

GENERAL DYNAMICS

Information Technology

Maximo Asset Management System

Joint Panel Meeting

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Enterprise Asset Management (EAM)



- Defined: A computer system used to help manage the acquisition, provisioning, maintenance, replacement and decommissioning of Enterprise Assets
- Enterprise Assets
 - High Value (above some \$ value)
 - Critical in Nature (for want of a nail the kingdom was lost)

Benefits of EAM

- Reduce Capital and Operational Costs
- Increase Asset Operational Life and Return on Asset Investment
- Sharing of data
 - Operation Procedures
 - Location Hierarchies
 - Documentation
- Consolidated Reporting

Benefits of EAM (cont'd)

- Single Point of Integration to other Enterprise system
 - Financial
 - HR
- Helps enforce Common Best Practices
- Preventive Maintenance Planning
- Repair and Corrective Maintenance tracking
- Asset Life Cycle Management
- Tracking of all costs (Material, Labor, Tools, Contract)

Technical Characteristics of an EAM System

- Multi-user
 - sometimes in the thousands
- Centrally host
 - Users from multiple locations access the same software and database
- Web based (thin-client)
 - Need to little or no configuration
- Able to segregate data by Department or Location
- Multi-level Security

Maximo

- Widely used Asset Management System
- Enterprise Application
- Highly configurable

Database Configuration

Database Configuration - Microsoft Internet Explorer

Address: http://207.158.32.56/maximo/ui/?event=loadapp&value=configur&uisessionid=1260284944967

Database Configuration

Object: WORKORDER * The WORKORDER Table

Attributes: Filter 2 - 11 of 282

Status	Attribute	Description	Type	Length	Scale	Required
▶	ACTLABCOST	Actual Labor Cost	AMOUNT	10	2	<input checked="" type="checkbox"/>
▶	ACTLABHRS	Actual Labor Hours	DURATION	8	0	<input checked="" type="checkbox"/>
▶	ACTMATCOST	Actual Material Cost	AMOUNT	10	2	<input checked="" type="checkbox"/>
▶	ACTSERVCOST	Total actual service cost against this work order	AMOUNT	10	2	<input checked="" type="checkbox"/>
▶	ACTSTART	Date and time the actual work began.	DATETIME	10	0	<input type="checkbox"/>
▶	ACTTOOLCOST	Actual Tool Cost	AMOUNT	10	2	<input checked="" type="checkbox"/>
▶	ACTTOTALCOST	Actual Total Cost	AMOUNT	10	2	<input type="checkbox"/>
▶	ASSETCUST	Asset Custodian	UPPER	30	0	<input type="checkbox"/>
▶	ASSETFILTERBY	Filter By(all,user/custodia,public)	UPPER	14	0	<input type="checkbox"/>
▼	Add	SAPSHOPNO	UPPER	15	0	<input type="checkbox"/>

Details

Attribute: SAPSHOPNO
 Description: SAP Shop Number
 Type: UPPER
 Length: 15
 Scale: 0
 Required:

Title: Sapshopno
 Class:
 Domain:
 Default Value:
 Alias: SAPSHOPNO
 Status: Add

Advanced

Entity: WORKORDER
 Column: SAPSHOPNO
 Same as Object:
 Same as Attribute:
 Autonumber:
 Search Type: NONE
 Localizable:
 Text Direction:

Persistent?
 Must Be?
 Positive?
 User Defined?
 Can Autonumber?
 Long Description Owner?
 Sequence Name:
 Type of Complex Expression:

Audit Enabled?
 Multilanguage Supported?
 Multilanguage in Use?
 E-signature Enabled?
 Primary Column:
 Attribute #: 282
 Next Sequence Number:

New Row

Application Designer

Work Order: 1020	Generator Overhaul	Site: BEDFORD	Attachments
Location: BR230	Boiler Room Emergency Generator	Class: WORKORDER	Status: WSCH
Asset: 11230	Emergency Generator	Work Type: EM	Status Date: 5/2/02 11:46 PM
Configuration Item:		GL Account: 6210-327-???	Inherit Status Changes? <input checked="" type="checkbox"/>
Parent WO:		Failure Class:	Accepts Charges? <input checked="" type="checkbox"/>
Classification:		Problem Code:	Is Task? <input type="checkbox"/>
Class Description:		SAP Shop No: 8402W102	Under Flow Control? <input type="checkbox"/>
Launch Entry Name:			Suspend Flow Control? <input type="checkbox"/>
			Flow Action: <input type="text"/>
			Flow Action Assist? <input type="checkbox"/>

Job Details		Asset Details		Priority	
Job Plan: JP11210	Asset Up? <input checked="" type="checkbox"/>	Asset/Location Priority: 5	Warranties Exist? <input type="checkbox"/>	Priority: 2	
PM: PM-GEN	SLA Applied? <input type="checkbox"/>	Priority Justification: <input type="text"/>	Charge to Store? <input type="checkbox"/>	Risk Assessment: <input type="text"/>	
Safety Plan:					
Contract:					

Multiple Assets, Locations and CIs Filter Download ?

Asset	Location	Configuration Item	Target Description	Sequence	Progress	Site
...No rows to display...						

Select: Clear All New Row

Scheduling Information		Follow-up Work	
Target Start: 4/22/02 9:51 AM	Actual Start: 4/22/02 3:51 PM	Originating Record: <input type="text"/>	Originating Record Class: <input type="text"/>
Target Finish: 4/28/02 3:31 AM	Actual Finish: <input type="text"/>	Has Follow-up Work? <input type="checkbox"/>	Interruptible? <input type="checkbox"/>
Scheduled Start: 4/22/02 9:51 AM	Duration: 4:00		
Scheduled Finish: 4/28/02 3:31 AM	Time Remaining: <input type="text"/>		
Predecessors: <input type="text"/>			

Responsibility			
Reported By: Phil	Supervisor: <input type="text"/>	Owner: <input type="text"/>	
Reported Date: 4/22/02 4:34 AM	Crew: <input type="text"/>	Owner Group: <input type="text"/>	
On Behalf Of: <input type="text"/>	Lead: <input type="text"/>	Service Group: <input type="text"/>	
Phone: <input type="text"/>	Work Group: <input type="text"/>	Service: <input type="text"/>	
	Vendor: <input type="text"/>		

Work Flow

Workflow Designer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://207.158.32.56/maximo/ui/maximo.jsp?event=render&targetid=wfdesign&value=rerender&uisessionid=1260284944967>

Workflow Designer

Find: Select Action

List Canvas Process

Process: APPWFWO Approval process for work order Changed By: JHELLMERS Enabled?

Object: WORKORDER Changed Date: 12/8/09 7:48 AM Active?

Process Revision: 3 Interactive Initiate?

100%

```
graph LR; START1[START 1] --> CHECKOWNER{CHECKOWNER}; CHECKOWNER --> NOOWNER[NOOWNER]; CHECKOWNER --> APPROVTSK["@APPROVTSK"]; NOOWNER --> APPROVTSK; APPROVTSK --> STOP2[STOP 2];
```

Applet workflowdesignerapplet-wfcanvas_wfcanvas started

Internet

Work Flow

The screenshot displays the Workflow Designer application interface. The main window is titled "Workflow Designer - Microsoft Internet Explorer" and shows a browser address bar with the URL: `http://207.158.32.56/maximo/ui/maximo.jsp?event=render&targetid=wfdesign&value=render&uisessionid=1260284944967`. The application window has a menu bar (File, Edit, View, Favorites, Tools, Help) and a toolbar with navigation icons. The main workspace is divided into a left sidebar and a central canvas area. The sidebar shows a process tree with "Process: APPWFWD" and "Object: WORKORDER". The central canvas area is currently empty, showing a "Task Node Properties" dialog box.

The "Task Node Properties" dialog box is the primary focus, containing the following sections:

- Title:** @APPROVTSK, **Description:** :DESCRIPTION, **Time Limit:** 0:00
- Application:** WOTRACK, **Work Order Tracking**
- Display One?:**
- WF Task Type:** [Empty field]

Assignments Table:

Role ID	Description	Send E-mail	Task Description	Time Limit
APPROLEWO	Work order approval owner.	<input type="checkbox"/>	:DESCRIPTION	0:00
SAPSHOPMGR	Shop Manager in SAP	<input checked="" type="checkbox"/>	:DESCRIPTION	0:00

Details for SAPSHOPMGR:

- Role ID:** SAPSHOPMGR, **Description:** Shop Manager in SAP, **Time Limit:** 0:00
- Application:** WOTRACK, **Work Order Tracking**
- Description:** :DESCRIPTION
- Escalation Role:** [Empty field]
- Communication Template:** WFASSIGN, **Default Template for Workflow Assignment not**
- Expression:** SAPSHOPNO is not null
- Priority:** [Empty field]
- Send E-mail?:**
- Calendar Based?:**
- Custom Class?:**

Notifications Table:

Communication Template	Send To
1018	WOWNER

Details for 1018:

- Communication Template:** 1018, **Task Notification**
- Send To:** WOWNER
- Subject:** Assignment SCR :wonom
- Message:** You have a new assignment on SCR :wonom.Task ID - :taskidDescription - :description :descrip

Perform Accept Action:

- When any assignment is accepted
- When All assignments are accepted.

The dialog box includes "New Row" buttons for the Assignments and Notifications tables, and "OK" and "Cancel" buttons at the bottom.



NAVSEA Shipyards

- **Background**
 - Support for Norfolk, Puget Sound, Portsmouth and Pearl Harbor shipyards
 - 6,000+ Users
- **Industrial Plant Equipment (IPE)**
 - Manages all work done on IPE (demand maintenance, PMs, and projects) ~150,000 Assets
- **Tool Management.**
 - Supports inventory management (stocking, re-stocking, etc of bulk, special, unique, and consumable tools) as well as operations of tool cribs (issuing, exchanges, tracking, etc.). Includes Qualifications to use tools
 - Over 100,000 tools supported with an inventory of 5-7 million
 - Ensures Test, Measurement and Diagnostic Equipment (TMDE) tools are tracked and calibrated on schedule



NAVSEA Shipyards

- **Nuclear Refueling Gear**
 - Tracks the status and condition of nuclear refueling gear
- **Radioactive Material Control**
 - Use Active RFID tags to tracks the location of radioactive material as it moves throughout the shipyard
 - Tracks movement of over 620,000 packages (2.4M transactions) of radioactive material
- **Weight Handling**
 - Tracks the status, condition and issuance of weight handling equipment (cranes)
- **Contract Management**
 - Ties Contracts, Delivery Orders, Purchase Orders to Work Orders for status and cost information.



Facilities Asset Management

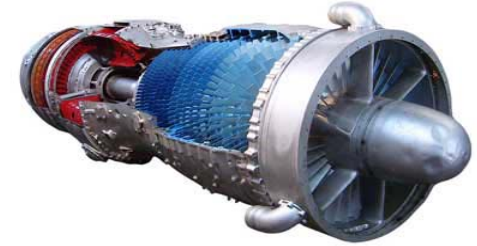
- **Background**
 - Asset Management for many different types of assets integrated into single database structure – industrial plant equipment, facilities, personal property, real property, and vehicles
 - Tracks over 150,000 assets and over 15,000 inventory items
 - Over 4,000 Active Users
- **Vehicles**
 - Tracks over 15,000 vehicles, leasing/rental, inventory objectives, reporting by classification
 - Certification and Maintenance of Class II and IV Cranes (self propelled)
- **Equipment Utilization**
 - Tracks the utilization vehicles
 - Utilization tracked on an as needed, daily, weekly, monthly basis
 - Utilization rates can be viewed on-line or via reports and compared to utilization objectives
- **Labor**
 - Actual costs calculations based on different overhead rates depending on user
 - Actual labor reports can be changed after the labor transaction is approved
- **Installation/Facility Condition Assessments (ICAP/FCAP)**
 - Processes and Data collection for complete asset lifecycle maintenance



NAVAIR Fleet Readiness Centers

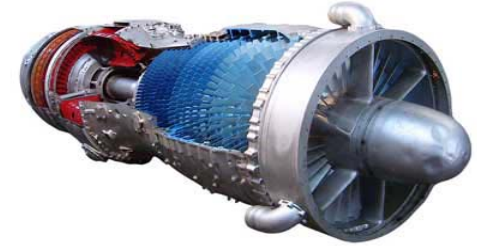
- **Background**
 - Support for North Island, Jacksonville, and Cherry Point Fleet Readiness Centers (FRCs)
 - Asset Management for many different types of assets integrated into single database structure – industrial plant equipment, facilities, weight handling, ground support and metrology equipment
 - Tracks over 370,000 assets and over 26,000 inventory items
 - Centrally hosted with single database supporting the three FRCs
- **Metrology**
 - System used for both Contractor and In-house work force
 - Manages complete business process – Recall, tracking asset thru Lab, capturing work performed (technician, hours, parts, standards, etc.), and shipment
 - Quality Module provides for both In-Process Reviews (IPR) and Quality Process Reviews (QPR)
- **Industrial Plant and Equipment (IPE)**
 - Manages all work done on IPE (demand maintenance, PMs, and large projects)
- **Ground Support Equipment (GSE) – Tractors, Trucks**
 - Tracks Pre-Operational Inspection and Custody Maintenance information
 - Maintenance Control Requests and GSE Dispatch

Asset Configuration Management



- **Roll-Royce – Aircraft Engines**
 - **Implemented by IBM (a GDIT partner)**
 - Very complex Assemblies and Sub Assemblies
 - Managing the configuration of Jet Engines
 - Changes to configuration managed by work orders/change orders
 - “Build-out” of approved configuration
 - Visual cues regarding status of configurations versus time (color coded)
 - Notifications of Required Preventive Maintenance
 - Uses MIL-STD-1388-2B and Logistics Support Analysis Record (LSAR)

Asset Configuration Management (Cont'd)



- Meter Recording input for Asset Condition Monitoring
- Define Hierarchy of Models, Variants and Revisions
- Create Work Packages based of related required works (Campaigns, Preventive Maintenance, Operational Checklists, etc)
- Trip logs
 - start/ending date,
 - orgin/destination,
 - trip problems,
 - maintenance recommendations,
 - crew certifications
- Tracking Engines while installed on customer equipment
- Accounts for “Organic” Maintenance

Misc

- Handheld Solutions for
 - Work Order Management
 - Shop Stores Inventory
 - Asset Inventory
- Automated Input from SCADA (Supervisory Control and Data Acquisition) and Monitoring equipment