VERMONT'S "OFF-THE-SHELF" EQUIPMENT MANAGEMENT SYSTEM

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BACKGROUND

In the late 1970's the Vermont Agency of Transportation (VAOT) decided to build a computerized equipment management system. A number of staff personnel attended the "Equipment Management System Training Course" offered by the Federal Highway Administration. The course material served as the base reference document from which the system would be developed. The system was to provide decision-making information not readily available in the existing manual system as well as automate the accounting system under which the internal service fund operated.

Inventory management was first addressed with a purchased inventory system installed on the mainframe. From this, work was initiated both on a repair order system and the accounting system as well as a number of changes to the purchased inventory software, some of which were major. The garage operation was low on the totem pole for system analyst and programmer time so the project went very slowly.

In the mid 1980's, portable computers (PCs) arrived making it possible to automate some of the functions at the Garage using Garage staff to do the programming. This helped in a number of areas but also added to the problem in the mainframe development of maintaining and updating multiple files and records. Basically there was very little interfacing within the systems without a lot of manual intervention.

By the late 1980's, the mainframe programming work was getting to be very costly and slow because the new work was impacting on the earlier programs. The programmers that had done the earlier work had moved to new positions and very few people were left that knew anything about the system. Essentially at this point emphasis was shifted to fix and maintain the mainframe and not add anything new.

We started to investigate what was available for software for equipment management systems through the private sector as well as looking at what some of the other states had. The decision had been made that no more would be spent to try to finish our system. Around 1990, I was informed that the Agency had awarded a contract for a new agency accounting system and that it had a fleet management system in it. It did have accounting elements but our partial equipment management system actually was better than what was to be provided in the new accounting system. Based on what we already knew was available from the private sector and the costs of these systems it was decided not to modify the new accounting system. In 1992, we were given the green light to develop a Request for Proposals (RFP) for an equipment management system.

COMMERCIAL SYSTEMS

In the early 1990's, we found that there were 25-30 different equipment management systems on the market. These ranged from small PC systems with limited capabilities to large mainframe systems with almost unlimited capabilities. There were a variety of programming languages and you could find one for almost any operating system. The price range was from less than $25,000 to about $500,000. All less than what we had spent trying to develop a system in house.

All of them contained some type of inventory management system and a repair order system with preventive maintenance scheduling. The comprehensive systems provided capabilities to track and compare makes, model, and year of vehicles against each other; identify recurring repair problems; perform replacement analysis; oil analysis; motor pool dispatch; warranty claims submittal and management; tire management; fuel management: accident reporting and more. Almost any feature you could want you could find a system which had it.

It was difficult to find a user that was not happy with the system that they had purchased. Some wished they had purchased one or two of the optional features available for the system they had, but had no regrets that they purchased the system. One interesting thing we found was that very few users use the total system they purchased. Most purchased the system to eliminate a particular problem and that's how they used it. Each system has its strong points and that was what the user was interested in when they purchased the system. Every system also had some weak points. Replacement analysis seems to be a common one. Although every user indicated that they were pleased with the support the

vendor provided after installation, it was clear that not everyone took advantage of their services or felt they could have been better. Others clearly had an outstanding working relationship with their software vendor.

REQUEST FOR PROPOSAL

A six-member committee was set up to develop a RFP for the purchase of Equipment Management System software and to evaluate the proposals. The committee consisted of:

- Maintenance Engineer (Supervisor of the Districts);
- Garage Superintendent (Statewide Fleet Manager);
- Shop Maintenance Chief (Statewide Equipment Maintenance);
- Storekeeper (First Line User);
- Systems Analyst (Computer Systems); and
- Chief of Financial Services (Accounting).

The intent was to provide a cross section of users and affected parties. This was to ensure that all the needs were met and the desires addressed. The committee worked with literature that had been collected on commercial systems; the RFP developed by the State of Maine for a Fleet Management System; and the good and bad points of our current system. From that a list of "must have" items and features was developed along with a list of "would like" items. This resulted in a thirteen-page list of items included as part of the RFP on which the bidders were required to respond: a) currently in system; b) will be included; or c) can not be provided.

Some of the key features we wanted are:

- On line data entry and update. We were after real time information.
- The ability to combine units yet track their maintenance histories and costs separately. For example an aerial lift truck would be made up of the truck chassis and the aerial lift unit.
- Multiple closing of repair orders. Initial closing when work was completed and final closing when the work and parts used were approved.
- Trouble tickets and warranty alerts appear on the screen when the repair order is opened.
- Use the American Trucking Association's (ATA's) system, reason and work accomplished codes. We did not want to develop our own coding structure and ATA has the most complete system we are aware of. Plus it would be a system common to most other users.

- Automatic preventive maintenance scheduling with the ability to select by unit schedules based on: fixed dates, usage, or fuel consumption.
- Both labor and parts to use bar coding for data entry. Wanted to reduce or eliminate the manual data entry.
- So called paperless shop. With the bar code data entry and "real time on-line update" it is possible to have the paperless shop. However in actual practice you will find that a lot of paper will still be generated. Auditors still want hard copy documentation and the technicians want written instructions.
- Automatic reorder of parts based on usage and the ability to adjust to seasonal demands.
- The ability to take partial physical inventories. We do not want to shut the shop down to take complete inventories.
- The ability to track indirect costs and ensure they are covered in the shop flat labor rate.
- A tool control system to control issues and returns to the tool room, depreciate capitalized tools, and provide a maintenance and cost history.
- An accident reporting system to track type of accidents, costs, and the operators involved.
- A replacement analysis system based on maintenance histories, projected costs and usage.
- A warranty claims submittal system to retrieve data from the repair order system, to support and track warranty claims, and credit the units on receipt.
- Multiple security levels with an audit trail to document who did what.
- An "Ad Hoc" report writer system for preparing custom reports.
- A whole list of interfaces to and from the Agency accounting system.

The RFP was sent to 10-12 companies of which four responded. The committee quickly discarded two of the proposals, as they fell short in too many areas. The other two could provide almost everything we wanted and their ratings, done individually by the committee members, were very close. Both were brought in to do presentations and answer questions. These sessions were video taped. The presenters were told that they were being taped and any promises made during the presentation would be included in the contract if they were the successful vendor. The tapes also were intended for referral by the committee during the selection process.

In the first round of evaluations, prior to the presentations, the system finally selected was rated number two. After the presentations it was the unanimous choice. In late June 1993 the contract was issued with a November

1 implementation date to bring the Central Garage location on line.

IMPLEMENTATION

The primary implementation team consisted of the Shop Chief, Field Maintenance Supervisor, Office Manager, and Garage Superintendent. We had to learn the system and develop a good understanding of it before we could start the implementation. Training sessions were scheduled along with bringing in a programmer for the interfaces and utility programs to convert our existing files. We found out very quickly the reason this commercial software, and I suspect most others, works so well for such a wide range of users is the built in flexibility in how you operate the system. You have a lot of options. The training was done in three to five day sessions starting with an overview followed by the control module and then the operating modules.

The biggest problem we faced was the temptation to modify the system to make everything the same as we were used to. Some differences were just in terminology such as repair order instead of work order. Others meant a small change in our procedures or that we didn't know how to make the system do what we wanted. The only changes we did make were for the interfaces. Most of the other changes we thought we needed were resolved by the vendor showing us how to make the system do what we wanted. The reason we resisted modifying the system is that the State commonly buys software and modifies it at high cost then has problems making it work. In the end, we made the right choice. The system works very well and the changes we had to make to our procedures to use it had no negative impacts and in some cases turned out as an improvement.

The Central Garage location did go on line November 1st as scheduled with the 13 field locations brought on line by May 1994. The vendor trained the Central Garage personnel and trained the trainers who trained the field personnel and brought those sites on line.

ON GOING SUPPORT

One advantage to a commercial system is the dedicated on going support after installation. This will vary from vendor to vendor and should be a key item in the evaluation and selection process. Some items to look for in continuing support are:

- *Troubleshooting*: Because the systems are flexible you will probably run into situations where you try a new transaction and it doesn't work the way you thought it would. The vendor, with on line access, can see what you did and tell you how to do it correctly. At times production will crash and they can walk you though the restore and rerun.
- *Training*: In our case, we have had to bring the vendor back in a number of times to train the computer production personnel because of rapid turn over of people in that area.
- *User Group*: The user groups bring a wide variety of ideas for changes and improvements to the system. They push the vendor to keep the system up with current technology. Most system improvements will come through this group. Maintenance agreements, paid by all, cover the cost of most, if not all, of these improvements. Look for a system with an active user group and a responsive vendor.
- *System Updates and New Releases*: The system should be updated at least annually with minor improvements and every few years have a new release with some major improvements.
- *Interfaces*: In most cases, if you have the vendor write your interfaces the vendor is responsible to ensure that the interfaces work in the updates and new releases. Some users do not install the updates or new releases because of the cost to themselves to modify the interfaces or modifications that they made. Let the vendor do the interfaces and any needed modifications. It is a one time cost and may be less costly than in-house work because of their knowledge of the system. It should not affect what you would pay for the on-going maintenance agreement.

SUMMARY

Commercial systems are readily available in a wide range of capabilities and cost. All are less costly to acquire and install than building one from scratch. Most are flexible in how they operate to meet the needs of a variety of users. With a cross section of users the vendor receives a broad range of input from which to constantly update the system. Those looking for a new system should look into the commercial systems before trying to build one.