ensuring the integrity of the data and the reliability of the Maximo and ArcGIS software.