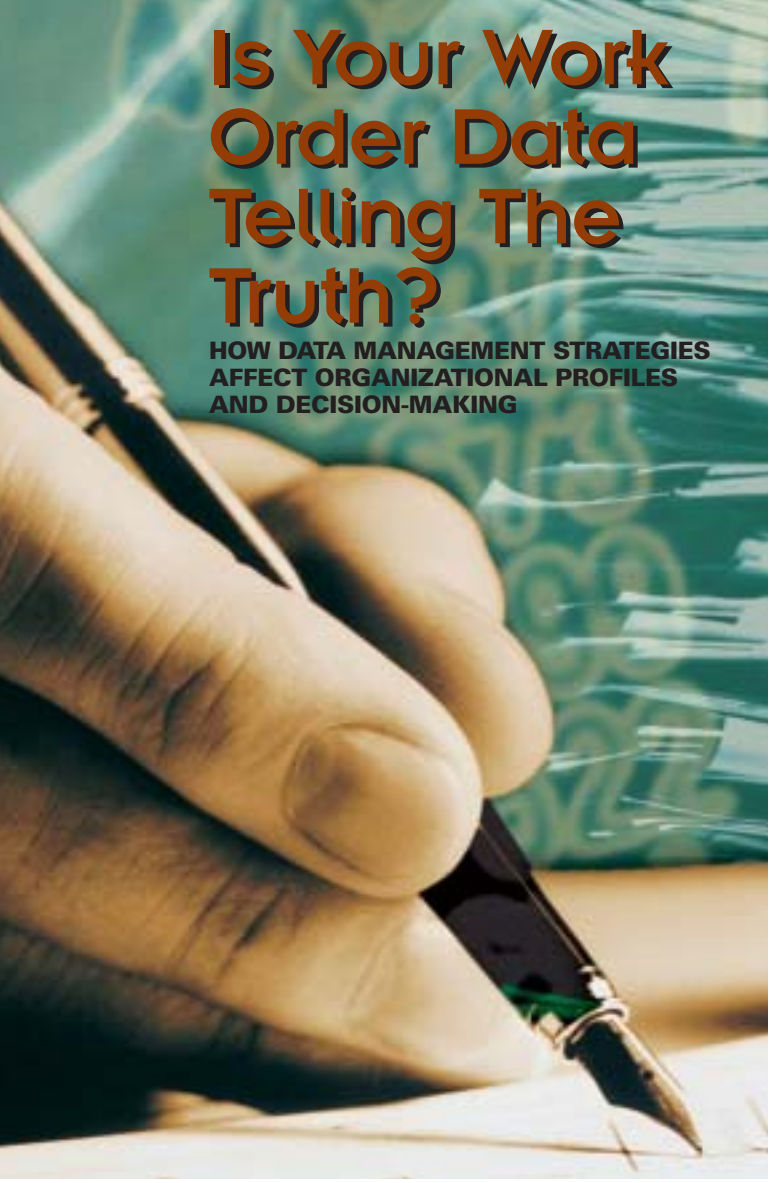


Is Your Work Order Data Telling The Truth?

HOW DATA MANAGEMENT STRATEGIES AFFECT ORGANIZATIONAL PROFILES AND DECISION-MAKING

by Frank Lucas

Maintenance management has come a long way over the last 30 years. Once regarded as strictly a reactive, resource-intensive cost center, managers now run maintenance organizations like businesses, collecting and analyzing data to assess, plan, and make important decisions aimed at preserving facilities and assets in the most efficient manner possible. Work orders serve as the primary source of this information due to their role as the essential instrument used for recording maintenance activities.

But how do you know that the key facts and figures being extracted from these documents are accurate and credible? What if the data on which you have been basing important strategies and decisions is not portraying a true profile of the organization? While computerized maintenance management systems (CMMS) have become an invaluable tool in the maintenance professional's arsenal, they will only produce what has been put into them. The axiom "garbage in equals garbage out" still applies. Just as important is how data is identified for future recall, for this is the dynamic component that can make even good, factual information tell an inaccurate story.

Everyone agrees that the heart of a maintenance organization lies in what happens out in the field—what my mentors referred to as "where the rubber meets the road." But this distinction is lost when an organization doesn't take the necessary steps to ensure their data management strategies are accurately describing these activities. This key process must be well thought out and executed if decisions are to be based on valid, reliable information. Despite all the advancements made on the business side of facilities management, it still takes human beings to develop and execute procedures, conduct training, and perform review functions that regulate the data collection effort in a dependable manner that produces legitimate results.

Forecast vs. Historic Data

Maintenance data can be broken down into two main categories, *forecast* and *historic*. A newly created work order is actually a rough draft that documents a maintenance concern or customer need. This information can be used to predict or *forecast* future events and activities. Anyone who monitors maintenance backlogs or plans work schedules uses forecast data to accomplish these tasks. Conversely, a completed work order is the final report of exactly what was done to address the issue. This information becomes the actual or historic account of actions taken. Those who report on expended work hours or accumulated costs use historic data to generate these statistics.

In some cases, forecast and historic data are preserved on the same document. An example of this is estimated cost (forecast data) and actual cost (historic data). In other cases, forecast data must be changed to become accurate historic data. If a work order to answer a "too hot" complaint is initially classified as routine maintenance (forecast data) and the technician corrects the problem by making a repair (historic data), the work classification should be modified to match that action. This is the part of data management that many maintenance professionals fail to address in procedural documents and execute as part of their daily operational routines. Hence, many reports and statistical compilations generated from the CMMS will likely present inaccurate representations of what is truly taking place in the organization.

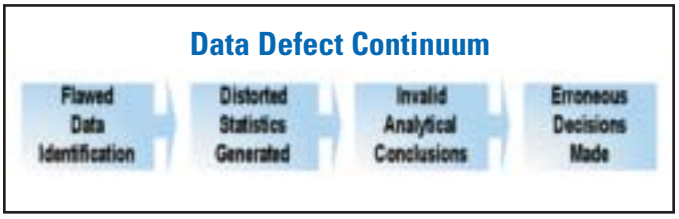
While items such as work order types, priority codes, work hours, cost, and equipment tag numbers play an important role, it would be hard to argue against the technician's field comments as being the most important component of a work order. As demonstrated above, it is these field comments that communicate to the organization what was done to complete

***Frank Lucas is assistant director of work management at the University of Nevada, Las Vegas. He can be reached at frank.lucas@ccmail.nevada.edu. This is his first article for* Facilities Manager.**

the requested work. The field comments turn the work order rough draft into the final report, transforming forecasted data into historical data. This is the information most often used to statistically profile the maintenance organization. It is also the same data technicians use to review previous actions taken, find trends, and determine root causes of problems. This makes the technician's field comments more than just a historical record of how work orders were resolved; it now becomes the principal source from which statistical information is collected, identified, and managed for future recall.

In some instances we already know what the expected resolution will be, and work orders can initially be coded to meet that expectation. A work order created to have a key made, for example, has very little probability of being fulfilled in any way other than a locksmith cutting the key. The chances are very good that no changes to the work order classification will be necessary if it was coded correctly to begin with.

But what about a work order to address a "too hot" complaint? Expected technician activities can range from simple adjustments, to moderate repairs, to replacing a capital piece of equipment. Each of these actions describes a vastly different scenario for resolving this common service call. Thus, the codes used when creating the work order must be reviewed at close-out and modified to appropriately reflect the nature of the work that was performed. Failing to do this triggers a data defect continuum (see below) of sorts, a chain reaction of events that could profoundly affect statistical profiles and eventual decision making.



Developing Data Management Controls

To be run like a successful business, maintenance organizations must have process and procedure documents at the core of their operations that govern all aspects of work order data entry. These documents should include definitions for each of the classifications and codes that management has determined are appropriate for their needs. Along with the definitions, some common examples of each should be included to help employees understand how the corrective actions taken dictate their use.

For instance, a work order type called *repair* must include an explanation of what a repair means to the organization, and should include some examples of repairs that routinely occur at the plant. Replacing worn components, patching leaking pipes, and re-wiring faulty circuits are all examples of traditional repair activities.

During the life of an active work order, at least two classification and coding opportunities will occur, once during initial

To be run like a successful business, maintenance organizations must have process and procedure documents at the core of their operations that govern all aspects of work order data entry.

creation and again at close-out. The initial creation of a work order offers the first opportunity based on known facts, which are usually minimal or general in nature. In the case of the "too hot" complaint, the actual "fix" will not be known until the technician has had a chance to assess the situation, take necessary corrective action, and verify that desired results were achieved. An organization should decide on the use of default codes when defining factors are not initially known, with the understanding they will be reviewed at least one more time at work order close-out. The "too hot" example above may be classified as *routine* or *recurring* work at first, but then changed upon final review of the documented corrective actions. Depending on the processes outlined in an organization's control procedures, additional classification and coding opportunities are possible.

Some organizations make interim changes to work orders as they pass through various stages of the work process. These can entail updating status codes, modifying job scopes, or routing line item tasks to other shops and trades. Such updates help manage backlogs and schedules by making work order data as real-time as possible. Once the work order has been turned in for completion and all postings and documentation have been entered, a final code review can take place. This step includes looking at the technician's comments, ensuring they adequately describe what was done, and changing classifications and codes that more appropriately match the actions taken.

Classifications and codes are then used to quantify data into various statistical categories that management has determined will provide a representative snapshot of the business. The results can be analyzed and appropriate decisions made. This process assumes classifying and coding was done correctly and is reviewed for accuracy prior to the data becoming part of the historical record. The identifiers a maintenance manager decides upon can be based on a combination of past experience or preferences, industry standards and best practices, or those that fulfill site-specific requirements. Once they are decided upon, it is important that everyone is made aware of them and understands the circumstances and situations that determine their use.

Examples of more common classifications and codes include request and work order types, priority codes, building and room designators, statuses, trades and shops, equipment or asset tags, and condition-cause-action codes. Other identifiers may stem from operational features built into the CMMS design or requirements of other business systems that share data with the CMMS. These can include repair or cost center

labels, account number formats, task or job numbers, warehouse and part IDs, employee designators, timekeeping codes, and other site-specific references.

Employee Responsibilities

Some organizations have the resources of an extensive work control operation to perform data entry and review functions while others may need to rely on a limited clerical staff or the technicians themselves. Whatever the situation, these employees play a major role in how the organization is statistically portrayed. It is absolutely vital that technicians write good comments, not only for management's purposes, but also to serve as a viable maintenance tool for learning, diagnosis, and prevention.

There is often debate over what constitutes a good comment, and clear answers are hard to define. While they shouldn't be novels, they should at least contain enough information so appropriate qualifiers can be determined based upon the definitions established by the organization. If a work order was created to "cut a key," a comment of "done" or "complete" might be good enough. But a work order created to address a "too hot" complaint will require more elaboration to describe how the problem was resolved. In addition to this requirement, organizations may stipulate additional information such as the operating condition a piece of equipment was left in, fill-in-the-blank answers to task questions, and follow-up activities that may need to occur in the future.

While good comments are vital, it is equally important that employees interpret, classify, and code them in a manner that truly represents the work performed. Statistical reports are not generated directly from field comment text but rather from identifiers that represent field comment text, so it is important that they are categorized in accordance with organizational guidelines. If field comments do not allow for accurate determinations to be made, the work order must be sent back to the technician for additional information. Work orders may also include ancillary materials in the form of check sheets, logs, and other attached documents.

Data management procedures must address the handling of this information as well.

The need for a manager to include reviews of closed work orders cannot be underscored enough. It is the only way with any certainty to verify employee performance and ensure that statistics being generated from the CMMS are portraying the organization with a high degree of accuracy. This can be accomplished by creating reports that show all appropriate disposition criteria and field comments for work orders that were closed in a given time period, usually the previous day or week. This information is then reviewed for accuracy, with items requiring modification highlighted and returned to data entry personnel for correction. This becomes a good training tool that fosters an atmosphere of continuous improvement and demonstrates the organization's commitment to data reliability. In addition, error rates can be benchmarked, recurring mistakes highlighted, and follow-up training performed so improvements can be made where needed.

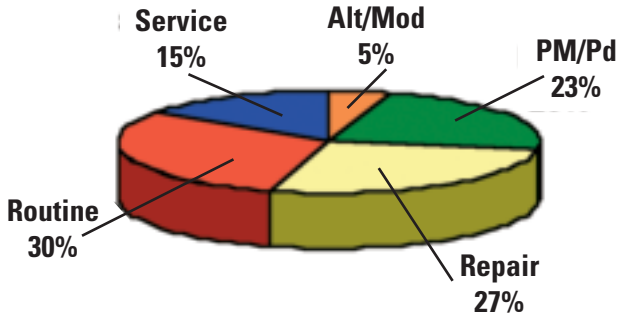
Understanding Data Dynamics

The accuracy of collected information ultimately lies with management. It is their responsibility to write procedures, perform training, enforce data identification requirements, and review employee performance to ensure success. It is also important for employees to understand how these activities affect the organization. Showing them how data is used and the potential impacts of non-conformance is a great learning tool. It helps instill a sense of awareness, promotes ownership of the process, and illustrates their role in the success of the organization.

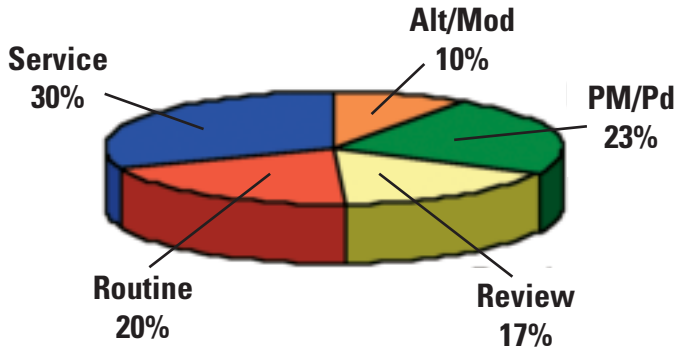
Figures 1 ands 2 represent a work year of activities for a 20-person maintenance shop. They demonstrate how changes in the way work order data is categorized can lead to dramatically different statistical results, which in turn can affect a manager's perception of the organization.

Figure 1 shows a work hour collection broken down by work order type for a maintenance organization. Figure 2 shows the same data classified differently. Because both fig-

Work Hour Distribution by Work Type
FIGURE 1



Work Hour Distribution by Work Type
FIGURE 2



ures present a different set of circumstances, conclusions about the data will be different. Quite often budgets are earmarked for specific activities, such as the maintenance of real property and installed equipment. Note the percentage difference in non-maintenance service hours, with Figure 2 indicating less time being spent performing core maintenance functions.

If the annual budget submittal was based on Figure 1 data, this increase could violate guidelines describing how maintenance-funded work hours are to be used, which could lead to reduced funding from this source in the coming budget cycle. Some organizations charge back requesters for performing non-maintenance services. Assuming this is the case here, a manager reacting to Figure 2 data could assume 15 percent more of his FTEs, or three more technicians, would be paid for by customer accounts (20 × .15 = 3 in Fig. 1 versus 20 × .30 = 6 in Fig. 2).

Figure 2 shows a smaller repair percentage than Figure 1 with both having a consistent PM/Pd share. Because Figure 2 data indicates fewer things are breaking down, a manager using this data could assume the PM program is working much more effectively than originally anticipated. By extracting the PM and Repair percentages from each chart, a classic PM to Repair comparison can be done. When adjusted to a 100 percent scale, dramatically different PM to Repair ratios and vastly opposed organizational profiles become evident (57.5% PM to 42.5% Repair in Fig. 2; 46% PM to 54% Repair in Fig. 1).

In many organizations, alterations and modifications represent resources spent on modernizing facilities and equipment. A manager operating under these assumptions could conclude the drop in repair rates in Figure 2 is due to its 5 percent increase in modernization work. If such work is traditionally performed by outside contractors using capital funds instead of the operations budget, the manager might incorrectly expect a labor surplus that can either be re-assigned to new activities or serve as justification for a reduction in force.

A Foundation for Success

The above examples are an oversimplification of how differing statistical profiles can affect decision making. But while historical work order data should accurately reflect the activities taking place in the field, relying on it alone violates the intent of making a fully informed decision. Analyzing budget reports, reviewing commodity usages, and conducting meetings with supervisors and technicians are examples of steps that can be taken to corroborate findings prior to making important choices.

A work backlog forecast that disputes statistical indications of shrinking maintenance requests or a budget report that lacks the evidence of expected surpluses from an increase in chargeable services would refute the statistical analyses above. Clearly, a well-rounded approach should be employed to verify what the data is telling you and create a higher degree of viability. But regardless of whether or not all the indicators agree, a story about the organization is being told just the same. The reasons why they do not corroborate are just as important as the reasons why they do.

The process of good decision making is built upon a foundation of accurate data collection and identification. Understanding its origins, developing management controls, training responsible employees, and performing reviews to verify its authenticity are essential functions for operating a maintenance organization in a business-like manner. Asking important questions about the intent of such a process and setting expectations for what the end results should be are a good way to start.

What statistical categories are going to be analyzed? How will the results be used or interpreted? Who or what will influence contributing data sources? How will the data be formatted, generated, and presented? What procedures, training, and follow-up activities will be necessary to ensure success? The answers to these questions will vary among organizations but the ultimate goal is the same—a sound data management strategy that should never leave you wondering if your work order data is telling the truth.