

Exceptional service in the national interest



Leveraging your Maximo Investment

Implementing multiple unique solutions using one Maximo instance

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Session Number 1356



Sandia National Laboratories



- Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration.
- The core purpose for Sandia is to help our nation secure a peaceful and free world through technology.
- Sandia serves many U.S. Government agencies including Homeland Security, Energy, Military, Nonproliferation, and Security.
- Sandia is also a low-volume manufacturer of advanced components.

How does Maximo fit in?



What does Sandia need to Manage?

Sandia National Laboratories has a growing number of internal customers with asset and work management requirements, each with unique needs.

- Multiple types of assets across and within multiple sites
 - Traditional Facilities assets such as chillers, pumps and motors
 - Fire extinguishers
 - Locks and Keys
 - Complex equipment systems
- Materials/Inventory
- Work Tasks
 - Preventive/Scheduled maintenance
 - Job Plans
 - Corrective maintenance
 - Work assignments
- Service Requests

Implemented Maximo Solutions: Current State

1. Facilities operations for the New Mexico site (17 years)
2. Facilities operations for the California site (4 years)
3. Lock and Key accountability for the New Mexico site (2 years)
4. Configuration management for complex equipment systems (1.5 years)
5. Lock and Key accountability for the California site (4 months)
6. Technical Systems operations for the California site (2.5 months)
7. Multi-solution Service Request management (2.5 months)

Implemented Solutions - Statistics

Solution	Users	Locations	Assets	PMs	Job Plans	Inventory Items	Service Requests per year	Work Orders per year
Facilities NM	400	4,000	54,000	27,000	16,500	64,000	25,000	50,000
Facilities CA	20	150	4,300	3,000	400	0	tbd	14,500
Lock & Key NM	5	4,000	3,800	1,800	n/a	20	tbd	1,700
Complex Eq Systems	130	n/a	1,400	0	n/a	1,000	tbd	tbd
Lock & Key CA	5	120	50	n/a	n/a	n/a	tbd	tbd
Tech Systems CA	200	120	tbd	tbd	tbd	tbd	tbd	tbd
Service Requests	500	n/a	n/a	n/a	n/a	n/a	tbd	n/a

Presentation Topics

This presentation will describe how Sandia configured Maximo to enable hosting of multiple solutions within a single Maximo instance to meet these unique needs

- Why multiple solutions?
- Guiding principles in the development of multiple solutions
- Business Model developed to support this new vision
- Development Standards
- The Development Process used for determining how to configure new solutions
- Maximo Software Configuration
- Support team structure
- Cost Allocation across Solutions
- Key challenges
- What worked
- Lessons learned
- Current and Future work
- Conclusion

Why implement Multiple Solutions?



Why multiple solutions?

- CIO recognized Maximo as an “enterprise” level application with the viability for consolidating and integrating the plethora of asset, inventory, tracking, and location centric applications currently in the Sandia IT applications inventory
- Implementation of multiple solutions in one instance leverages our technical expertise and resources in Maximo as well as our overall investment in Maximo
- A larger customer base enables us to spread our fixed costs over more customers which results in lower costs per customer.
- Funding from customers for their share of M&O enables us to maintain a full-time support team.

Moving Forward....



Guiding Principles in the Development of Multiple Solutions

Overall Guiding Principles

- Platform for things/actions/etc. that need management
- Integration/consolidation without customization
- Available for implementing business as well as line solutions
- Implementation project to be owned and managed by the customer
- Implemented solutions will maintain the same common look and feel as the core Maximo modules
- Each configured solution will utilize the implemented security model that will compartmentalize it's data from exposure to other configured solutions
- Core Maximo support and base licensing contracts to be paid by the corporate CIO office
- Implementation and production support costs, and any additional licensing needs (beyond the existing enterprise license), will be paid by the customer

Business Model

Business Model

Executive Review Board

- Who: upper management
- Responsibility: Review request for applications to be integrated on the criteria of readiness and impact



Technical Review Board

- Who: Maximo IT Team
- Responsibility: Work with the requesting organization to assess technical requirements against platform capabilities and develop implementation plan



Requesting Org Development Team

- Who: Requesting org functional team
- Responsibility: Provide project leadership, subject matter experts and staff to be trained for first line support

Business Model – continued...

- Solutions Analyst assigned from the Maximo IT team to each solution
 - Liaison between the Maximo Core Team and the Functional Project Team
 - Provides guidance/consulting on Maximo development and implementation
 - Assists the Functional Project Team in mapping processes and requirements against Enterprise Maximo using Maximo's out-of-the-box functionality
- Solution Developer assigned from the Maximo IT Team
- Subject Matter Expert assigned from the requesting organization
 - Provides documented businesses processes
 - Develops solution requirements
 - Interacts with requesting organization staff and management
- Solution Customer Point of Contact assigned from the requesting organization
 - Provide first line support to the users of the solution
 - Answers functional questions, troubleshoots issues, provides training, etc.
- User Group created for each solution
 - Provides overall direction for the solution in the area of production support, including minor enhancements and fixes (less than 20 hours of effort)

Development Standards

Development Standards

- Baseline:
 - **Stay out-of-the-box as much as possible**
 - **Configure, don't customize!!!**



Configuration = anything the front end lets you do



Customization = extending Java classes



Use Caution = new code that doesn't extend existing Java classes, xml changes

Development Standards – continued...

- Process
 - All database changes are reviewed and implemented by the developers assigned to the Maximo database administration role
 - Define a project code for each new solution, i.e. FAC for Facilities, LNK for Lock and Key, etc.
 - Use the project code as a prefix for all new fields added for that solution, domains, relationships, cloned applications, etc.
 - Clone all applications used by the new solution
 - Changes moved through Development and Quality for final testing and customer approval before moving to Production
 - Bi-weekly production releases

- Configuration Management
 - Multiple environments: Development, Quality and Production
 - 4th environment created for high risk work, i.e. upgrades, new installs, etc.
 - Strict configuration management process required to prevent mishaps between solutions
 - Management of IT service requests for each solution

Development Standards - Security

- Design intent:
 - Don't create one security group per person
 - Provide flexibility so that a user's security can easily be changed based on their role

- Implementation:
 - Define roles, i.e. read-only Facilities user, Maintenance Planner, Facilities Help Desk, Lock and Key Administrator, etc.
 - Compartmentalize security groups so that groups can be combined to comprise a user's role, for example:
 - One security group per site, with only site permissions
 - One security group per role, with only application permissions
 - One security group per storeroom, with only storeroom permissions

Development Standards - Security

Security Groups	Notes	Sites	Applications	Storerooms	Labor	GL Components	Limits and Tolerances	Data Restrictions
Sites	One group per site	Site specific privileges	No privileges	No privileges	No privileges	No privileges	No privileges	No restrictions
Application	One group per role	No privileges	Role specific privileges	No privileges	No privileges	No privileges	No privileges	Role specific restrictions
Storerooms	One group per storeroom	No privileges	No privileges	Storeroom specific privileges	No privileges	No privileges	No privileges	No restrictions
Labor	One group for labor privileges	No privileges	No privileges	No privileges	Labor Authorization	No privileges	No privileges	No restrictions
GL Components	One group for GL privileges	No privileges	No privileges	No privileges	No privileges	GL Component privileges	No privileges	No restrictions
Limits & Tolerances	One group for Limits & Tolerances per site	No privileges	No privileges	No privileges	No privileges	No privileges	Limits & Tolerance privileges	No restrictions

Facilities NM Planner Role would have these security groups:
Site specific group
Role specific group
Storeroom access
Labor authorization
GL Components

Development Process: Adding a New Solution

High Level Process

- Identify scope of project
- Identify solution requirements
- Document user processes
- Obtain stakeholder sign-off on project scope, schedule and cost
- ***Configure and test the new solution in a standalone, out-of-the-box environment for proof-of-concept***
- ***Perform “gap” analysis in the standalone environment to determine what needs to be configured in Maximo for the new solution***
- ***Correct gaps***



**Don't try to force a square
peg into a round hole**

High Level Process – continued...

- Obtain stakeholder sign-off on prototyped solution
- Migrate the new solution to the Enterprise Development environment to validate viability in the enterprise environment with multiple solutions
- Test the existing solutions with the new solution to prevent unforeseen conflicts with the existing solutions
- Migrate the new solution to the Quality environment for final user testing, training and sign-off to move to Production
- Migrate the new solution to the Production environment



Detailed Process

- Assign project code
- **Determine Organization/Site configuration - critical**
 - Data Sharing
 - Can Items be shared with other solutions?
 - Can Companies be shared with other solutions?
 - Can Locations (site level) be shared with other solutions?
 - Is Work Order auto-numbering (org level) used in other solutions acceptable?
 - Is the Asset auto-numbering (org level) used in other solutions acceptable?
 - Can the data in the new solution be managed with the data in an existing system?
 - Can existing domain values be used?
 - Security Controls
 - Can/should users of the new solution be able to view data in existing solutions?
 - Can/should users of existing solutions be able to view the data in the new solution?

Development Process: Adding a New Solution

Detailed Process – continued...

- In the standalone, out-of-the-box environment:
 - Create Organization/Site
 - Determine applications that will be used
 - Clone required applications (but don't modify screens yet....)
 - Identify security roles for the new system and create security groups
 - Set up test users with identified roles
 - Test the user process against the cloned applications
 - Identify gaps between the needs of the user process and out-of-the-box Maximo
 - Negotiate with the customer how these gaps will be resolved, i.e. new field added, screen changes, result sets on a start center, etc.
 - Implement the gap solutions
 - Obtain stakeholder sign-off on prototyped solution
- **Migrate the new solution to the Enterprise Development environment to validate viability in an enterprise environment with multiple solutions**

Adding a new Solution – Case Review

Lock and Key NM

Adding a new Solution: Lock and Key NM

- Existing solutions: Facilities New Mexico and Facilities California
- New solution: **Lock and Key New Mexico**
- Assign project code: **LNK**
- Determine Organization/Site configuration
 - Data Sharing
 - Can Items be shared with other solutions? **Yes**
 - Can Companies be shared with other solutions? **Yes**
 - Can Locations (site level) be shared with other solutions? **Yes, LNK could share New Mexico locations with Facilities New Mexico**
 - Is Work Order auto-numbering (org level) used in other solutions acceptable? **Yes**
 - Is the Asset auto-numbering (org level) used in other solutions acceptable? **No, LNK needs specialized asset numbering**
 - Can the data in the new solution be managed with the data in an existing system? **No**
 - Can existing domain values be used? **Yes, although new values will be needed**
 - Security Controls
 - Can/should users of the new solution be able to view data in existing solutions? **Yes**
 - Can/should users of existing solutions be able to view the data in the new solution? **No**
- **Organization/Site Configuration Decision**
 - **Existing Organization can be used since Item and Company data can be shared**
 - **New Site must be created since the data must be managed separately from the existing solutions**

Adding a new Solution: Lock and Key NM

- In the standalone, out-of-the-box environment:
 - Create Organization/Site: **existing Org ORG001, new Site LNK**
 - Determine applications that will be used: **Assets, Items, Quick Reporting, Preventive Maintenance, Master PMs, Service Requests**
 - Clone required applications (but don't modify screens yet....): **LNKASSET, LNKITEM, etc.**
 - Identify security roles for the new system and create Security Groups: **Lock and Key Administrator, read-only, etc.**
 - Set up test users with identified roles
 - Test the user process against the cloned applications
 - Identify gaps between the needs of the user process and out-of-the-box Maximo
 - Negotiate with the customer how these gaps will be resolved, i.e. new field added, screen changes, result sets on a start center, etc.
 - Implement the gap solutions
 - Obtain stakeholder sign-off on prototyped solution
- Migrate the new solution to the Enterprise Development environment to validate viability in an enterprise environment with multiple solutions

Configuration

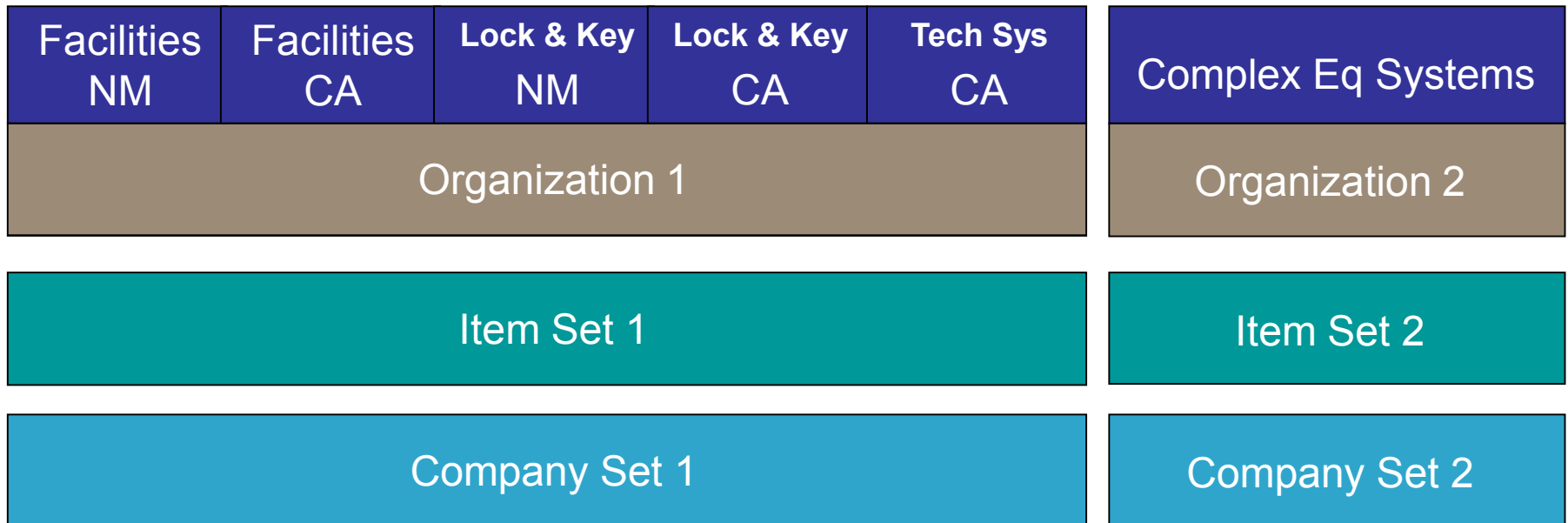


Decision Process: Org/Site

Imple. Order	Solution	OK to share this data with other solutions?						Implications/Notes	Decision
		Items	Companies	Locations	Work order Autonumber	Asset Autonumber	Security Requirements		
1	Facilities NM	N/A	N/A	N/A	N/A	N/A	N/A	(1) First solution, no conflicts (2) Work order autonumber has prefix	New org: ORG001 New site: SNMFAC
2	Facilities CA	Yes	Yes	No	Yes	Yes	Control separately from other solutions	(1) New org not needed since item and company data can be shared, and asset and work order autonumbering is acceptable. (2) Site specific locations needed (3) Data needs to be controlled separately from other data in existing solutions	Existing org: OR G001 New site: SCAFAC
3	Lock & Key NM	Yes	Yes	Yes	Yes	Yes	Control separately from other solutions	(1) New org not needed since item and company data can be shared, and asset and work order autonumbering is acceptable. (2) NM Site specific locations needed (3) Data needs to be controlled separately from other data in existing solutions	Existing org: OR G001 New site: LNK
4	Complex Systems	No	No	No	Yes	Yes	Control separately from other solutions	(1) New org needed since item and company data cannot be shared (2) Locations used to indicate locations of assets on a system (3) Data needs to be controlled separately from other data in existing systems	New org: ORG002 New site: ISE1
5	Lock & Key CA	Yes	Yes	Yes	Yes	Yes	Control separately from other solutions	(1) New org not needed since item and company data can be shared, and asset and work order autonumbering is acceptable. (2) CA Site specific locations needed (3) Data needs to be controlled separately from other data in existing solutions	Existing org: OR G001 New site: CLK
6	Tech Systems CA	Yes	Yes	Yes	Yes	Yes	Can be merged with Lock & Key CA	(1) New org not needed since item and company data can be shared, and asset and work order autonumbering is acceptable. (2) CA Site specific locations needed (3) Data does not need to be controlled separately from other data in existing solutions	Existing org: OR G001 Existing site: CLK
7	Enterprise SRs	N/A	N/A	N/A	N/A	N/A	Allow creation of SRs for all sites the user has access to	(1) Need to allow users to enter service requests for the different solutions depending on their site access (2) Need to manage service requests by solution (not globally by one group) (3) Need to force site for correct locations and domain values to be displayed since by default, the SR site is determined by the value in person.locationsite or the site associated with entered asset	Force site when selecting SR option: SNMFAC SCAFAC etc.

Maximo Organization/Site Configuration

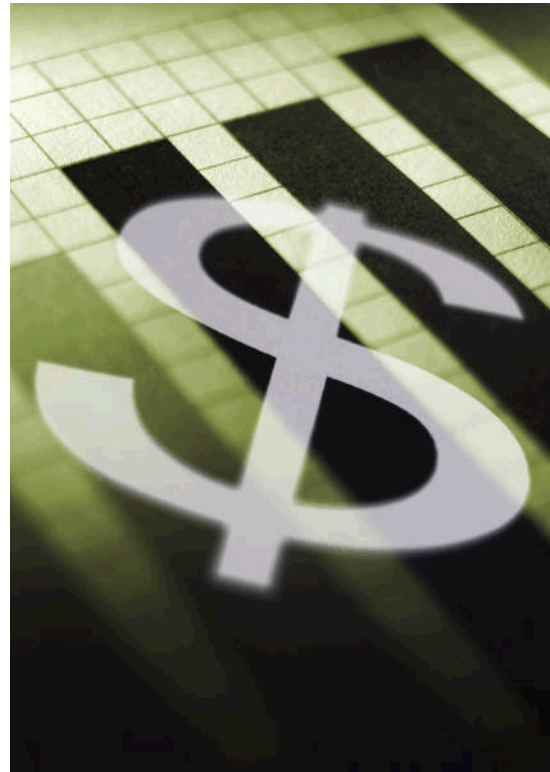
Enterprise Service Requests



Maximo Software Configuration

- One Maximo instance
- Software
 - Maximo Asset Manager (Core product)
 - Calibration
 - Transportation
 - Maximo Mobile products
 - Inventory Manager
 - Work Manager
 - Mobile Asset Manager
 - Asset Configuration Manager
 - Actuate
- Oracle database
- WebSphere Application Server
- Environments
 - Development – Single server, vertical cluster
 - Quality – Fully clustered environment with multiple servers, load balancer, multiple UIs
 - Production – Fully clustered environment with multiple servers, load balancer, multiple UIs

Support Team & Costs



Support Team Structure

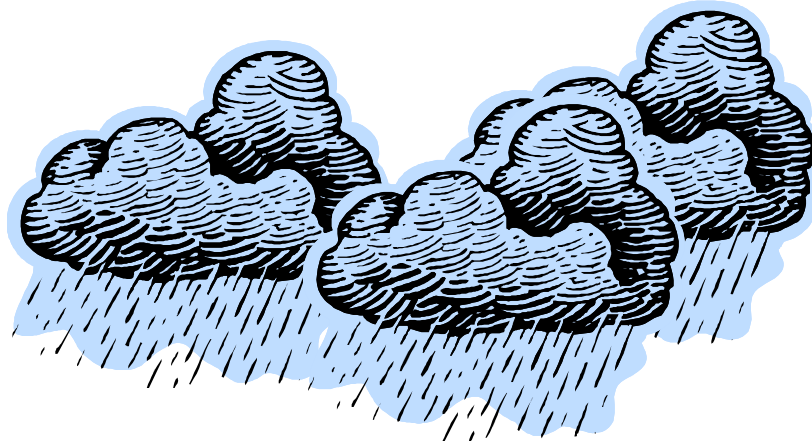
- 4.5 members in the Maximo “core” team
 - Configure Maximo for new solutions
 - Serve as Solutions Analysts for one or more solutions
 - Provide production support
 - Serve as project managers for one or more solutions
- 1 Solutions Analyst outside of the core team for the Lock and Key New Mexico solution
- Corporate DBA support for backups, Oracle traces, etc.
- 1 Maximo server administrator
- Consulting assistance
 - Implementation of new solutions
 - “Thorny” problems
 - In general, assistance where the core team does not have the expertise or time
- Customers (varies per customer)
 - Subject Matter Expert
 - Functional project management
 - Overall project management

Cost allocation across Solutions

- License costs
 - Corporate CIO office funds the core product and industry solutions
 - Additional licenses beyond existing license base or for new products are funded by the customer
- Maintenance support costs
 - Developed cost algorithm
 - Identified major support components of Maximo, i.e. integrations, reports, cloned applications, etc.
 - Identified number of each support component used by each solution, i.e. number of integrations supported for Facilities NM
 - Assigned a weighted factor to each of the support components, i.e. integration support has a higher weight than cloned applications
 - Multiplied the number of each support component by the weighted factor for each solution and added up the results for each solution
 - Determined percentage of Maximo used by each solution
 - Multiplied the percentage by the total cost for the support team to determine the amount each solution needs to contribute to the maintenance support for Maximo
- Upgrade costs
 - Funded by each solution based on the percentage of Maximo used
- New development costs
 - Determined on a project by project basis

Cost Allocation Example

Complexity (beyond out-of-the-box Maximo)	Site 1 (Quantity)	Weight (Relative Difficulty to Support)	Site 1 (Qty * Weight)
Integrations	11	190	2090
WorkFlow	5	180	900
Mobile Inventory Manager Users	5	170	850
Mobile Work Manager Users		170	0
Mobile Work Manager for Calibration Users		170	0
Mobile Asset Manager Users		170	0
Custom Code	10	160	1600
Custom Reports	33	140	4620
Security Groups	33	100	3300
Conditional Expressions	1	90	90
Users	408	50	20400
Industry Solutions - Transportation		30	0
Industry Solutions - Calibration		30	0
Edited Applications	22	25	550
Result Sets		20	0
Ad Hoc Reports		20	0
Relationships	10	15	150
Cloned Applications	22	10	220
Lite Users	500	10	5000
e-Signature		10	0
Weighted Support Points by Hosted Solution (Column Total)			39770
Weighted Percentage share of Maximo non-Base Support Costs (Column Total / Sum of all Column Totals)			60.54%



Challenges

#	<i>Challenge</i>	<i>Resolution</i>
1	Having a matrixed developer assigned to the Maximo IT team as a middleman caused communication issues (direction from different people)	Don't have a matrixed developer as a middleman
2	Upgrades are problematic and take too much time, resulting in lost opportunities	None at this time
3	Managing IT service requests for multiple solutions in separate spreadsheets doesn't allow for good project management of team member's assignments	<ul style="list-style-type: none"> ▪ Consolidate requests into one spreadsheet/application ▪ Use Maximo to manage requests → changes → bundle releases
4	Each member of the Maximo IT team does both new development work and production support, causing resources to be spread too thin to adequately support all solutions	<ul style="list-style-type: none"> ▪ Restructure the team to divide responsibilities between new development and production support ▪ Team members assigned to production support provide front line support to users ▪ Team members assigned to new development will provide support to production support team members
5	Too much work for the existing level of staffing	<ul style="list-style-type: none"> ▪ If funding allows, expand team ▪ If funding is not available, reduce work or spread work out over a longer period of time

Challenges – continued...

#	<i>Challenge</i>	<i>Resolution</i>
6	Users with access to multiple sites may be able to update data in a site that they should only have read access to	Use application restrictions

- Example: Facilities Manager
 - Access to Facilities site
 - Update access to Facilities Assets via the Facilities Assets application
 - +
 - Access to Lock and Key site
 - View their assigned Lock and Key assets via a Start Center result set (not intended to be able to update Lock and Key assets, only view)
- Because the Facilities Manager has access to both sites and to an Assets application for update purposes, the manager can update Lock and Key assets in the Facilities Assets Application
- Solution: Apply an application restriction to each application allowing only the data associated with that application to be displayed, i.e. restrict the Facilities Assets application to only be able to display and edit Facilities data

Challenges – continued...

#	Challenge	Resolution
7	<ul style="list-style-type: none"> ▪ Because the Service Request application is defined as a system level application in Maximo, it allows for “crossing over” of service requests in a multi-solution model <ul style="list-style-type: none"> ○ Service requests submitted for one solutions sometimes showed up the SR queue for another solution ○ Locations for one solution were able to be entered on a service request for another solution 	<ul style="list-style-type: none"> ▪ Create a new field for project code ▪ Associate the project code field with the solution’s service request entry point ▪ Force the org and site values in the service request to match the correct solution based on the project code ▪ Limit access via org and site restrictions

Create Service Request (Enterprise)
Bulletins: (0)

Maximo Development

→ [Welcome](#) → [New Mexico Facilities Welcome](#) → [Requester](#) → [Your Request \(SNMFAC\)](#) → [Attachments](#)

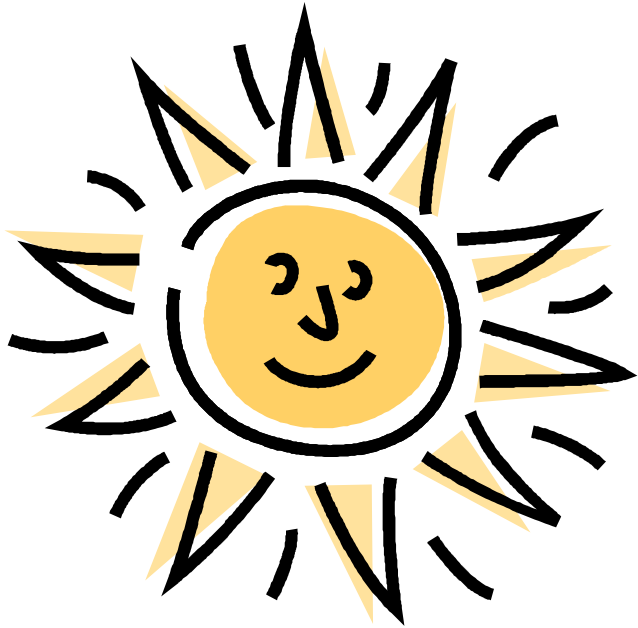
Welcome to the Service Request system

You may have several general request types to choose from, please select the radio button next to the type of request you need to enter.

Please select this radio button for [New Mexico Facilities](#) requests (SNMFAC)

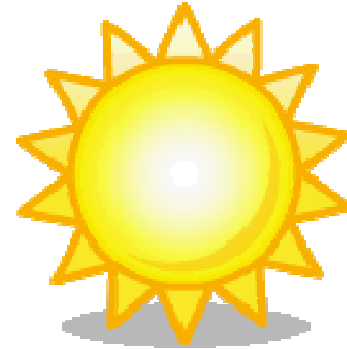
Please select this radio button for [California Facilities](#) requests (SCAFAC)

What worked well!



What worked well!

- Solutions Analysts
- Customer Point of Contact
- Development standards
- Teamwork within the Maximo IT Team
- Teamwork with our customers
- Implementation of new solutions



Lessons Learned

- Resist customization
 - Tried it, didn't like it
 - Upgrades more difficult
 - \$\$\$
- You can change your mind (configuration “mistakes” are not fatal!)
 - Multiple site to single site
- Configuration Management
 - Define CM process before you start
 - Be rigorous in documenting configuration changes
- Multiple Industry Solutions do not play well together
- Test, test, test

Current and Future Work

- Current work:
 - New development for existing solutions
 - Phase 3 for Complex Equipment Systems
 - Maximo-Tririga interfaces
 - Fire extinguisher operations and maintenance for Facilities New Mexico
 - E-Signature implementation for Lock and Key issues/returns
 - Corporate dashboard for assets
 - Development of Maximo IT Service Requests
 - Production support

- Future work:
 - New development for existing solutions
 - Phase 4 for Complex Equipment Systems
 - Mobile Work Manager for craft for Facilities New Mexico
 - New solutions
 - Operations and maintenance of Technical Systems assets for California
 - Operations and maintenance of Technical Systems assets for New Mexico
 - Operations and maintenance of Facilities assets for the Tonopah site
 - Upgrade to 7.5

Multiple solutions work in a single Maximo instance!

