

Developing a Statewide CAMA System in Vermont—A Case Study

BY JAN SCHREIBER, PH.D.

The state of Vermont has 262 towns, most of them small. Although larger and wealthier towns have full-time assessors, smaller towns often employ part-time listers, who are charged with keeping parcel inventories up to date and certifying a “grand list” itemizing all properties in the jurisdiction, along with their taxable values. Over the past two decades the Vermont Department of Taxes Division of Property Valuation and Review (PVR) has assisted towns in acquiring computer capabilities to aid them in this process. But with the rapid pace of technological change, it was evident by the mid-nineties that many towns were laboring with awkward and obsolescent computer systems or even

paper-based appraisal processes.

Among the consequences affecting both the towns and the state were inequitable taxation and excessive appraisal costs. These problems in turn raised the unwelcome possibility that state highway and education funding might be withheld from certain communities. Furthermore, Vermont’s proposed Education Reform Act (later signed into law as Act 60) called for the redistribution of resources, with wealthier communities remitting some tax revenues, which the state passed on to less affluent communities to support school systems. The bill called for properties to be appraised at 100 percent of market value, and proposed that the accuracy of appraisals be

Jan founded MicroSolve in 1987 and has served as President and CEO ever since. While a research scientist at the Lincoln Institute of Land Policy in Cambridge, he developed numerous modules of the software that became MicroSolve and taught mass appraisal techniques to assessors and appraisers. At MicroSolve he has trained assessors all over the world in the use of the software and has supervised development of advanced capabilities in appraisal, sketching, photo imaging, and document management. His publications in the Assessment Journal and other periodicals cover topics in valuation, imaging, and assessment administration. He has directed major projects involving software development, customization and installation, data collection, and staff training, and he continues to supervise an aggressive and innovative R&D program at MicroSolve.

The statements made or views expressed by authors in Assessment Journal do not necessarily represent a policy position of the International Association of Assessing Officers.

maintained at specific standards. It was clear that serious efforts would have to be made to ensure that the towns could meet those standards.

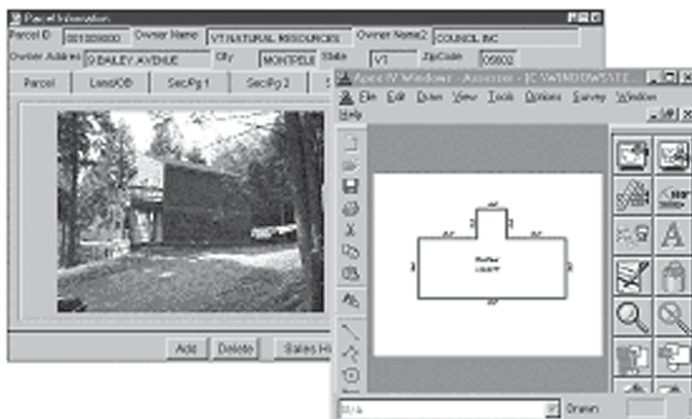
After researching the current state of the art among computer assisted mass appraisal systems, officials at PVR concluded that it would be necessary to replace the existing legacy appraisal systems. A new computer solution, they determined, would have to incorporate a proven, standardized process for property valuation and be capable of meeting the current and future needs of the state. Beyond that, the solution needed to be user friendly and capable of operating in both larger centers and small, remote towns. Finally, it should communicate with Vermont's tax roll, or "grand list," software application, which was provided by the New England Municipal Resource Center (NEMRC). In 1995 PVR drafted a procurement document stressing these objectives.

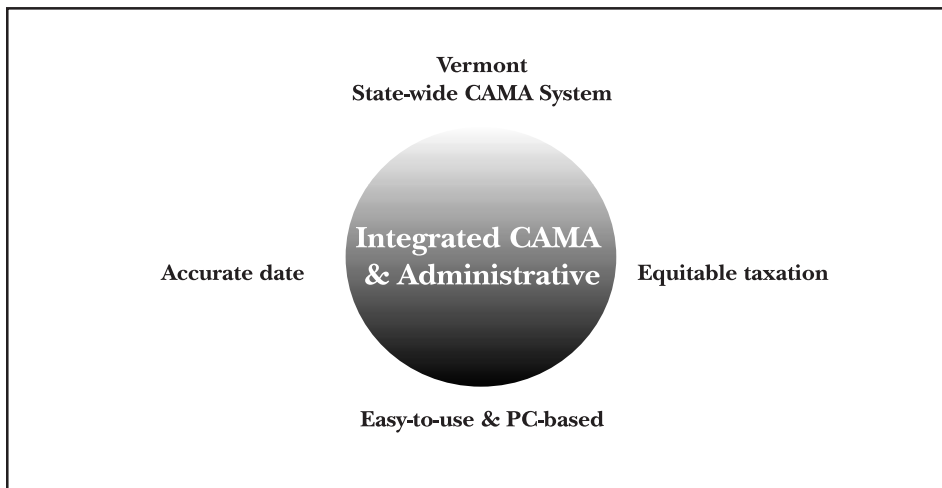
At the time the request for proposals was issued, MicroSolve Corporation, based in Waltham, Massachusetts, was, like many other mass appraisal companies, in the early stages of developing a Windows-based mass appraisal program with a graphical user interface, able to take advantage of modern database technology and the more rapid processing speeds of the new generation of Intel chips. The lack of a fully developed package was not altogether a disadvantage,

since it enabled the developers to incorporate a number of Vermont's requirements into the system architecture as they proceeded.

As it prepared a response to the RFP, MicroSolve initiated a dialogue with NEMRC to explore possibilities for a collaborative effort. It was felt that an integrated mass appraisal and administrative/accounting system would serve the needs of Vermont listers, and ultimately have more appeal to the state, than an independent program, however capable (Schreiber 2002). The integration issues were complicated, however, because most MicroSolve users were still running the older DOS-based CAMA system, while the newer software being developed still lacked a number of important features. NEMRC, on the other hand, had much of its software written in an early form of FoxPro that lacked many of the graphic capabilities now considered standard. Both companies, therefore, had to offer widely used but obsolescent versions of their products for immediate installation, with a promise that modern releases were on the way.

On the other hand, because both companies were built around a single product (CAMA and municipal accounting, respectively), without layers of bureaucracy between decision makers and technicians, they were able to develop a prototype integration mechanism before their joint proposal was submitted. Called upon to show the





systems in operation after the first stage of proposal evaluation, they demonstrated how parcel-identifying data entered in the NEMRC program flowed directly to the CAMA database and, reciprocally, how values produced by the CAMA program were promptly written back to the NEMRC files.

These practical considerations, together with the willingness of the principals to work closely with PVR in implementing Vermont-specific standards and requirements, convinced Vermont's decision makers to award a joint contract to the two companies.

LAUNCHING THE PROJECT

From the start, the state's Information Technology Division provided PVR with a systems analyst with appraisal expertise, who became the project leader with responsibility for training and ongoing support. This decision proved invaluable. Communications between the towns and the state's Tax Department improved, as did associated assessment business processes. To supplement the analyst's expertise and ensure input from practitioners active in mass appraisal, a CAMA committee was formed. Its members included local assessors and listers, heads of appraisal firms that regularly assisted towns in reappraisals, and some of the Tax Department's district advisors whose responsibilities included

assisting listers in the production of a grand list.

A major responsibility of the CAMA committee was to establish unified appraisal standards that could be applied by the software, particularly in database design and in the details of the cost approach. What categories of energy adjustment would be recorded, for example, or what thicknesses of basement walls? How should finished basements be priced? Porch ceilings? Apartments over garages? Even though there was consensus on continuing to use Marshall & Swift cost data, problems remained. Outbuildings, even on residential properties, are priced from the Marshall Valuation Service commercial manual. Not every building class and quality level is represented in those tables, and as a result users must supply their own figures for certain property classes and quality levels. One task of the CAMA committee was thus to approve supplementary cost figures in certain cases.

Because many towns wished to move at once to a more efficient CAMA system, PVR installed MicroSolve's DOS-based legacy program while the newer Windows-based program was being finalized. Towns were assured that their data would be converted without cost to the new software when they acquired it. Thus for three or four transitional years, two software packages

were in use in Vermont, with the new one gradually overtaking and replacing the old.

The tasks of program modification and adjustment were made somewhat easier by the software design. Instead of being hard-coded throughout, with a cost approach that operates only as originally configured, the CAMA 2000 software is equipped with a built-in user programming environment in which the cost approach can be modified or even radically changed without affecting the underlying source code. Similarly, report formats can be adjusted to suit local needs and conditions. Because of these features, the cost calculator underwent almost continual modification during the first two years the system was deployed.

During the same period a handful of towns stepped forward to act as beta sites for the developing software. This was not always a gratifying role, since the software still contained bugs and in some areas lacked important or even essential features. However, the towns' participation accelerated and focused the development, particularly in cases where a revaluation had to be completed by a deadline. The achievement of a certifiable grand list in such cases was a cause for celebration and relief. Around this time a state-commissioned study of equalization procedures gave added impetus to the drive for improved valuation software at the local level (Almy, Gloudemans, Jacobs & Denne, 1999).

With program changes occurring rapidly, version control became a critical matter. Both the underlying software and the higher-level cost approach instructions were undergoing modification, and it occasionally happened that new changes were applied to an older version, resulting in the appearance of a regression in function. These problems were solved by implementing a rigorous process of registering changes and maintaining "release versions" of the software in multiple backup copies.

The robust software that emerged from the development process is based on a flexible relational database suitable for small, medium-sized, and large jurisdictions. It operates in a network or stand-alone environment, integrating the sophisticated Apex sketching program and the SPSS statistical capability. Users can easily attach digital photos to the parcel record and print them out (along with sketches) on a property record card that can be configured to local requirements. A user-accessible data dictionary allows the database to be modified to suit individual needs (though for Vermont users PRV requires a basic standard set of fields). The commercial cost approach uses the Marshall & Swift Commercial Estimator as a "black box," allowing quarterly rate updates from CDs. Any income approach that can be implemented on a spreadsheet can be connected with the database and run on any records the user chooses. There are effectively no size limitations on either the database or the number of fields that can be accommodated. The software allows nuanced adjustments of the weights used to search out comparable properties. It makes multiple regression easy to operate. And it facilitates rapid execution of sales ratio studies to measure appraisal equity (Schreiber 2003).

THE PROJECT MATURES

As time went on and the "bug list" grew shorter, more towns became interested in acquiring the software. Working with limited staff resources, PVR prioritized these candidates, giving preference to those towns facing revaluations within the next year. The arrangement was that PVR itself would convert existing data to the new format, perform the on-site installation, and act as the first responder to any software or data problems encountered by local listers, while MicroSolve served as a technical backup and the "fixer" of last resort.

It soon became evident that the PVR project leader (who also had administrative duties in the department) could not singlehandedly cope with all these tasks without extending the towns' wait for service over an unacceptably long period. Recognizing this, PVR allocated additional personnel who could be trained in the basic procedures of software implementation and support. The project leader retained overall responsibility, but increasingly the basic mechanical services could be provided by a small cadre of well trained staff.

MicroSolve, for its part, continued its policy of responding to all software or data problems as soon as they were reported. Even though conditions in the town offices varied widely—with a variety of network environments, many obsolescent standalone computers, a bewildering array of printers connected in ways that sometimes defied explanation, and local expertise ranging from power user to computerphobe—the great majority of such problems were resolved the same day they were reported.

By maintaining control over the version of the cost approach distributed to the towns as well as the cost tables affecting both building and land values, and by serving as the gatekeeper for access to the software itself, which it put through a rigorous testing procedure before each release, PVR was able to maintain uniformity and consistency among the towns that chose to acquire the CAMA 2000 mass appraisal system.

Meanwhile the two companies holding the contract with PVR—MicroSolve and NEMRC—created a more sophisticated link between the new versions of their programs. Each produced transaction files that the other program automatically checked. Updates of the identifying information received by CAMA from the administrative program occurred whenever a user launched the CAMA program from

NEMRC. Updates of the NEMRC taxable value occurred whenever the user placed values in appropriate fields in the CAMA program and then moved back to NEMRC. Tools in NEMRC facilitated reconciliation of the two databases, to ensure that taxable totals on each side matched.

Additional features were developed to aid the independent appraisal companies who often did mass appraisal on contract for the towns. MicroSolve added the ability to create a sales file with the same structure as the primary file and stock it with only sold properties, either on a mass basis or as each sale was recorded. This file could be accessed separately and used to select comparable sales or perform multiple regression analysis. To aid in data collection and updating, the developers created the "check-out/check-in" feature. This allowed users to download selected portions of a database to individual laptops, which could be taken into the field and used to update the records on site. Meanwhile, the records in the main-office database were designated as "checked out" and could not be updated. When the field laptop was returned to the office, its data could be read back into the main database, and the records, now officially "checked in," could be further updated or analyzed as needed.

In addition to installing new copies of the software in the towns, PVR staff conducted training at key points around the state, maintaining a basic level of familiarity among listers with the software and the elements of valuation. MicroSolve, for its part, trained PVR personnel in database design and in more advanced features of the system, such as data conversion, market valuation techniques, and the income approach. The company also provided one-on-one instruction to the private appraisal companies that serviced the towns, emphasizing techniques that could improve the efficiency of data collection and valuation.

CONCLUSIONS AND RECOMMENDATIONS

By the middle of 2003, more than 160 of Vermont's 262 towns had acquired and were actively using the software. Even though PVR had never required the towns to purchase the "official" CAMA system, and in spite of active marketing efforts by competing companies, towns by and large opted for the stability, uniformity, and reliability associated with the CAMA 2000 product. The Department of Taxes continues to conduct training for increasing numbers of listers throughout the state.

A review of the lengthy implementation process leads to a series of recommendations, some of which could shorten the cycle for other states or large cities facing a similar challenge.

1. Anticipate a long phase-in.

Particularly if you intend to customize the software to meet specific needs or functional criteria, you must recognize that no initial specifications can be sufficiently detailed to prevent ambiguity and the need for extensive testing and revision. Soliciting input from the major user groups will help ensure acceptance and ultimate utility of the software. Do not plan on using the software in next year's revaluation if it is not yet fully developed and tested. Seek test sites that are in the midst of data maintenance and have intermittent need to calculate values on individual properties but are not facing urgent deadlines.

2. Designate a capable facilitator.

It is an axiom of technology transfer that every technical innovation needs a champion – someone who can respond knowledgeably to user problems and see past immediate obstacles to the potential long-term benefits. The facilitator needs considerable technical skill, a thorough understanding of the application and the appraisal techniques to which it is being applied, and the en-

ergy, tact, and perseverance to respond to user needs as they arise. Ideally there would be two or more such persons in the early stages of an implementation project, but most government agencies are fortunate if they can enlist one.

3. Keep good records.

In a fast-paced development project it is surprisingly easy to lose track of software releases (which versions have which features), the status of bug fixes and enhancements, and who among the test sites has what version. Both the developer and the sponsoring agency should keep these records, and they should frequently compare notes to ensure agreement. Along with these electronic and paper records, there must be archives of the software source code and executable programs, reflecting both the current release and those that preceded it. It is sometimes necessary to backtrack, because of unexpected side effects in a current release. In that case users may be relieved to return to a more reliable albeit less capable version.

4. Provide adequate end-user support.

As installations proliferate, so do user questions and problems. This will happen even when the software is robust and well made. CAMA programs are complex and multi-faceted. Relatively few users understand all aspects of them. Further, many appraisers are not highly intuitive computer users. They may have only a hazy idea how the files that make up the database are laid out or where the photographs tied in with the data records are stored. A central agency that intends to support all the users in the field must make an early and broadly accurate estimate of the level of demand, both for training and for ongoing technical assistance. If current staff levels are insufficient to handle demand, there may have to be a reallocation of responsibilities in the agency, new hires (which rarely can be done without long-range

planning and budget requisitions), or reliance on outside contract personnel. The software developer is the most obvious source of the needed expertise, but the developer too will need some advance warning, and the cost implications of these alternatives will require careful study.

5. Plan for the long haul.

Even though software development is a never-ending process, a time comes in the course of a project when innovation is superseded by institutionalization. At that point the pace of change becomes more moderate. Existing users are generally familiar with the program and its capabilities, and new users know what to expect in terms of both features and reliability. The role of the facilitator may become more supervisory, as junior staff take on standardized roles of installation, training, and support. This is a time when long-term development goals should be reconsidered. How should the CAMA system be linked to other software (geographic information system, administration and accounting, Internet display and operation)? How should current technical innovations (handheld data collectors, wireless transmission capabilities) be incorporated? Is the original developer capable of acting as a systems integrator, or do you need to seek other resources? It is unwise for senior administrators to assume that little thought is required by a project once it is running smoothly. This may be exactly the right moment to take the decisive next step.

REFERENCES

- Almy, Gloudemans, Jacobs, and Denne (1999). "Study of equalization procedures." Prepared for the Vermont Department of Taxes, Property Valuation and Review Division.
- Schreiber, J. (2002). "CAMA: What the small appraisal office needs." *Newsletter: The Delaware Assessor*. (Available at www.delawareassessor.org.)
- Schreiber, J. (2002). "Overview of appraisal theory and technique." Paper delivered at the National Technical University of Athens. (Available at www.microsolvecama.com.)