HTM NEWS & VIEWS

Computerized Maintenance Management Systems—Design Features for HTM

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About the Author

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Computerized maintenance management systems (CMMS) used by healthcare technology management (HTM) groups are available from multiple vendors. Previously published articles on CMMS selection have failed to mention some very essential features.[1] In fact, several of the CMMS systems that are being marketed to HTM were originally designed for the facilities engineering or manufacturing industries and, therefore, have several design deficiencies for HTM.

Why is that? In the facilities world, many assets, such as buildings, do not have a manufacturer or model number. In the HTM world, the variety of types/subtypes and variety of manufacturers/models is much greater and diverse, and the velocity of device changeover is much greater than in the facilities world. Equipment gets replaced much more rapidly. New categories/subcategories are always being introduced. New, different manufacturers appear at a much greater rate.

The purpose of this article is to define what makes the CMMS needs of HTM different. Based on the experience I have had with multiple different CMMS programs over my career, I will cover the challenges that HTM groups will face if attempting to use a software program without these features. This article is aimed at both companies marketing these software programs and the HTM groups that are struggling with some of them. Below are some other terms I will use in the article:

- **Manufacturer/model combination (M/M combination)**—A combination of the manufacturer (may be the actual manufacturer name or a database code that points to the manufacturer name) and the model (often referred to as the model number, but may include alphanumeric characters as well). The model is usually the identifier that the manufacturer lists on the nameplate to group together similar devices.

  Type/subtype (aka category/subcategory)—A grouping mechanism used to group together similar types of equipment in a vendor neutral manner, e.g. Infusion Pump/General Purpose. For more information, see ECRI Universal Medical Device Nomenclature System. [2]
- **Scheduled maintenance (SM)**—term that includes preventive maintenance and/or performance assurance.

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Manufacturer/Model-Based Structure

Some CMMS vendors have elected to make each M/M combination a unique key field that is used in a variety of ways within the CMMS. When entering a new device into

inventory, the users select the manufacturer, which then predetermines a drop-down list of acceptable models made by that manufacturer. If the desired model is not in the list, an authorized user must create a new M/M combination. This is what is called the M/M structure. Within a CMMS utilizing a M/M structure, whenever an authorized user creates a new M/M combination, he or she also defines several other characteristics associated with the M/M combination, most typically the type/subtype, the SM interval, and the procedure used for SM activities.

Following is a list several reasons why the M/M structure is superior.

Data Integrity within The Equipment File

For background information on the subject of data integrity within the equipment file and how to achieve it, see two background articles. The first is "Improving Your Equipment Intake Process," which was published in *BI&T,*[3] and the second was published in *24X7 Magazine* in 2009.[4]

With strong M/M structure: The manufacturer and model are listed on the nameplate on the medical device (usually along with the serial number). When entering new equipment into the system, users select the manufacturer, then select from a list of models associated with that manufacturer (M/M combination). The predefined type/subtype is automatically assigned to the new device. If the M/M combination doesn't exist, an authorized user will create a new M/M combination after validating that the user looked under the manufacturer. (Many large manufacturers had multiple divisions. Each division may constitute a different manufacturer in the CMMS.) The decision as to what is the "correct" type/subtype is not left up to the each individual CMMS user, fostering much more uniform grouping of similar equipment.

Consistency is very important in the designation of the type/subtype. Even when using the UMDNS, it is possible to misclassify a given M/M combination. If an error is detected at a later date, it is simply a matter of correcting the type/subtype associated with that M/M combination in one place instead of associated with each equipment record.

The M/M structure is easier for users because they only need to enter the two pieces of information that can be found right on the device (manufacturer and model) and the type/subtype decision has already been made for them. Consistency resulting from the M/M structure means that all of the devices of the same M/M combination will all be grouped together by one type/subtype, which has enormous advantages for reporting purposes.

Without M/M structure: Even when the CMMS contains many other instances with the same M/M combination, each user must make a type/subtype decision every time a new device is entered. Whereas manufacturer and model are written on the nameplate, the type/subtype are not on the device. Even if an institution has standardized by using the UMDNS, a decision must be made each time by each user which can easily result in a different outcome.

There are also some CMMS where the user is required to first select the type/subtype and that decision directs the user to manufacturer(s) that manufacturer that type/subtype. In my view, that logic is exactly reverse of the way it should be. If the users select the wrong type/subtype in this CMMS, they won't even find the manufacturer, which is one of the pieces of information that the user is certain of.

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Without M/M structure, users need to make a type/subtype decision every time they enter in a new device and this can lead to mistakes. For the same M/M combination we can have inconsistent grouping by type/subtype. A common example of this inconsistency that I have frequently seen in real practice is a defibrillator/monitor combination device. Most hospitals have several of these devices; some users will label it as a defibrillator and others will label it as a defibrillator/monitor.

Without a defined list of valid models

under each manufacturer, users have to type in the model designation each time new devices are added to inventory. Even after a device is in the CMMS, the model field can be changed at will. When multiple users are involved, choices and short cuts will lead to variations. Variations mean that the same actual model has been entered multiple different ways. As I have visited institutions utilizing a CMMS without an M/M structure, it is not hard to spot these variations even among devices that are fairly common (numerous) in the CMMS. An example for illustrative purposes is the LIFEPAK series of defibrillator/monitors manufactured by Physio-Control, Inc. The LIFEPAK designation is followed by an alphanumeric indicating the model within the series. For this illustration I will use the LIFEPAK 20. Users enter this model into their CMMS as "LP20", "LP-20", "LIFEPAK-20", "LIFEPACK 20", etc. Additional variations are possible if CMMS treats capital letters different from lower case letters (e.g. "LifePak 20" or "Lifepak 20"). An additional wrinkle (other manufacturers do this as well) is that the nameplate label has some of the model designation in the non-changeable portion of the label and some of the model designation in the changeable portion. In short, entering the manufacturer's model designation consistently is not a trivial task.

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If all devices of the same manufacturer/model were purchased at the same time and therefore entered into the database at the same time or entered by the same resource, there would not be an issue. The decision would be made once, replicated in the data import tool and entered consistently. The issue being discussed comes about when equipment is purchased at different times and locations; or when someone makes a change to one asset and change is not propagated to all of the same manufacturer/model.

Some CMMS manufacturers try to compensate for the lack of a M/M structure by allowing users to clone an existing device within the system; this needs to be done carefully in order not to clone information that is not relevant to the device (such as facility, department, etc.), which will create inconsistencies in the equipment file. In addition, since there were no restrictions when various devices within a CMMS without a M/M structure were created, the user may not have selected an ideal sample to clone.

Standardization—Scheduled Maintenance Procedures and Intervals

Most of the same issues raised previously with regard to data integrity apply also apply when considering SM procedures and intervals. I will not repeat all of those previously covered issues.

With strong M/M structure: The authorized user who creates the M/M combination in the CMMS makes the decision as to what SM procedure(s) are required (if any) and the appropriate interval(s). Those decisions are made once and associated with the M/M combination. Users entering new instances of the M/M combination don't have to make that decision.

Those CMMS systems that I am familiar with strong M/M structure, deviations from the M/M combination standard are allowed, but are clearly indicated as a deviation. The reason for allowing deviations is that there are some times when something different needs to be done in the procedure because of circumstances such as special notifications, or special interfaces that are different from the standard template defined for all members of the M/M combination. Because these deviations are clearly indicated, they can easily be reviewed to determine if the deviation should be added to the template.

Without M/M structure: When users are entering a new device, they must make a decision about SM procedure(s) and interval(s) each time. In my experience, when a CMMS does not utilize a M/M structure, the SM interval in particular is often open to judgment (including if any SM is warranted); unless the HTM group uses one rigidly uniform SM interval (e.g. annual SM for all devices).

Reports

When generating reports, the underlying integrity of the data used to generate the reports is critical. Without data integrity the report may be less than worthless; it may lead the reader to reach conclusions that do not reflect the current state. A very basic measure that affects many decisions is, "How many do we have of this type of device?". The count often refers to how many devices we have of a particular model. When attempting to identify devices by inventory affected by a manufacturer recall, an accurate list of all devices belonging to the M/M combination is essential.

- **With strong M/M structure:** Because of data being entered more consistently in the equipment file, reports based on type/subtype and/or M/M combinations will be far more likely to include all the equipment desired. Any reports used to look at or schedule SM associated with a type/subtype and/or M/M combinations will also more likely be consistent. Reports that are sorted by M/M and/or type/subtype will benefit the most from the data consistency associated with M/M structure.
- **Without M/M structure:** Whenever the same type of device is entered differently (not consistently) into the CMMS, all efforts to sort on these fields and generate subtotal counts based on these fields will not be accurate. For example, if some devices of one M/M combination are entered as "defibrillator" and some are entered as "defibrillator/monitor"; and the report is generated to count the number of "defibrillator/monitor", all those categorized as "defibrillator" will be missed.

When using a a CMMS without a strong M/M structure, users will need to scan the report generated to merge the duplicate entries and correct the mistakes on the report.

Attachments to the M/M File

HTM should be able to use their CMMS as an internal library for service manuals and other reference material. It should allow users to attach service manuals to the M/M file one time and have those attachments be accessible to any equipment record or work order record associated with that M/M combination.

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CMMS programs without an M/M structure often allow service manuals to be attached, but the same manual (or hyperlink to the manual) must be attached to every individual equipment record. If dealing with a M/M combination with many devices, that association can be very tedious and difficult.

Service Contracts

Many HTM groups use a whole range of service contract options depending on what is most advantageous. I have seen several CMMS programs that allow users to list service contracts with basic information (vendor, start date, end date, cost to purchase). In addition, look for the ability to do the following:

1. Detailed description of contract scope and terms. For example, is the SM covered?
2. Associate individual devices with the contract. From contract file, see list of all devices on contract.
3. Attach actual copy of contract.
4. When unscheduled work order is opened on asset under contract, display a prominent message that there is a service contract. Ability to assign to vendor as part of contract
5. Look up contract details directly from any device under contract or any open work order associated with those devices.
6. From contract file, see list of all work orders performed under contract.
7. Able to query CMMS to know how much actual work (hours, work orders, parts) has been done by vendor as part of contract.
8. Send an e-mail when the contract expires to the resource assigned to the contract

Information Technology

Equipment tracked by HTM is increasingly overlapping with the information technology (IT) world. The linkage with the IT world will only increase. Many CMMS programs haven't included these features. Look for the following features:

1. Ability to track the device's network information, including MAC address, IP address, network closet or switch device tied to. Able to track Operating System (OS), software version of device and OS, passwords (only available to qualified users).
2. Ability to show what other devices are connected via network. May be a "system" designation within CMMS.
3. Ability to query system for a particular MAC or IP address and locate the device.
4. Assess whether the equipment stores patient data. This information is needed for HIPAA.

HTM groups have different needs than other industries in their CMMS due to the variety of models and types of devices they need to manage. HTM groups need to select and insist on a CMMS that incorporates a strong M/M structure. If this is no longer possible, they can assign an admin who does all the data entries in the CMMS to prevent having incorrect information ■

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