University of California Larry L. Sautter Award Submission for Innovation in Information Technology

Project Name
Physical Plant Computerized Maintenance Management System (CMMS)

Project Institution
University of California, Riverside

Project Abstract

The Physical Plant Computerized Maintenance Management System (CMMS) is a web-based system available to the entire campus for obtaining products and services from the centralized Physical Plant department. Not only can customers submit various requests via the web, but also approve estimates, get status information on work in progress, query existing requests, review billing information, access various help items and tutorials, report problems using the on-line system, and receive e-mail notifications when requests are completed. The system allows submission of trouble tickets and service requests, as well as requests for estimates, projects, and preventive maintenance. Analysis and reporting features are also available for tracking work in progress, reviewing completed estimates, retrieving completed requests, and reviewing financial billing transactions.

A separate "management" web interface has been developed to allow the Physical Plant administration to search through all work orders, retrieve statistics about the number of work orders processed by month/crew, and search on parts prices, etc. The Labor Management Module is an exciting new enhancement being introduced into this part of the system. Using our campus wireless network and handheld PCs with integrated barcode readers; Physical Plant employees can interact with the system in real-time from job sites out in the field. For example, one series of screens allows employees to enter labor hours against work orders in real time via a custom-built web interface. Physical Plant administrative staff (supervisors and assistant directors) can access related web pages to generate time record reports and approve employees' overtime requests on-line.

The CMMS is an integrated system that uses Oracle RDBMS as back end database, Oracle Web Application Server as a middle tier and PL/SQL to present the dynamically generated content to the web. The system is built upon the FAMIS Maintenance Management System from Prism Computer Corporation. New web-based modules can be quickly implemented by UCR programming staff in a cost-effective manner. The system has also been fully integrated with our PeopleSoft financial system. For more information, please visit the UCR Physical Plant CMMS System at: http://famis.ucr.edu

Project Description

The Physical Plant Computerized Maintenance Management System manages work order processing, inventory control, billing/recharge activities and feeds General Ledger financial transactions directly to the UCR PeopleSoft Financial System. The system is categorized into two components – the customer web interface (used by departmental requestors) and the management web interface (used internally by Physical Plant staff). A description of each system component follows:

Customer Web Interface

1. Trouble Tickets
   The trouble ticket web page allows all members of the campus community to submit simple, non-billable requests for service. Since a user login is not required, job progress and billing information cannot be tracked if using this form. The idea behind this module was to allow anyone on campus (student, faculty, or staff) to alert the Physical Plant staff of trouble with campus facilities. Fallen trees and overflowing toilets represent common uses of the trouble ticket form.

2. Service Requests
   The service request web page enables validated users to submit billable or non-billable requests for service. Login is required to use this form. After logging in, much of the requestor information (name, contact information, etc.) is populated automatically, based upon the requestor's profile. The customer then specifies the location of work to be performed, the Full Accounting Unit (FAU) information for billing, and a description of the work to be performed. Since each request is tied to a particular requestor, job progress and billing information can be tracked after submitting the request form. This allows the requestor to check the status of the request at any point in time via the Physical Plant CMMS web interface.

3. Specialized Request Pages
   a) Sign Shop
   The sign shop request page offers functionality that is similar to the standard request page, but it is tailored to the specifics of a sign shop request. Customers will use this request form when ordering badges, nameplates, or outdoor signs. After these requests are entered into the system, they are routed electronically to the Physical Plant sign shop for timely processing.

   b) Special Events
   A specialized request page has also been developed for special events. This customized request page allows customers to specify dates, times, and locations of their special campus events. The number, type, and style of rental items (tables, chairs, podiums, canopies, etc.) can also be specified for delivery and set-up at the event location. As the user specifies the items needed for the event, a summary of charges is dynamically generated, showing the rental charge per day

of the items requested. Upon submitting the request, the work order is routed electronically to the Physical Plant day crew for processing.

4. Estimate Requests
When the cost of a job is uncertain, campus customers can submit an electronic request for an estimate. The customer logs into the page and describes the work to be performed. Upon submitting the estimate request, the system delivers e-mail to the Physical Plant projects staff, alerting them to the fact that an estimate request has been submitted. The projects crew then determines the cost for the job and enters the detailed cost estimate into a specialized screen within the system.

5. Review of Completed Estimates
When Physical Plant projects staff completes an estimate, the system automatically sends e-mail back to the requestor, stating that the prepared estimate is available for review on the Physical Plant CMMS website. The customer can then login and review the estimated cost for performing the job. Customers can choose to accept the estimate on-line, which automatically converts the estimate into a "real-live" work order. The customer also has the option of rejecting the proposal or modifying the scope of work to request an adjusted estimate all from within the Physical Plant CMMS website.

6. Analysis and Reports
Upon logging in, this section of the website allows requestors to review previously submitted requests. A search engine allows customers to retrieve requests based on various criteria. From the search results grid, users can drill into the original request details and view the current status of work orders while Physical Plant is engaged in processing them. A detailed account of billing transactions is also displayed, allowing financial analysts to reconcile detailed work order charges to financial journals in the PeopleSoft general ledger system.

Management Web Interface

1. Work Order Search
A full-featured search engine allows Physical Plant staff to search for work orders by their request date, assigned crew, status, location (site/building/floor/room) and source. The query results are shown in a grid of all work orders that meet user selected criteria. Each request can then be opened to reveal the request details, billing, history, and parts and labor detail.

2. Utilities
Various utilities are also offered within the Physical Plant site. A work order aging page shows the number of work orders submitted for a specified fiscal year by month/crew, as well as number of open work orders by age. The Storehouse utility displays material purchase amounts from the storehouse by month, material activity from stores, and an exception report. The part number search allows a

user to find a certain part's price by searching on part number, part description or commodity type.

3. Labor Management
   a) Time Recording
   All labor and leave time (for both administrative and craft personnel) are entered on-line through this web interface directly into the Oracle database. Hours are typically entered on a daily basis, however they can also be entered on a weekly basis for those employees whose time is not recharged. Each employee enters his/her own labor/leave hours except in work units like custodial, where it is impractical. In those situations, entries are performed by the employee's supervisor or other appropriate administrative staff. Data can be input either by desktop PCs or by pocket PCs.

   Data entry is simplified by the use of barcode readers. On the back of each employee's name badge is a bar code, which represents his or her employee id. Each work order also has the work order number represented as a bar code on the printed form. The employee can then simply scan the name badge and work order to identify who is working on which work order. The number of hours is entered, and labor entry is complete. Our campus wireless network allows this process to take place anywhere – even at remote job sites.

   In addition to entering labor and leave activity, employees can review activity entered for a specific day, browse work orders currently assigned to the individual, and access other work orders assigned to his/her crew. At the end of each reporting period, an email is automatically generated to supervisors and assistant directors notifying them to generate time record reports for employee signature and to complete approval of on-line employee overtime pay requests.

   b) Management Time Record Reports
   Many utilities are also available for Physical Plant's payroll and personnel staff. Within the Physical Plant CMMS system, staff can view employee daily labor totals, produce timesheets for a specific employee or department/craft, access the approved overtime list, and print monthly (or year-to-date) employee overtime summaries for the director.

Objective Customer Satisfaction Data / Benchmarks

The Physical Plant CMMS System has been in production since July 1, 1999 and has processed over 40,000 electronic requests in less than three years. Over 204,000 sheets of paper forms have been eliminated as a result of this web-based system. Amazingly, the system was developed and deployed with the scarcest of resources, as it was developed and implemented with only a single programmer (1 FTE) dedicated to the project.

Simply put, the Physical Plant CMMS system is the best of breed when it comes to web-based transaction processing systems. It was the first system of its kind to be deployed at the UC Riverside campus. As it evolves over time, enhancements and advanced features are implemented to automate and streamline the interaction between Physical Plant staff and requestors within campus departments. It is perhaps the most widely used web-based work order system at UCR and has received praise from its users - both departmental requestors and Physical Plant staff alike.