

The Value of Automated Data Mining

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It's the late '70s. A couple of things are heavy on the minds of biomed managers: how to live without disco and how to figure out trends with medical equipment based on information inside file cabinet equipment history folders. Decisions were likely made by gut feelings, and asking peers what they thought should be done regarding equipment replacement and department budgets.

Now it's the '80s. Along comes the computer, with its 8-inch floppy disk drives. The first computerized maintenance management system (CMMS) programs are written and implemented. These applications stored basic equipment inventory information, would possibly queue up scheduled inspection tasks, and kept some very basic service and inspection history. At least it was easier to print hospital medical device inventories on that rockin' dot matrix printer.

The '90s come bounding in, and CMMS applications have become a bit more elaborate, utilizing coding to flag important service history entries, such as use errors and certain types of failures. Asset records were coded for key information management, such as service coverage methods. With this coding, more functional reports could be written to focus in on service issues and asset management planning. But this still required printing reports (on that blazin' laser printer), and then paging through to mark up the reports with action items. Asset records lacking key information reduced the value of the database for benchmarking cost of service or replacement planning. In order to identify asset records that needed data completion, one would have to print reports, page through them, and hand them to others to gather and input these key data such as acquisition cost and purchase

date.

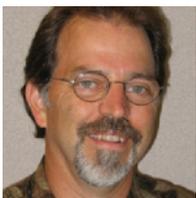
The year 2000 comes and goes. Society did not collapse. CMMS applications introduce scheduled alerts that can be configured to mine data from equipment history and asset records. These scheduled alerts can deliver well-written reports via e-mail directly to the staff members that need information to act on.

Automated data mining can release biomed managers and technical staff members from the tedious review of asset inventories and histories that was once required to make effective equipment management decisions. Well-written queries can be used to key in on records that need action. These queries can be launched close to real-time so action may be taken to correct data issues or to provide communication to technical staff and their customers. Data queries may be utilized in stand-alone reports, built within reporting modules now common in CMMS applications, or sometimes written as Transact-SQL language and scheduled for automated execution within the database.

A very simple example of a T-SQL query that will identify active asset records missing purchase cost is shown below:

```
SELECT dbtableAssets.dbfieldAssetNumber,
       dbtableAssets.dbfieldAssetDescription
FROM dbCMMS.dbtableAssets
WHERE dbtableAssets.dbfieldPurchaseCost is null
AND dbtableAssets.dbfieldStatus = [Active]
```

One does not need to be a skilled programmer to build data queries and schedule them for automated delivery via e-mail. Your CMMS application is likely to have a reporting module that allows a system administrator to pick and choose fields to include in a report, and then apply criteria for inclusion of records for the output. These reporting modules allow the result of the query to be embedded in the body of a scheduled e-mail or attached as spreadsheet or document. There are times when the CMMS reporting user interface does not achieve the



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desired criteria filtering, and the need for more elaborate SQL queries is necessary. It is possible for your organization's database administrator or the CMMS vendor to assist in the development of a query to meet the desired outcome.

Our organization has developed many different scheduled alerts that mine our equipment management system and place information directly in our biomed team's hands, as well those of our customers. Examples of these automated report examples include:

- **E-mail response for work orders:** communicates status and detail of new work orders, change of sub status, and completion.
- **New work orders every two hours:** helps our management staff stay in tune with service requests in near real time. This communication of service requests can help the manager later when they review analysis reports.
- **Unassigned work orders:** daily alert to ensure that all active work orders have an assigned staff member to carry out requested service.
- **Preventive maintenance (PM) status:** weekly alerts summarizing completion of scheduled inspections.
- **PM's scheduled next month:** summarizes PM quantity and assignments for next month.
- **Active work orders over 45 days old:** management of aged service requests.
- **Asset data integrity:** identifies new asset records missing key data elements.
- **Assets with warranty ending:** monthly report summarizes the cost-of-service ratio for devices going out of warranty the next fiscal year. This summary helps the directors more accurately forecast their next year's budget through the prorated cost of service value for the upcoming fiscal year, and the remainder of the costs for the following fiscal year.
- **Monthly operational statistics:** key indicators are delivered to biomed managers (number of service requests, value and quantity of equipment, average time to complete service requests, quantity of new and retired assets).
- **Staff time spent on equipment modality:** summarizes individual staff time spent on service of equipment relative to all staff historical data.
- **Time documentation:** summarizes by each staff member time recorded for last week.
- **Key word alerts:** focus on words or phrases of interest in work orders and send these to managers or staff for further study. Examples are follow-up with customers, vendor-performed service, and physician recommendations.

So, where does one begin to utilize automated data mining? Maybe the above list will trigger ideas for the information warehoused in your database that needs to be delivered for analysis or action. Think of those times where it's taken a lot of time to extract the information you need through ad-hoc queries or consider those reports that must be run manually. Remember what reports must be run for routine analysis or presentation to others. Identify key indicators for critical business metrics and where these indicators lie in the data.

As data or operational situations are encountered, consider methods where automated data mining could identify these issues on a routine basis. These data or operational issues may be placed in your hands well before a crisis is encountered, and steps may be taken to avoid unnecessary overreaction by staff, managers, and customers. Design reports to pull operational indicators together for a given time range in a format that delivers information to act on. Determine how often this information is needed, and who needs it. Take these reports and queries and package them into scheduled alerts to efficiently push information directly to team members for action. You may be surprised how much more predictable and efficient your days become. ■

Points to Ponder

Considering how to use automated reports? Give some thought to how to tailor them to your department's needs.

- Can your preventive maintenance (PM) status reports include some kind of distinction as to the nature of the equipment to be inspected? Is it life-support equipment? Such a distinction can help technicians prioritize their assignments in alignment with regulatory requirements.
- Can your reports on active work orders include status, such as "waiting on parts" or "out for repair" as a way to distinguish those that need external follow-up?