

Jerry Miller – Product Architect – Maximo for Utilities  
Richard Berthet – Technical Sales Representative



# IBM Maximo Spatial Asset Management

## PulseANZ2010

Meet the people who can help  
advance your infrastructure



# EAM Solution Areas



## Capable of Supporting all Industry Solutions Maximo Asset Management, Utilities and Oil & Gas built specifically to consume Spatial Asset Management



### Support Work and Asset Management for Organizations with Geographically Dispersed Assets

- Delivers an integration framework based upon ESRI ArcGIS Server Technology that support future product development and customer extensions.
- Expose GIS Data to Maximo users and detailed Maximo work and asset business information to GIS users.
- Visualize GIS Assets and provide a geospatial context of work, assets and relevant land based features which impact reliability, longevity, and efficient work execution.
- Create and manage work orders related to mass property: utility poles, assets, vegetation management, infrastructure repairs, etc.





# Maximo Spatial - Features and Benefits

More Accurately  
define work locations

When a new service request is created, either manually or through a call center, having access to a map of the region to determine the location of the problem leads to a more efficient resolution.

Plan and schedule  
work by area

Ability to look at a number of open work orders and create a project or work package using a map view. Query work order by status, work type or craft requirements to find related work.

Query a map by  
Address

When trying to locate an asset or work order users can query the map by a specific address.

Optimize technicians  
travel time

By having a work orders location accurately specified, there is less time spent on travel trying to find the correct address or location, and less time traveling between work locations inefficiently.

Advanced analytics

Ability to overlay information on a map like traffic or weather information, asset failure history or population to prioritize work, schedule outages or plan future maintenance projects.



## Maximo Spatial Asset Management 7.1.1

- Released December 2009 – 7.1.1
- 7.1.1.1 (Fixpack) released Q1 2010 supporting ESRI 9.3.1 SP1
  - 7.1.1.1 Critical Hotfixes Currently Available – from Support by Request
- **Highlights**
  - Technology Migration to JavaScript REST API
    - Dramatically improved performance - QA Validated a 50% improvement
    - Cleaner Look & Feel - Docking of menus frees up map real estate
    - Expanded use of core Maximo capabilities
      - Security, Application Configuration, Conditional UI, Integration Framework
      - Access to maps outside Map Tab
    - Support for federated database



## Product Discussion Disclaimer – General Product Direction

- *The information on the new product is intended to outline our general product direction and it should not be relied on in making a purchasing decision.*
- *The information on the new product is for informational purposes only and may not be incorporated into any contract.*
- *The information on the new product is not a commitment, promise, or legal obligation to deliver any material, code or functionality.*
- *The development, release, and timing of any features or functionality described for our products remains at our sole discretion*

# Maximo Spatial Asset Management – Roadmap

Released 7.1	Released 7.1.1	Release 7.x.x	Future Releases
December 2008	December 2009	eGA TBD	eGA TBD
<ul style="list-style-type: none"> <li>• Port to Maximo 7</li> <li>• Specific Spatial Install</li> <li>• Included with Maximo for Utilities</li> <li>• Support for Map Tips</li> <li>• Graphic interaction On Map between Feature &amp; Result Set</li> <li>• Spatial SigOption Security</li> <li>• Supports ESRI ArcGIS Server 9.3</li> </ul>	<ul style="list-style-type: none"> <li>• Service Address Supports Geo-Coding</li> <li>• Auto Create, Auto Locate Work Orders &amp; SRs</li> <li>• Polygon Selection Sets with defined Actions</li> <li>• Single Click Linking</li> <li>• Highlight linked Assets and Locations</li> <li>• GIS Adm. Defines User Map Services by site</li> <li>• Support Multi-Geo Databases</li> <li>• Supports ESRI ArcGIS Server 9.3.1</li> </ul>	<p><u>Spatial Maximo Development</u></p> <ul style="list-style-type: none"> <li>• Auto Locate search by x y</li> <li>• Enhance Redlining tools support persisting data</li> <li>• Enhanced Editing:</li> <li>• Extend Map Tips: more links</li> <li>• Configuration Enhancements: Label definitions, Map tips, Redlining file storage</li> <li>• Service Address Enhancements</li> <li>• Spatial Framework Enhancements</li> <li>• New Customer Enhancements</li> <li>• Support ArcGIS Server</li> </ul>	<p><u>Potential Future Enhancements</u></p> <p><u>GPS &amp; LBS</u> Location Based Services – LBS GPS / AVL – Crews / Vehicles People / Device NEZ No Entry Zones</p> <p><u>Roads, Rails, Water/Waste Water Linear Spatial Support</u> Visualization Dynamic Segmentation</p> <p><u>Geo-Metric Networks (Tracing)</u></p> <p><u>Support GIS Interoperability:</u> Through Maximo Configuration Oracle Spatial, Intergraph, ArcExplorer, Google Maps, Bing Maps</p> <p><u>Extend GIS Mobile</u></p> <ul style="list-style-type: none"> <li>• Supports ArcGIS Server</li> </ul>
Maximo 7.1.1.4	Maximo 7.1.1.6	Maximo 7.x.x	Maximo x.x

All dates are estimates and specific content is subject to change.

*Disclaimer - The information on the new product is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information on the new product is for informational purposes only and may not be incorporated into any contract. The information on the new product is not a commitment, promise, or legal obligation to deliver any material, code or functionality. The development, release, and timing of any features or functionality described for our products remains at our sole discretion*



**Demonstration of Maximo for Spatial Asset Management. We have more to share than we have time, please see the additional detail in this presentation.**

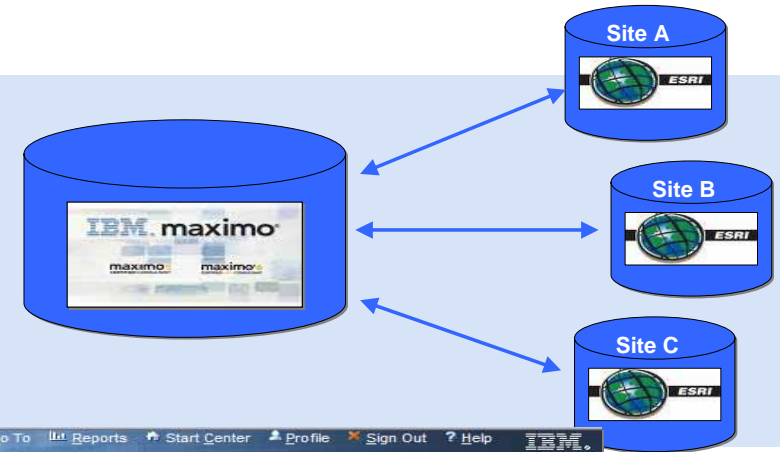




# Site Configurations

## NEW – Site Configuration

- Maximo Sites -> create configuration to multiple GIS geodatabases
  - eg...A utility in multiple states and each has its own GIS geodatabase for each state. A Site in Maximo can be defined with its own map configuration and geodatabase



The screenshot shows the IBM Maximo Map Manager (Spatial) interface. The main content area displays configuration details for a site named 'BEDFORD'. The 'Geometry Service' section shows the URL: `http://9.42.61.203:8399/arcgis/rest/services/Geometry/GeometryServer`. The 'Map Services' section shows a table with the following data:

Name	Order	URL	% Transparency
dynamic	10	<code>http://9.42.61.203:8399/arcgis/rest/services/LLDynamic/MapServer</code>	25
cache	20	<code>http://9.42.61.203:8399/arcgis/rest/services/LLCache/MapServer</code>	0

The 'Service Layers' section shows a table with the following data:

ID	Name	GIS_Object
1	Work Orders/MAXIMO.WORKORDERBOUNDARY_GIS	WORKORDERBOUNDARY_GIS
2	Work Orders/MAXIMO.WORKORDERPOINT_GIS	WORKORDERPOINT_GIS
6	Land_Link/MAXIMO.AddrPoint	ADDRPOINT
8	Land_Link/Poles/MAXIMO.DISTRIBUTIONPOLE STEEL_GIS	DISTRIBUTIONPOLESTEEL_GIS

# Service Address

## NEW - Service Address App

- **Problem** – need a common way to identify a physical locations
- **Solution** – added Service Address to all spatial enabled applications
- Service Address fields added to Assets, Locations, Work Orders and Service Requests
- Enables search by address in Maximo Advanced Search
- Address fields can be exposed on application form using App Designer

A screenshot of a Maximo search form titled "New Search Fields - Current Query". The form contains several input fields for search criteria: Organization, Site (with a dropdown menu showing "BEDFORD"), Address, Street Address, Address Line 2, Address Line 3, City, Region/Country, County, State/Province, Zip/Postal Code, Country, GEO Code, and W/GDT. At the bottom of the form are buttons for "Find", "Restore Application Defaults", "Reset", and "Cancel".

A screenshot of the Maximo "Service Address (Spatial)" application interface. The top navigation bar includes "List", "Address", and "Map" tabs. Below the navigation bar is a table of service addresses. The table has columns for Address, Street Address, City, State/Province, Zip/Postal Code, Organization, and Site. The data rows are:

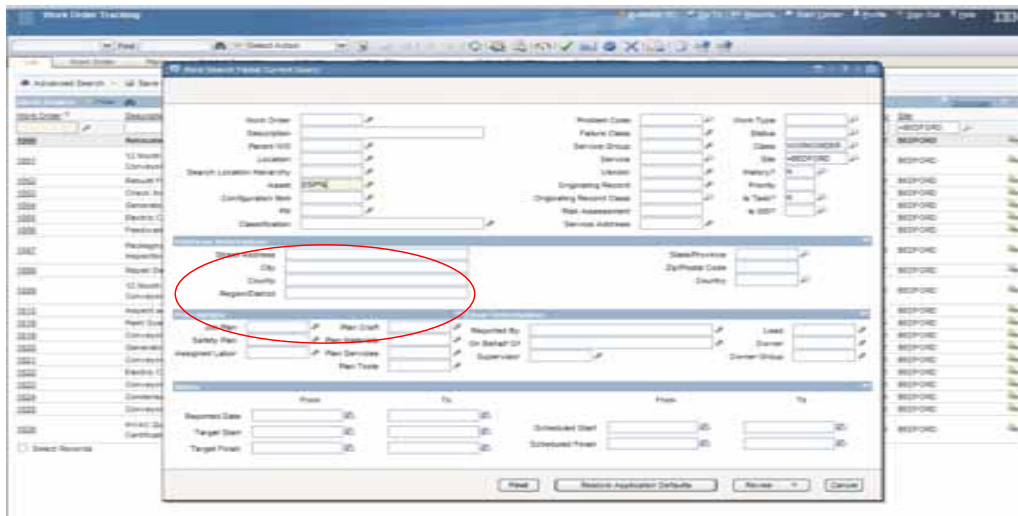
Address	Street Address	City	State/Province	Zip/Postal Code	Organization	Site
1010	1453 Banbury Lp N	LAKELAND	FL	33809	EAGLENA	BEDFORD
1017	1435 Banbury Lp N	LAKELAND	FL	33809	EAGLENA	BEDFORD
1018	6702 Asbury Dr.	LAKELAND	FL	33809	EAGLENA	BEDFORD

Below the table is a detailed view of a selected address (1010). The "Address Information" section includes fields for Street Address (1453 Banbury Lp N), Address Line 2, Address Line 3, City (LAKELAND), Region/District, County, State/Province (FL), Zip/Postal Code (33809), Country (US), GEO Code, and Time Zone. To the right of these fields are input fields for Latitude, Longitude, Reference Point, and Directions. Below the address information is a map showing the location of the address. A small window titled "Location: greater" is open over the map, displaying the address details. An arrow points from the "Street Address" field in the address information section to the map.

# Auto-Locate

## NEW – Auto-Locate

- **Problem:** WO and SR's that did not have a WO or SR GIS feature (geometry) linked did not show on map
- **Solution:** Added plotting functions that will use an asset, location, or service address to plot a temporary symbol for the WO/SR in the map

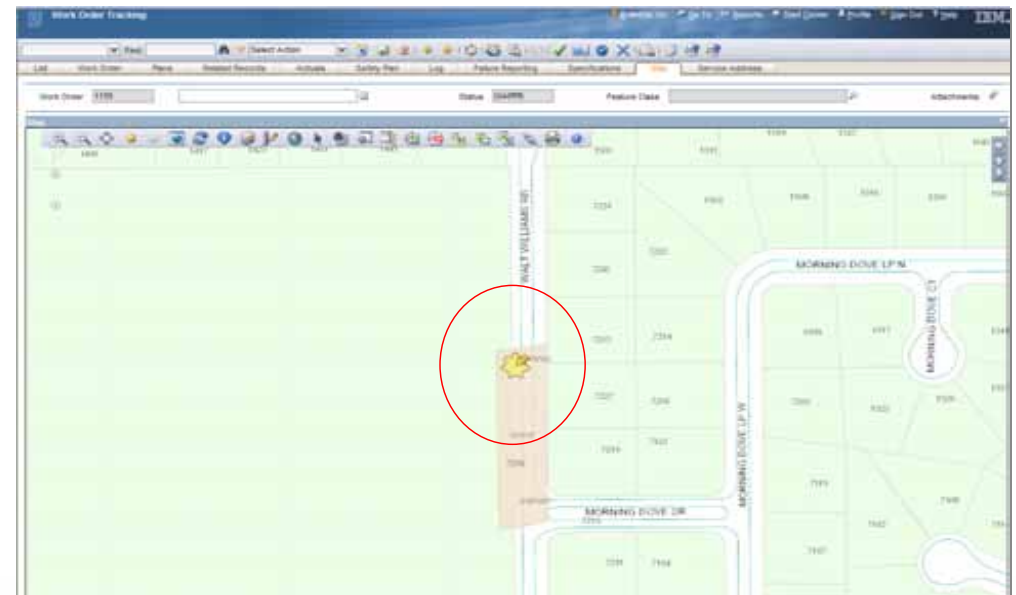


No Work Order GIS Feature

Linked Asset in WO will be used to Auto-Locate



Star indicates current record and Arrow indicates a WO is assigned to the asset

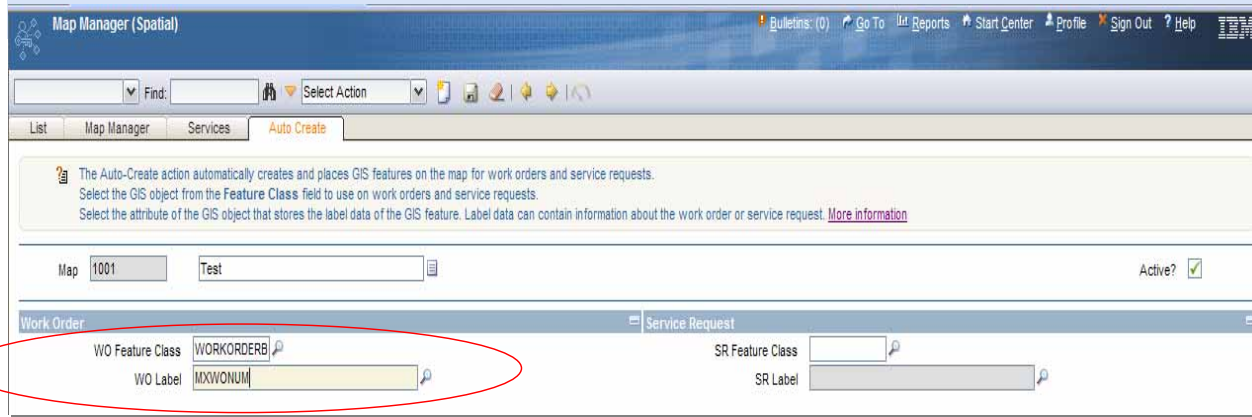


Meet the people who can help advance your infrastructure

# Auto-Create

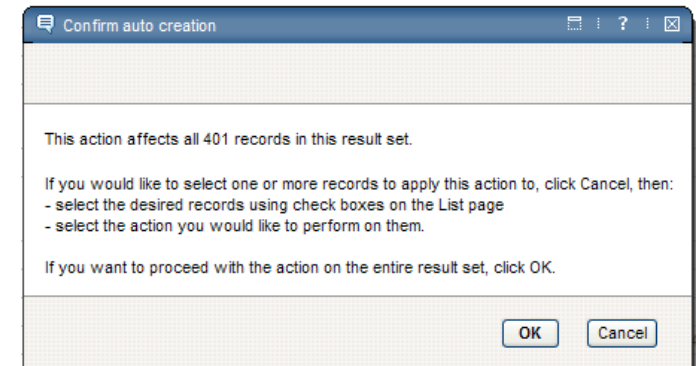
## NEW – Auto-Create

- **Problem:** Adding features (geometry) to the map for bulk WO/SR's was tedious and too time consuming
- **Solution:** Added create and place functions to create WO/SR features in the map when an asset, location, or service address on the WO/SR is linked to a GIS feature



Prompts will prevent user from performing Auto-Create on unqualified records

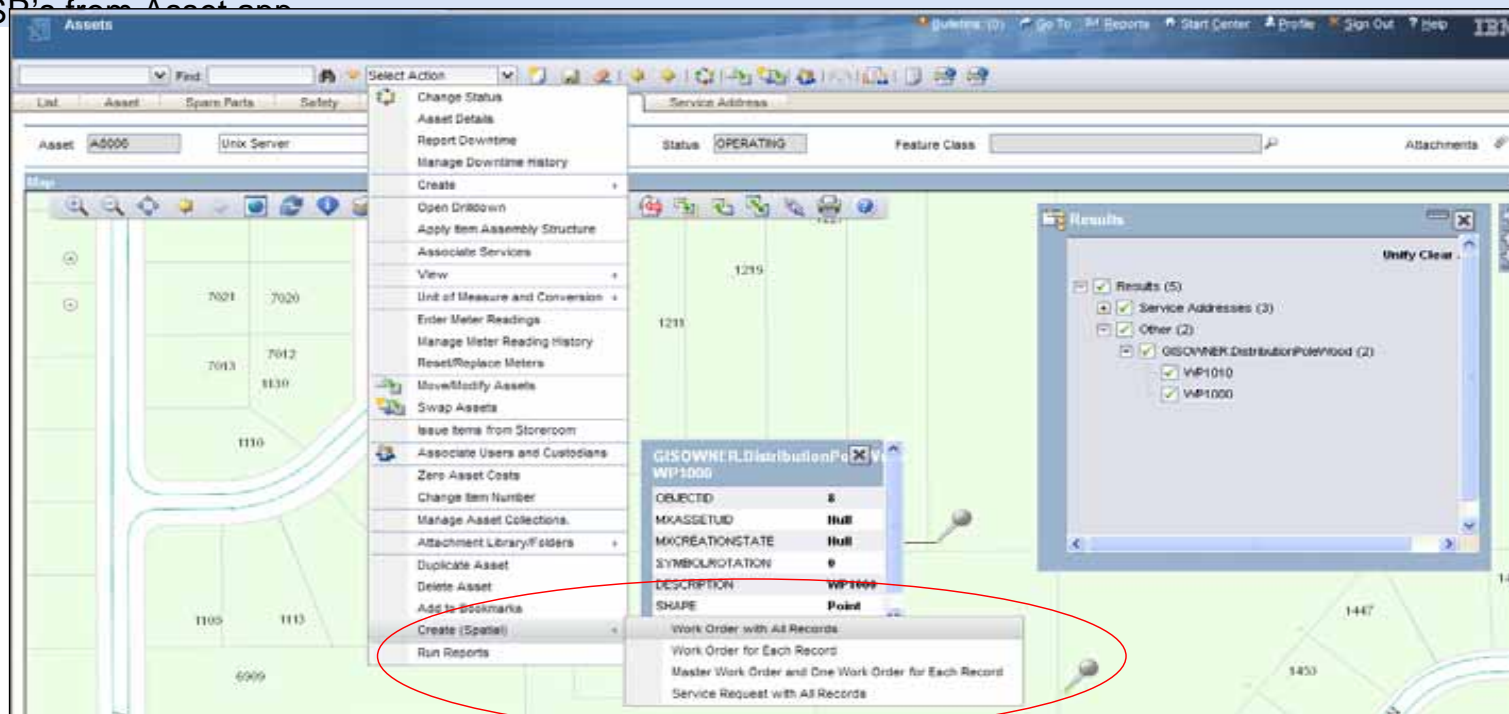
Configure the GIS feature to place and the column to use as the label in Map Manager



# Polygon Selection Sets

NEW – Create and Add Map Selection sets of Assets and Locations to WO/SR's

- **Problem:** Need a process to create WO and SR's from the map view with a selected set of features
- **Solution:** Create selection sets from the map using selection and query tools, create the WO or SR, and add the selected features
- Create WO/SR's from Asset app



# Simplified Linking

NEW – improved usability in linking record not requiring Edit Task

- **Problem:** Needed an easier way to link records (fewer mouse clicks)
- **Solution:** Simplified linking support linking GIS and Maximo records without using the Edit Task (point and click)

Unlinked GIS Feature

Feature Linked to current MX Record

Link Feature dialog points to feature to be linked

Link

MAXIMO DISTRIBUTIONPOLESTEEL  
This feature can be linked to current ASSET. It is not currently linked.

OBJECTID:17  
MXCREATIONSTATE:  
SYMBOLROTATION:  
DESCRIPTION:XXX  
MXASSETNUM:  
MXYEYER:

Link

Just set the Maximo current record, select a feature to link from the map

# Query by Attributes

NEW – improved usability in creating queries in the map tab

- **Problem:** Simplify building queries in the map tab
- **Solution:** Simplified query using a Simple and Advanced query

**Simplified**

**Advanced**

## NEW – redline tools for Map Tab

# Draw Tools

- **Problem:** Need a simple way to make notes in the map tab
- **Solution:** Draw Tools
- Notes do not persist in this version
- Save notes in map extent using the Image Save function creating a png or pdf

The screenshot displays the 'Work Order Tracking' application interface. The main map area shows a utility site with several poles and lines. Annotations in red and yellow highlight specific areas: 'Inspect Pole base for dry rot' near pole DSP0D2, 'Replace with wood poles' near pole CO1183, and 'Contact Tom Green when inspecting - 6701 O'Doniel' near pole DSP6701. A red line connects the 'Replace with wood poles' area to the contact note. Two windows are open: 'Draw and Measure' and 'Create a Map Attachment'. The 'Draw and Measure' window shows drawing tools and text input: 'Text: /when inspecting - 6701 O'Doniel', 'Color: Red', and 'Size: 10'. The 'Create a Map Attachment' window shows 'Select a Folder' set to 'Attachments', 'Name the document' set to 'CO1183', and 'Inspect poles - dry rot' in the text field.

Draw tools  
pallet

Save map  
extent as a pdf  
or PNG

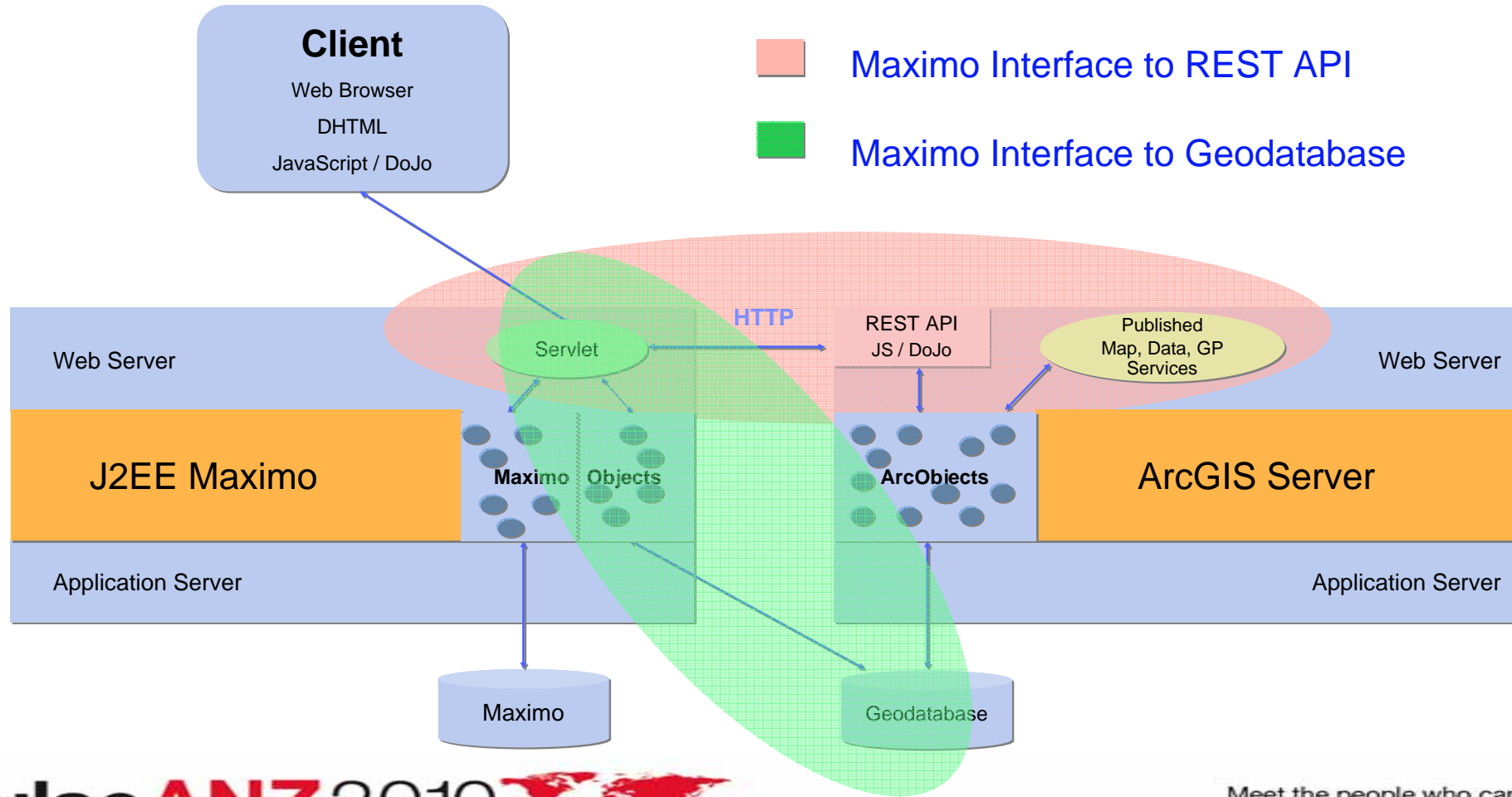




## Stay connect .....

- Join the IBM Asset Management Community
- <http://www.ibm.com/communities/assetmanagement/>
- Follow the IBM Asset Management Team Blog
- <http://www.ibm.com/blogs/assetmanagement/>
- Join the IBM Asset Management Group on LinkedIn
- <http://ow.ly/18mpS>
- Follow the IBM Asset Management playlist on YouTube
- <http://ow.ly/18hhU>
- Follow MaximoMary on Twitter
- IBM Asset Management on Flickr
- <http://www.flickr.com/photos/38458067@N08/>

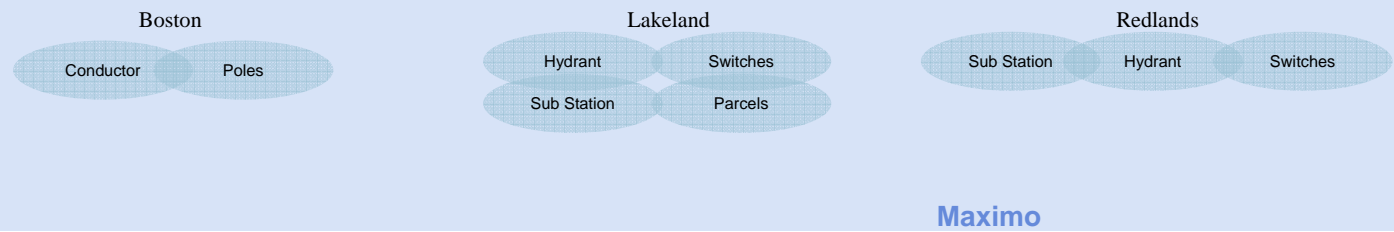
# Maximo Spatial Architecture



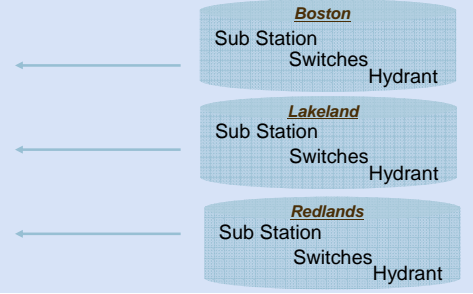
# Feature Class Objects *Inside* Maximo

STEP 1

## OBJECT GENERATION - Define Feature Class Tables within Maximo

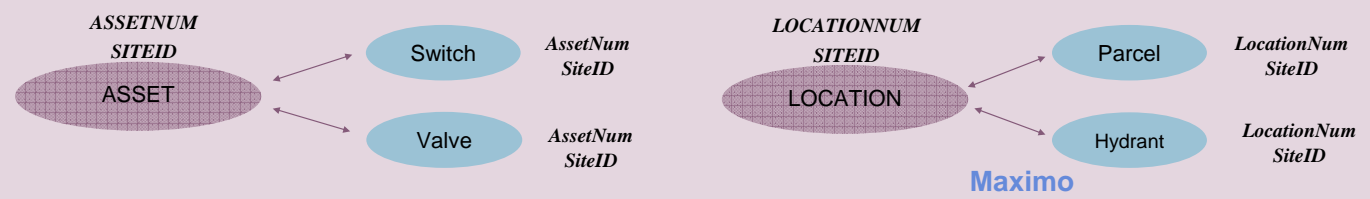


### Multiple Site Geodatabase Support

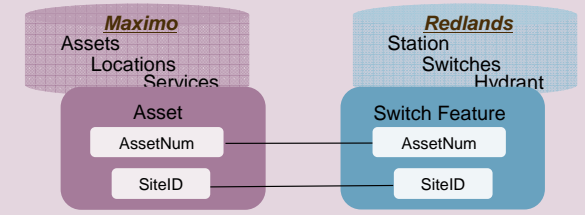


STEP 2

## CREATE RELATIONSHIPS – Define Attribute Keys Between Objects



### Foreign Keys Between Tables



STEP 3

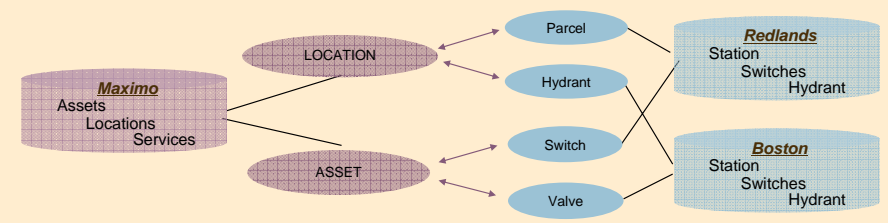
## CONSUME FC OBJECTS– Same Capability As Maximo Objects

- Add Feature Class Attributes with **Application Designer**
- Display FC Attributes by Asset Type with **Dynamic UI**
- Control Access and Actions through **Administration**
- **Audit** and **Signature** Enabled
- **Workflow** and **Escalation** Enabled
- **Integration Framework** Enabled



Maximo

### Objects Mapped to RDBMS Tables



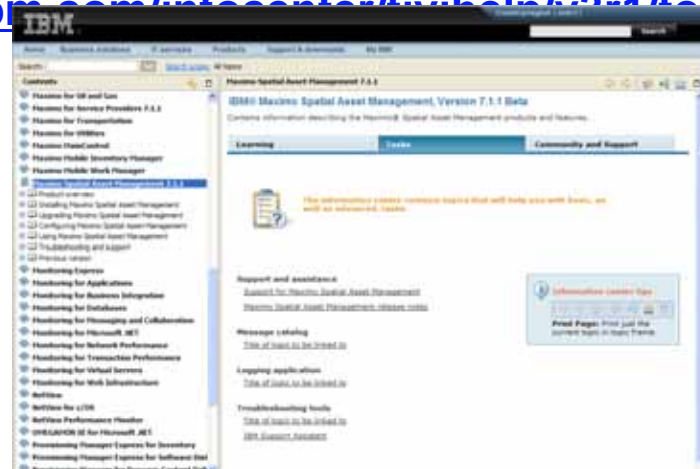
## Additional References

- **Maximo Spatial Asset Management Product Page:**

- [http://www-01.ibm.com/software/tivoli/products/maximo-spatial-asset-mgmt/requirements.html?S\\_CMP=rnav](http://www-01.ibm.com/software/tivoli/products/maximo-spatial-asset-mgmt/requirements.html?S_CMP=rnav)

- **Maximo Spatial Info Center**

- [http://publib.boulder.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.spl.doc\\_7.1.1/welcome.htm](http://publib.boulder.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.spl.doc_7.1.1/welcome.htm)



- **Enterprise Asset Management Wiki**

- <http://w3.tap.ibm.com/w3ki07/display/IBMSE/Enterprise+Asset+Management>



# Q u e s t i o n s ?

Terry Saunders ([terry.saunders@us.ibm.com](mailto:terry.saunders@us.ibm.com)) for general product questions

Gary Cooper ([gcooper@us.ibm.com](mailto:gcooper@us.ibm.com)) for Maximo Spatial questions (GIS)

Jerry Miller ([jerrym1@us.ibm.com](mailto:jerrym1@us.ibm.com)) for Utilities T&D questions

Ron Wallace ([ron.wallace@us.ibm.com](mailto:ron.wallace@us.ibm.com)) Utilities & EAM Marketing

Dianne DePuy ([ddepuy@us.ibm.com](mailto:ddepuy@us.ibm.com)) Utilities Industry Leader

Kim Woodbury ([kwoodbur@us.ibm.com](mailto:kwoodbur@us.ibm.com)) for commercial & product questions

Don [1@us.ibm.com](mailto:1@us.ibm.com) for Spatial Implementation questions



*Let's build a smarter planet*



# Questions and Discussion?



Backup Slide Details





# Maximo Spatial Asset Management

## Technical Information

# New Key Columns Used for Linking

- Key columns now conform to Maximo's Standard of Site + ID
  - eg...SiteID (BEDFORD) + AssetNUM (HYD1253)
- Enhances Maximo's control over GIS tables when registered

POLE Feature Class (geodatabase) – Link Columns (match the colors)

OBJECTID	MXASSETNUM	MXSITEID	MXASSETUID
100	HYD1253	BEDFORD	Existing field – keep if Joins required 15500

Maximo Asset Table – Pole Asset

ASSETUID	PLUSFEATURECLASS	ASSETNUM	SITEID
15500	HYDRANT	HYD1253	BEDFORD





# Configuration Apps

## DB Config & App Designer

- DB Config -> Register GIS Objects and Define Relationship Columns – adds to Maximo meta-data
  - Define columns to be register
  - Define relationship between GIS and Maximo records using primary key columns (SiteID + ID)
  - Builds meta-data about the GIS objects
- **App Designer**
  - Registered GIS objects available in App Designer, GIS fields can be placed on Maximo forms

## GIS Admin

- GIS Admin -> make GIS Objects available to spatial and creates SIGOPTIONS for link/editing
- Create security by feature class using SIGOPTIONS
- Each GIS table can be secured based on Maximo's security model

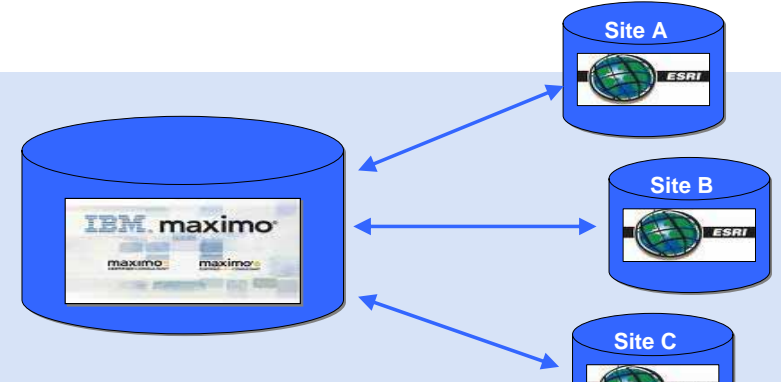
## Map Manager

- Defines map per site and all map, geometry, and geocode services
- Map Manager Service Layers - associate the GISADMIN objects with a layer, this way enabling link/editing, also creates SIGOPTIONS

# Site Configurations

## Services Tab

- Defines Geocode Service for current Site



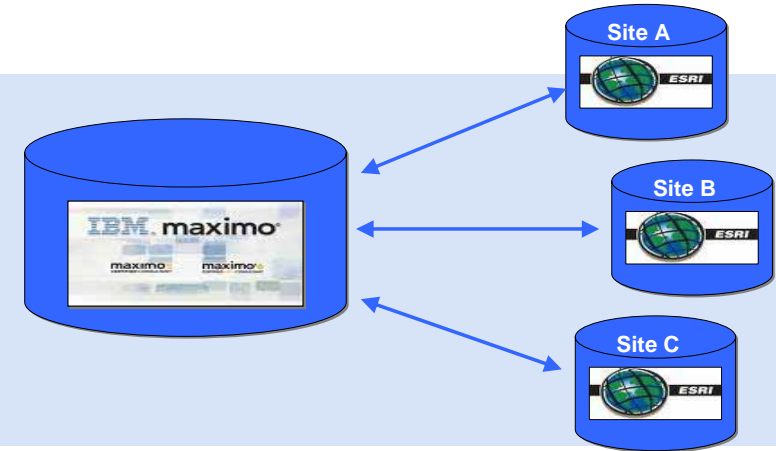
The screenshot shows the Map Manager (Spatial) interface. The 'Services' tab is active, displaying a table of Geocode Services. The table has two columns: 'Name' and 'URL'. A single row is visible with the name 'geoloc' and the URL 'http://9.42.61.203:8399/arcgis/rest/services/geolocator/GeocodeServer'. A red oval highlights the table area. The interface also includes a search bar, a 'Find' button, and a 'Select Action' dropdown menu.

Name	URL
geoloc	http://9.42.61.203:8399/arcgis/rest/services/geolocator/GeocodeServer

# Site Configurations

## Auto-Create Tab

- Defines Feature Class and label column to use when automatically creating GIS features for Maximo Wo and SR's



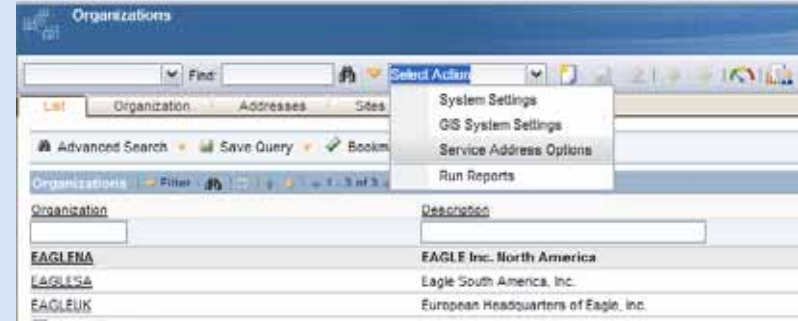
The screenshot shows the IBM Maximo Map Manager (Spatial) interface. The 'Auto Create' tab is selected, displaying instructions for configuring GIS features. The 'Work Order' section is highlighted with a red oval, showing the following configuration:

Field	Value
WO Feature Class	WORKORDERB
WO Label	MXWONUM

The 'Service Request' section is also visible, with empty fields for 'SR Feature Class' and 'SR Label'. The 'Map' field is set to '1001' and 'Test', and the 'Active?' checkbox is checked.

# Service Address – System Settings (MAXVARS)

## Service Address Options in Organizations



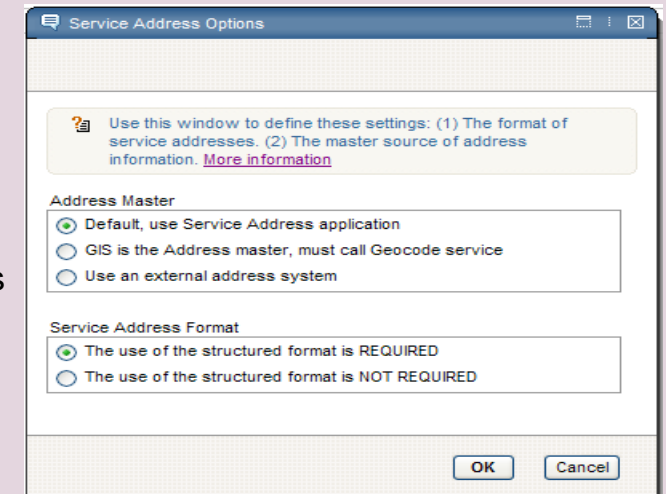
### Address Master - NEW

- Is Maximo the system of record for addresses or an external system?

### Address Format - NEW

- REQUIRED – address data must be selected from the Maximo Service application
- NOT REQUIRED – address data can be added to any form without validation

Address





# Maximo Spatial Asset Management Product

- Add Spatial Context to any Maximo Entity
  - Assets, Locations, Service Requests, Incidents, Inventory, Materials,...
- Extends Maximo Capabilities with Spatial Referencing
  - Areas, Intersections, Connectivity, Proximity, Distance, Contains
- Interrelate Spatial Data and Spatial Functionality within Maximo
  - Workflows, Escalation, Auditing, Administration, Configuration, Reporting, Analysis
- Delivers Enterprise Level Management of Spatial Services and Content
  - Security, Multi-Organizations, Multi-Sites, Auditing, Financials, Multi-Languages, Reporting
- Designed & Delivered on the Maximo Architecture
  - Configurable, Extensible, Scalable, Enterprise Platform
- Register and Deploy Spatial Services & Content within Maximo Applications
  - Map Services, Geo-coding Services, Layers, Feature Classes, Analytics, Tools...
- Manage Authorization & Consumption of Spatial Services, Content by Org/Site/Role
  - Map Services, Layers, Features, Reports, Tools...
- Federated DBMS Support for Distributed Spatial Content
  - Distributed by Organizations, Sites, Workflows, Business Processes



# Spatial Feature Classes as Maximo Objects

## ...Delivers Same Capability as ANY Maximo Object

- Add Feature Class Attribute Fields to any Maximo Application with **Application Designer**
- Configure New Applications using Feature Class Objects and *Maximo Objects*
- Conditionally display Feature Class attribute fields based on data values and conditions with **Dynamic UI**
- Filter Displaying of Features based on data values and conditions with **Dynamic UI**
- Control Feature Class Data and Actions at all levels through **Administration**
- Enable **Auditing** of Feature Class Transactions and Enable **Signature** for Critical Actions in supporting Regulatory Compliance, internal and external Governance
- Use **Workflow** to drive data completeness, accuracy, and control of Feature Classes through defined workflow processes
- Use **Escalation** in monitoring critical business processes, data, and conditions with Feature Classes
- **Use Integration Framework** with Feature Class Objects for transactional events and data exchange
- **Create and Associate** Feature attributes and geometry within same Maximo Application workflows
- Feature Class Schema's are represented in Maximo Reporting, manage report access, generation, distribution, and data through authorization control





# Maximo Federation Support with GeoDatabase

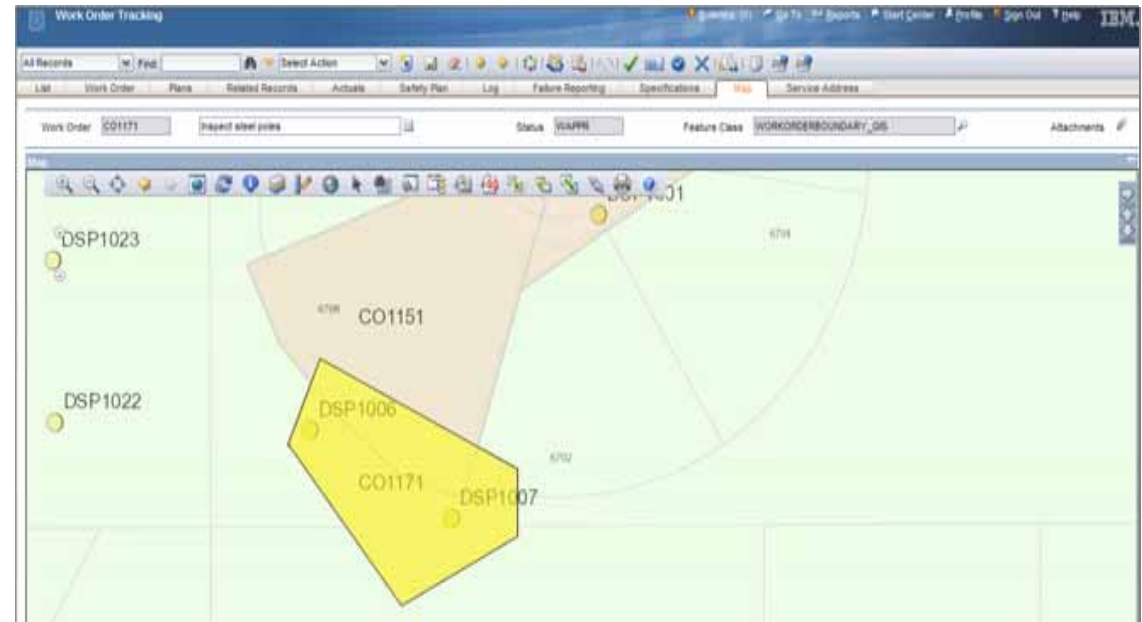
- *Support of Feature Classes across multiple sites and multiple geodatabases*
- *Transparent access to multiple DBMS across the enterprise*
- *Works Directly with existing geodatabase eliminating business process constraints with data synchronization*
- *Transactional Data Integrity, business data and spatial data as a combined transaction*
- *Manages Data Concurrency handling large user volumes allowing expansion of new business processes internal and external*
- *Availability of the most recent data updates increases process efficiency and service delivery*
- *Leverages Organizations Established Skills in DBMS Access and Administration*
- *Leverages DBMS Scalability and Optimization Features*
- *Leverages DBMS Built-in Spatial Engine Functionality and Optimization through SQL*
- *Leverages Maximo J2EE Platform Scalability and Security*
- *Leverages IBM Portfolio supporting Scalability and Security*
- *Supports Cloud Computing in Resource Sharing, Scalability, Deployment, Administration*

## Service Address – Asset/Locations/Work Order/Service Requests

- Service Address fields are available in the List Tab, Advanced Search, Detail Tab and Service Address tabs
- Map extent will zoom to address if entered in WO and SR apps
- Address data can be inherited from Maximo Parent Records

This screenshot shows a Maximo form with multiple sections for data entry. The top section includes fields for 'Work Order' and 'Problem Code'. Below that are sections for 'Service Address' and 'Status'. The bottom section contains 'Work Order' details like 'Work Order ID', 'Parent WO', and 'Feature Class'. A red circle highlights the 'Service Address' fields, specifically 'Service Address', 'City', 'State/Province', and 'Zip/Postal Code'.

This screenshot shows the 'Service Address' tab for work order CO1151. The form displays details for the location 'ADDRESS1' at 'Address Unit #2001 Oak St. - W580'. The 'Service Address' field is highlighted with a red circle and contains the value '1413 Barbary Ln'. Other fields include 'City' (LAKELAND), 'State/Province' (FL), and 'Zip/Postal Code' (33003).







# Trademarks and disclaimers

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries./ Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both. IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce. ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office. UNIX is a registered trademark of The Open Group in the United States and other countries. Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both. Other company, product, or service names may be trademarks or service marks of others. Information is provided "AS IS" without warranty of any kind.

The customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer.

Information concerning non-IBM products was obtained from a supplier of these products, published announcement material, or other publicly available sources and does not constitute an endorsement of such products by IBM. Sources for non-IBM list prices and performance numbers are taken from publicly available information, including vendor announcements and vendor worldwide homepages. IBM has not tested these products and cannot confirm the accuracy of performance, capability, or any other claims related to non-IBM products. Questions on the capability of non-IBM products should be addressed to the supplier of those products.

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Some information addresses anticipated future capabilities. Such information is not intended as a definitive statement of a commitment to specific levels of performance, function or delivery schedules with respect to any future products. Such commitments are only made in IBM product announcements. The information is presented here to communicate IBM's current investment and development activities as a good faith effort to help with our customers' future planning.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the ratios stated here.

Prices are suggested U.S. list prices and are subject to change without notice. Starting price may not include a hard drive, operating system or other features. Contact your IBM representative or Business Partner for the most current pricing in your geography.

Photographs shown may be engineering prototypes. Changes may be incorporated in production models.

© IBM Corporation 1994-2010. All rights reserved.

References in this document to IBM products or services do not imply that IBM intends to make them available in every country.

Trademarks of International Business Machines Corporation in the United States, other countries, or both can be found on the World Wide Web at <http://www.ibm.com/legal/copytrade.shtml>.