Project Name
Web-Based Printing and Reprographics Work Order System

Project Institution
University of California, Riverside

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Project Summary
In 2001 the University of California, Riverside Printing & Reprographics (P&R) department recognized the need to convert and enhance its paper-based work order process to a web-based on-line order system with a goal of seamless connectivity for our roughly 15,000 orders processed annually. These orders are produced in four separate locations -- three copy centers and one large production center.

Project Description
Goal, Process and Outcome
We wanted our customers to have easy password protected web-based access to an online version of our Reprographics order form, with integration into other enterprise systems already deployed at UCR (financial systems, authorization systems, and facilities/space management systems). Another core design element was to support the electronic attachment of original source documents to each web-based work order. This would enable hundreds of campus users to submit their orders in a completely paperless fashion, without ever having to leave their offices. Before the decision was made to develop our own system, many hours were spent researching commercially available printing management systems. Pricing for these canned systems started at $50,000 and were generally more than $150,000, which was problematic from a budgetary standpoint.

Even with this high level of expense, no commercial software package had the ability to integrate with our in-house financial and space management databases, which would not meet our goal of a seamless process and connectivity. We decided a custom developed program was the only way to succeed if we were going to take advantage of the above mentioned campus data.

We proceeded by process mapping our organization, and in doing so discovered a side benefit. With automation we could reduce the amount of time it took us to process, print, deliver and finally, bill projects to the campus general ledger. Also, our clients now could have the ability to glean substantial information on how their reprographic dollars were spent and quickly export that information to a
spreadsheet in a seamless manner. As an unexpected bonus we now could save and archive all orders and supplied electronic documents. These projects are held in perpetuity, allowing our customers to retrieve prior printed files and documents, and as a result creating a reorder is done with just a few clicks of a mouse. This time saving process of saving files electronically is something that no commercial product can do and of course none have the ability to check for accuracy of supplied accounting information while interacting with campus space databases for delivery information. The system also has been integrated with our campus Enterprise Access Control System (EACS), thereby eliminating the need for P&R staff to manage its own list of authorized users, since access decisions are now in the hands of campus System Access Administrators (SAAs).

Several enhancements have been introduced since the initial deployment of the system. Customers can now order business cards and Syllabi or Course Readers within the system. The business card application allows the customer to see a virtual representation of the business cards they are ordering with elimination of a time delaying paper proof. Another advantage is delivered business cards are billed with no intervention by our Reprographics’ staff, since charges are calculated and applied directly to customer ledgers.

Our Faculty can order Syllabi and Course Readers for their students from an electronic work order attaching files and seeing immediate delivery times as well as an expected production schedule. The students are kept abreast of expected delivery via a real-time web based list giving then the expected availability, location and cost for each reader. Lists can be sorted by major, faculty name, or description as a reader, syllabi or class notes.

**Copier Billing**

Copier billing is managed via a web portal using a flexible pricing model. Pricing for the 240 centrally managed copiers can be changed instantaneously which leads to accurate use-based pricing. Customers can log into the system and change user access/identifications via the web. Vendors are given access to the site via a vendor specific portal that allows them to collect meter reads for use based maintenance reports. All collected data is saved in perpetuity for auditing. Statistical reports for collective or individual machines on use and cost can be done instantaneously from a selected date range. Paper use or abuse is quickly identified using a relational database of meter reads and delivered supplies. This has reduced theft and misuse of paper, saving thousands of dollars annually.

**Benefits Resulting from Automation and Web-Based Order System**

- Our system has the ability to check viability of fund source in real time and only allows accurate and valid FAU (Full Accounting Unit) use. This eliminates the problem of bad FAU combinations that previously would delay billing of orders and required additional staff hours to track down the correct FAU information.

- Our system learns characteristics of each client by pre-filling needed information on the fly, reducing keystrokes required to complete order.

- The client is prompted to choose from pre-selected printing choices included size, color and substrate along with graphical representations of finished product.

- The client is given the opportunity to decide delivery location with an interactive building locator that connects to the existing campus facilities database which contains current building and office numbers, thereby improving accuracy and speed of deliveries for roughly 10,000 annual orders.
Files and electronic materials to be printed can be attached using simple windows based dialogue boxes and prompts. These electronic files stay with the job in perpetuity and will always be available to the client for future use and reorders.

Our system replaced unsupported old technology, non-windows/GUI based software that has an expensive annual support fee and no interconnected tools.

New orders are automatically moved to a dispatcher’s workbench where our P&R employees can prioritize, assign and process orders as they are moved through the various stages of production.

Printing & Reprographics management and Customer Service personnel can electronically track activity including location of orders, which staff have and are currently working on a given project as well as notes provided during production.

Many orders are automatically billed with no interaction needed from our P&R staff (triggered by selecting “final delivery” by our delivery drivers). Others are easily billed using a pre-selected menu that contains pre-selected variables.

Our system has menus for both clients and P&R management that are intuitive and robust, allowing for the performance of real-time analysis and reports.

Reports for clients are exported automatically to an Excel spreadsheet when requested.

Employee timekeeping is now controlled by the database, which allows preparation of monthly payroll with greater accuracy and accountability.

All previous work order projects can be searched by either the client or P&R management using thousands of variables and criteria.

All campus Syllabi and Course Readers are connected to our P&R web site and get updated in real-time with price and location. This same database tracks historical use and sales.

Long-term savings on eliminated support fees will be $15,000 per year.

Technology Utilized in the Project
The Printing and Reprographics Work Order System is based upon the Oracle 8i relational database. The web-based client and management interfaces were developed as stored procedures written in Oracle PL/SQL. The website is hosted by a webserver running Oracle Internet Application Server (iAS).

All aspects of the system are database-driven. Obviously, work order information is stored in database tables, and the original source documents attached to work orders are stored electronically within the system. In addition, P&R staff has access to management web pages for maintaining the system configuration within the database. This allows P&R management to change billing rates, specify the revenue cost center by service type, etc. without requiring software changes. Even the programs that dynamically generate each web page are stored within the database.

To gain access to the system, a user must enter a valid UCR Net ID and password. The program authenticates against the UCR Enterprise Directory housed in LDAP. Some 200 departmental users distributed throughout campus electronically maintain the Enterprise Directory. The system is available
within the UCR iViews portal (http://iviews.ucr.edu) and features single sign-on, which is enabled through UCR’s Central Authentication Services (CAS) infrastructure (http://cnc.ucr.edu/cas/).

Authorization occurs in a completely on-line, paperless environment. Campus Systems Access Administrators (SAAs) grant access to systems via the Enterprise Access Control System (EACS). After authentication, the system checks EACS to confirm user privileges. For more information on the Enterprise Access Control System, please visit the following site: http://cnc.ucr.edu/iviews/enterprise_acc_control/

The Printing and Reprographics Work Order System is tailored to the unique needs of the campus and boasts a high degree of interoperability with other campus enterprise systems. The system interacts with the UCR financial system (UCRFS) in real-time to validate FAU values and confirm that appropriate budgets exist before an order can be submitted for recharge. There are also on-line interfaces to the campus facilities data system for selecting valid campus delivery locations.

**Objective Customer Satisfaction Data**

Clients can use our online Work Order system to eliminate document management issues and concerns about storage of paper originals.

Accuracy of duplication is improved since most documents are in a PDF format allowing for correct file interpretation, and redundancy of keystrokes is eliminated.

Our clients never have to leave their desks to order printed materials, since files are electronically attached to each order and our P&R department is automatically notified of new incoming orders.

Delivery times are drastically reduced since work orders are submitted electronically; the quality of the finished product is usually improved since we are printing from the original source file; and time to billing is faster by about 100% since the calculation of costs is now largely automated.

P&R staff feel more in control of the production process since they can easily track, identify and monitor all future, present and past work.

The ability of P&R staff to communicate schedules and delivery questions are now instantaneous, whereas before they were dependent on phones, faxes and best estimates.

Information is now more accurate and leaves little to guesswork; we can quickly respond to inquiries and identify problems before they happen.

Production notes and all job related activities are kept in perpetuity with each order, allowing for better auditing and records retention.

Individuals from the City of Beaverton Oregon and other UC campuses including Berkeley and Davis have expressed interest in the system, and are considering using at least some part of the UCR system in their implementations.
Benchmarking Data
The Printing and Reprographics Work Order System was developed over a span of 6-8 months and has been in production since October 31, 2003. To date, over 11,000 work orders (including business cards are course readers) have been electronically processed through the system:

Amazingly, the system was designed, developed, and deployed with relatively scarce resources. The project team includes only 4 functional and 2 technical team members participating on the project. Please visit http://printing.ucr.edu/ for more information about the Printing and Reprographics Work Order System.