

Biographical Information

Shirley A. Stadjuhar
Executive Consultant

Specific Responsibilities

Provide expertise, technical leadership, application development and problem resolution in the implementation of GIS and Outage Management Systems with extensive integration to other enterprise systems for electric and gas utility clients.

Past Experience:

Thirty years experience in Information Systems and the Energy Industry including 14 years in the utility industry as an employee and consultant. Strong background of technical expertise and leadership focused on providing solutions for GIS implementation and Outage Management integration.

KEMA Consulting

Delivered solutions for electric and gas utility clients, including requirements definition, design, implementation, technology transfer and go-live support. Select project experience includes:

- GIS and OMS implementation for GPU (First Energy)
- OMS implementation and integration for Conectiv
- OMS problem solving and enhancements for CILCO
- OMS process modeling with a focus on reliability reporting and OMS to WMS interface design for National Grid
- OMS to distribution SCADA interface for North East Utilities.

IBM Global Services

Transferred to IBM with the Public Service Co. IT outsourcing. Successfully completed development and implementation of the PSCo GIS system supporting 300 users at 11 sites. Developed new applications and provided support for the production PSCo GIS.

Xcel Energy (formerly Public Service Company of Colorado)

Member of a small Self Directed Work Team that evaluated, selected and implemented PSCo's comprehensive electric, land and gas GIS System. Designed and developed multiple applications including work order processing/job design, data validation, safety inspection and cable failure tracking.

Educational Information

B.S., Mathematics, Computer Science Specialization

Professional Memberships

GITA, former Board member of the charter Rocky Mountain Chapter

**OMS is from Jupiter, WMS is from Saturn
Integrating Different Worlds**

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ABSTRACT

In today's changing business environment and tight economy, utility companies are focusing on the basics of safety, keeping the lights on, using resources effectively and increasing operational efficiency.

Outage Management and Work Management systems have been implemented in many utilities to support these goals. Looking for opportunities to integrate OMS and WMS can provide added benefits and leverage these investments to improve operational efficiency.

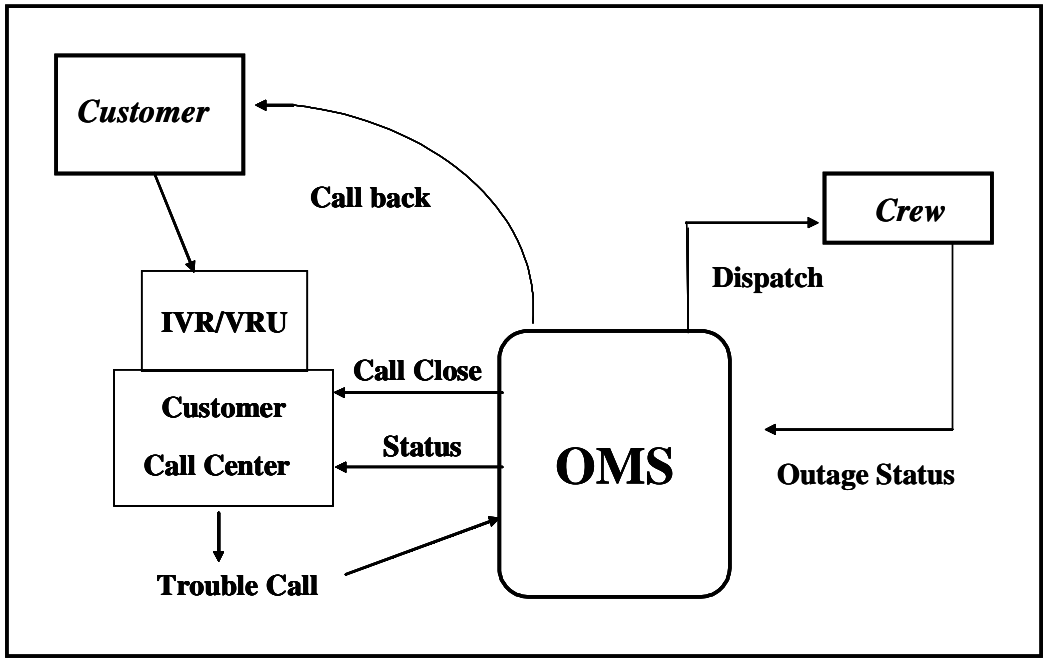
Outage Management and Work Management operate in different worlds, but have intersecting areas of data and process where integration can improve data accuracy, reduce paperwork, eliminate data re-entry and optimize resource utilization. Opportunities for integrating OMS and WMS are explored and issues examined. Solutions to maximize benefits and resolve issues are evaluated.

INTRODUCTION

Integration of Outage Management and Work Management Systems can leverage the investment in these applications to improve operational efficiency, but careful assessment of the complexities, issues and benefits is needed to achieve success. The functionality and scope of Outage Management and Work Management Systems are reviewed and compared. Opportunities for integrating Outage and Work Management Systems are explored, issues identified and benefits evaluated.

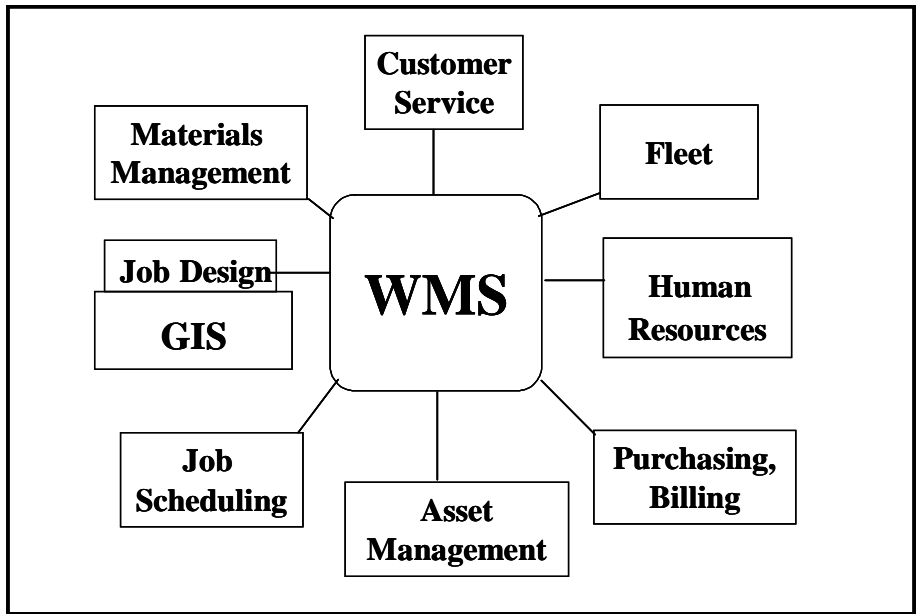
OUTAGE MANAGEMENT OVERVIEW

An Outage Management System (OMS) provides the technology and business process to analyze incoming trouble calls, predict the likely outage device, dispatch crews to restore the outage, close the trouble order and provide completion data for reliability reporting. The OMS is managed by the Dispatch Center and interfaces to the call center and trouble crews. The priority for an OMS is outage restoration and safety in response to emergency and unplanned work in a 24/7 time frame. The flow of data in an Outage Management System is shown in the illustration below.



WORK MANAGEMENT OVERVIEW

A Work Management System (WMS) is an enterprise wide process for managing jobs from initiation to completion. A WMS typically handles work requests, job design, scheduling, estimating, monitoring work in progress, as-built updates and closing. A WMS interfaces to, and in many cases provides modules for, other enterprise systems such as scheduling, materials management, purchasing, job design, customer service and human resources. The jobs managed normally include routine service work, construction and planned maintenance in a normal 8 to 5 work day schedule.



DIFFERENT WORLDS

The sphere of influence of a Work Management System is extensive and reaches throughout the enterprise like the rings of Saturn. The Outage Management System is volatile and buffeted by storms like the surface of Jupiter. Outage Management and Work Management Systems clearly operate in different worlds, but have intersecting areas of data and process that present opportunities for integration.

OPPORTUNITIES FOR INTEGRATION

Opportunities for integrating Outage Management and Work Management include:

- Crew, Equipment and Personnel
- Work Request Number
- Crew Time Reporting
- Work Request Initiation

Each of these integration opportunities are explored in detail below.

Crew Information from WMS to OMS

Work Management has access to information about vehicle and equipment availability, employee skills and crew composition and schedule. Downloading up-to-date crew composition or employee and equipment information to the Outage Management system is a potential area for integration and may provide benefits such as eliminating some data entry in OMS and providing more accurate contact information.

Issues:

WMS normally handles scheduled work from 8 to 5, while OMS operates on a 24/7 basis often calling in company or foreign crews for off-hour emergency work. WMS crew composition in comparison is relatively static. An Outage Management System typically provides crew creation and management functions that support rapid changes in the schedule and composition of trouble crews.

Crew and truck naming conventions in WMS and OMS often differ and make exchange of crew information difficult. WMS crew, employee and equipment information must be filtered to send only those crews qualified for trouble work and with the right truck and equipment to the OMS.

Conclusion:

Some utilities have crews that handle scheduled work and crews that are dedicated solely to trouble work. Other utilities are attempting to maximize resource utilization by having all crews work routine and scheduled jobs, but also respond to emergency and trouble

work on an as needed basis. In the former case, the relatively small benefits and numerous issues in sharing crew information from a WMS to an OMS make this integration a low bang for the buck. In the latter case, crew management and scheduling may be better addressed by mobile work force management or job scheduling technology. In all cases standard naming conventions will allow more effective integration.

Work Request Number

Generating work request numbers for OMS emergency, outage and trouble orders may provide benefits of creating a cross reference in the WMS for planned and unplanned work and provide a process for capturing what was done in the field.

There are two approaches for generating work request numbers:

1) When an order is created in the OMS, send a request to the WMS for a valid work request number.

There may be a time delay receiving the work request number from the WMS and the OMS will need to wait for its receipt or risk having a blank work request number. Outage Orders that have received a valid work request number may be rolled in to upstream outages and deleted leaving an empty work request in the WMS. Logic may be required so that some OMS orders do not request a work request number, for example an outage that was completed as a “no outage” condition by the dispatcher without a crew ever being dispatched.

2) Send a work request number from the OMS to WMS at the completion of the OMS order.

This approach will avoid timing problems inherent in requesting a work request number and will eliminate empty work requests in the WMS when outage orders are rolled up in the OMS. A valid series of work request numbers will need to be established in the WMS, for example OMS-1234, where the number represents the OMS order identifier. The process of sending the work request number from OMS to WMS can also include sending additional order history and completion information.

Conclusion:

Generating a work request number in the work management system for OMS orders is generally only valuable if additional data is integrated between the two systems. Sending the OMS order number and additional order information to the WMS when the OMS order is closed will provide the most benefit.

Crew Time Reporting

The work management system in some utilities may be used to capture time accounting and resource utilization for scheduled work. Time accounting for trouble and emergency work is often manually entered by a clerk from crew paper work. The outage

management system timestamps order status changes and thus tracks associated crew time for en-route, arrived, restored and field complete. Crew time data for OMS work can automatically be sent to the WMS system.

Issues:

Capturing accurate times is dependent on the crew reporting status changes via voice or mobile terminal precisely when they occur. In reality this may not always happen, for example a crew arrives on site, assesses the situation, corrects it and then goes back to the truck to report order completion. The intermediate times of arrived and restored are not captured. In such cases, crew performance metrics for response time and time to repair will be invalid. Other work related time such as going back to the barn for equipment will not be captured in the OMS and data entry from individual crew member paper work may still be required.

Conclusion:

There may be some benefit from capturing time reporting for emergency and trouble work and sending it from the outage management system to the work management system. The timestamps for order status changes and crew member names can be sent as part of the completion data with a valid work request number as discussed in the previous integration opportunity, but manual updates will be required for time spent on other work related tasks.

Follow-up Work Request Initiation from OMS to WMS

Emergency and unplanned work in the outage management system may involve temporary repairs to restore an outage and make the situation safe. Additional follow-up work will often be required to complete permanent repairs, replace a temporary device or perform needed tree trimming. The most obvious and beneficial integration from OMS to WMS is to automatically initiate a request in the work management system for follow-up work required on emergency, outage and trouble jobs completed in the OMS. This integration can capture information about what was done in the field and what work is needed, will reduce crew paperwork and subsequent data entry and, at a minimum, will create a work request shell in WMS for new required work.

Issues:

The OMS dispatcher and trouble crews are busy and their priority is to make the situation safe, restore the outage and then handle the next emergency or outage order. Follow-up work requests are often manually entered by an operations clerk from the crew paper work. The process of generating of a WMS work request will require a transition in the OMS work process and should be designed to have minimum impact on the dispatcher and crew.

Approach:

Technical implementation of the work request initiation should require minimum core code modification to the outage management system. The recommended approach is to add a work request button to the OMS order completion screen which will activate a new

screen that requires only minimum data entry by the dispatcher – for example, select the work request type and priority and enter a brief description of the required work. All other data should be generated or gathered automatically from the OMS, such as location (address, xy or pole number), OMS order number, crew and crew members, dispatcher name and OMS order completion information.

Conclusion:

Initiating work request in the WMS from the OMS for follow-up work can reduce loss of information, capture work needed in a timely fashion, reduce crew paper work and reduce data entry.

Other Work Initiation Opportunities

There are several other scenarios where initiation of work requests in WMS from OMS may be beneficial and these are briefly discussed below.

Asset Update:

Sending information from the OMS to WMS to update asset information when a device is replaced during emergency repairs will capture asset change information and will reduce paperwork and duplicate data entry. Updating assets from OMS makes sense if WMS owns or feeds the asset database and the WMS is used to send asset updates to GIS.

Map Data Correction:

Trouble crews working in the field are an excellent front line source to find and correct inaccurate GIS or map data. The crew can provide information on missing devices, devices that are the wrong size or type, and can provide the location and description of the required correction to the dispatcher for entry in the work request initiation process. As in the case above, providing data correction information from OMS makes sense if WMS is used to feed data corrections to the GIS.

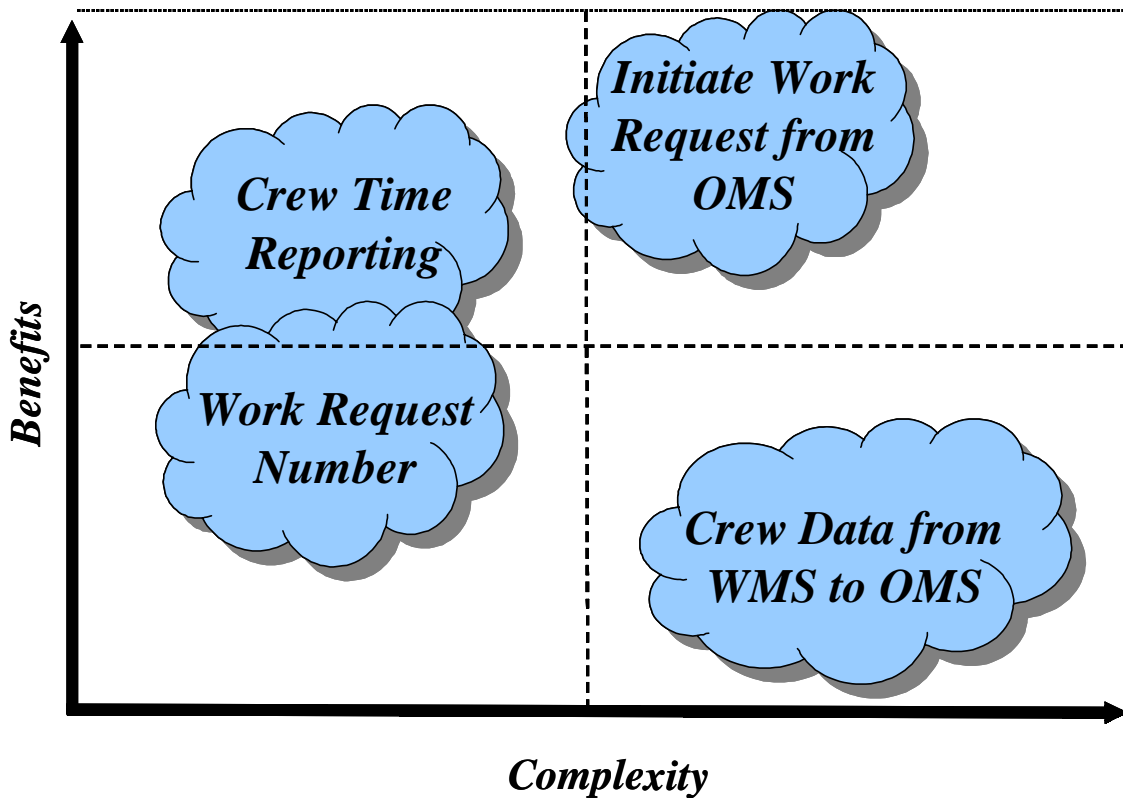
Claims and Billing:

Work requests can be generated from the OMS to provide information about damage to facilities by vehicles, an outside party or dig-ins. The trouble crew may not have pertinent information about the billable party identification, vehicle license number, etc. The work request can provide a tickler for claims generation, but will typically require additional manual data entry and may require handling by another organization or service representative.

EVALUATING THE BENEFITS

Benefits for integrating outage management with work management will depend on the business priorities and processes for each specific utility. Benefits as measured against the complexity of implementation for each of the integration opportunities are shown

graphically below, with initiating a follow-up work request from OMS to WMS promising the most benefit



LESSONS LEARNED

- Minimize impact to dispatcher and crew
- Automatically gather supporting data
- Minimize customization
- Standardize naming conventions
- Look to complementary technologies:
 - Mobile terminals vs crew paperwork
 - Job schedulers for both planned and emergency work

SUMMARY

A well thought out integration of OMS and WMS can reduce paperwork and re-entry of data, reduce loss of information, improve facility data accuracy, provide a cross reference between emergency and scheduled work and increase operational efficiency.