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Policy & Planning Division

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VERMONT'S GIS, FOUR YEARS LATER LESSONS LEARNED

This paper takes a critical look at the lessons learned and techniques that worked in building Vermont's geographic information system. The lessons summarized will include: introducing GIS into small municipalities; confronting public access issues straight on; developing and adopting standards; coming to grips with quality assurance issues; data sharing complexities; data development realities; providing outreach and education; and many institutional lessons. These lessons should offer many valuable insights into establishing a multi-participant GIS.

BACKGROUND & PURPOSE

In 1988, Vermont enacted a wide-ranging Growth Management law known as Act 200. The law directed the Governor to develop a statewide, intergovernmental Geographic information system. The law anticipated the need for stable, five year funding of \$4.75 million to develop this system.

This paper draws upon the author's experiences starting with drafting the proposed legislation to his four years of development and implementation efforts. The lessons pulled from this experience should provide any entity just beginning a multi-participant GIS with some guidelines on how to prepare for that implementation. The lessons are also valuable for anyone who has been through similar experiences. There are not many experiences as broadly based as the GIS implementation in Vermont.

Vermont has now spent four years developing the nation's first statewide, intergovernmental GIS. Vermont has proven that the idea is a good one. Success requires more than achieving objectives. Success requires careful negotiation of many curves and financial underwriting helps. Success for Vermont is having all communities prepared for the future through the assistance of GIS technology.

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LESSONS

Planning for implementation

The primary lesson based on Vermont's experience is that it is critical to know where you want to go before you set off on the journey. Vermont spent nearly a year planning for implementation. This start was indeed wise. After four years the direction set by the three volume planning study prepared for Vermont by a national consultant has helped in many ways.

With legislative intent provided in statute to create the nation's first statewide, intergovernmental GIS, we focused initial efforts on creating a participation process. This task fell to a twenty-one member Policy Oversight Committee. At the Governor's request, the Secretary of Administration assembled the body with a broad spectrum of users, policy makers, and managers.

Group directive and associated dynamics. The secretary charged the Oversight Committee to steer the initial efforts at organizing and designing the system. The idea was a sound one. Building consensus with a large body is difficult and often causes logistical problems. An eleven or thirteen member group is the ideal size for this type of committee. A smaller group would have streamlined many discussions with the same outcome. The mixed level of a member's position did not enhance the effort. Such a committee should be made up of peers to minimize frustration between big picture executives and sometimes nit-picking, staff level bureaucrats.

Needs analysis. The first step for developing a sound GIS planning effort is to conduct a GIS needs analysis. This is the essential document for sorting the chaff from the seed. Not only does it serve as the key device for setting system development priorities, but also it is the first learning experience for the uninitiated in the ways of GIS. Keep it simple and give it back to the contributing sources. Refine, revisit, and update your needs on a two year cycle. This part of GIS planning is essential to "corporate" buy-in. Without a needs analysis, GIS development efforts can easily derail implementation efforts.

Organizational location. Location, location, location! A multi-jurisdictional GIS needs a "power" location. Pecking order is important in most organizations -- state government is no exception. Assessing this decision could require a book, not a paragraph. The three best alternatives were: the Governor's Planning Office; the Secretary of Administration's Office (this is the chief cabinet officer in Vermont); or an outside of government body. The decision for creating an Office of Geographic Information Services in the Secretary of Administration's office seemed at the time to have made the most sense. Make sure you're located in a champion's office.

One drawback of visibility is that it also gave GIS a profile too visible for the few tangible products it could deliver in the short term period. It also ruffled the feathers of the Agency's various commissioners who felt uncomfortable at the new player at

their table. Expectations were high. The strong support of the Secretary did not appear. He delegated the entire manager and oversight function to his deputy. This second tier delegation immediately reduced the function in many a "career" bureaucrats mind.

Executive Orders. Setting up a GIS organization by an executive mandate brings with it several drawbacks. Legislative egos get bruised easily. A clear path for legislative creation of an organizational home is crucial. Second, never include language on self-sufficiency or charging for data without a legislative mandate. Better to carry out a study on those elements that are clearly or unclearly in the realm of the legislative body.

Advisory boards. The VGIS executive order contained a provision for the creation of a fifteen person VGIS Advisory Board charged with providing a policy advisory role. Be sure to create a GIS advisory body with a detailed set of charges and responsibilities. This body would play a key policy and advisory role in guiding the new system. Although the purpose of the group was noble.

Again, non peer-to-peer relationships skewed the level of discussion. Fifteen is an unmanageable size. Cabinet level members delegated their membership to a line staff person usually. This undermined the tone and demeanor of many meetings. Given this setting, it was extraordinary that the board did provide the office and the system a much needed imprimatur role. Delegating a board or committee member's seat (vote) should not be allowed. If the need arises, reconstitute the advisory board. Establish as many technical subcommittees as needed to handle the many specialized issues that arise.

Introduction of technology into small communities

More than half Vermont's two hundred and fifty-five communities have populations under fifteen hundred people. Volunteers are responsible for town planning in these towns. GIS technology was new to most of these communities. Pilot projects are excellent ways to educate more people. After four years, over half of Vermont's communities have used this technology to help them plan. Plant many seeds, care, feed, and water and many uses of GIS in communities will blossom.

Training community volunteers. In designing community training workshops, stick to a three to four hour introduction to GIS program. This amount of time is about all a community volunteer can handle. Don't make it free--charge a modest fee for materials. After three years of operation, one energetic GIS specialist has reached every town in his region and several others. He has developed base data layers with more than half his towns. His pitch, "get in line soon or I will not be able to get to do your work this year."

Developing data and ownership. With proper instruction, community volunteers can trace more information on mylar overlays onto orthophotographs than thousands of

dollars can buy. Their photo-interpretation skills may not be "expert", but they sure know where things are located and what they are. These community volunteers provide the best quality control possible. A beneficial by-product in this approach is pride of data ownership.

Seeing is believing. Your turn-around time for creating products may be slowed by using community volunteers. However, you will witness happy customers. The smiles on their faces when products are delivered are all the satisfaction you need to see. A 36" by 48" map illustrating land use drawn over property boundaries brings smiles over their faces--as very satisfied customers. Education by doing is much better than listening to boring lectures. They also don't see GIS as so much magic. This approach also the magic element so often surrounding GIS technology.

What do you do for an encore. Now that community volunteers are committed and elected local leaders are believers, it is not difficult to convince them of what else can be done. The second use of GIS technology is usually more sophisticated. A small town must need a reason to use the advanced capabilities of GIS. Communities now know what can be done. They are more willing to try it for further expanding their knowledge. Money and need are the driving factors for further utilization.

Public access

The development of a public access and data distribution policy was a key area of effort. The advisory board spent months of deliberation and study. This effort paid off in a broadly accepted policy. Update your public record statute to specifically deal with electronic records and GIS data. No policy, no matter how good, can prevent problems. It only takes one unhappy camper to spoil the party. One lawsuit can sidetrack and sap many staff resources. Legislative authority clarifying charges and distribution policy can save many hours of court time. Staff resources can be put to constructive uses.

In addition to the policy aspect of public access there is the more important issue of public access to the technology. By working with your library network, the public can be in a position of actually seeing the results of sophisticated analysis. Equally important is to provide the means at multiple locations where all citizens can benefit from seeing the images and information behind computerized data.

Media

Newspaper publicity is a two edged sword. Be careful of stepping on toes and remember to avoid quotations that will haunt you for years to come. One bad news story never goes away. Never refute the original negative story yourself. To counter the impact of negativism find two positive projects for exoneration.

Computerized information sources frighten newspaper editors and publishers. The unknown "electronic future" threatens their future existence. Work with them. Show

them how using GIS themselves can provide more reader understanding of complex topics. Presentations at annual press association meetings are very valuable. The system benefits by including members of the media on committees.

Standards development and adoption

Process. The *VGIS Handbook* contains policies, standards, guidelines and procedures. This one volume subscription document has leveled the GIS playing field in Vermont. Many hours of effort have resulted in a model for replication in other states. Borrow or steal (with permission of course) your neighbors standards and procedures. There is no need to reinvent the wheel.

Improve and share back with the originators. Assign topical committees to review draft proposals. Do not wait for a committee to draft documents. Get the fundamental standards adopted early--digital data conversion, data documentation, and quality control practices are essential standards for any shared system.

Results. The *VGIS Handbook* has been a success. Most users and developers of data in the VGIS are thankful to have this "control" device. Users often provide valuable feedback. Regularly update standards to respond to user concerns and problems. It also turns out to be a simple task. By far, the VGIS' "Data Documentation" standard has proved its worth. We have created a user-friendly data documentation program called, *GIS DOC*. As a result, data users and developers are more likely to spend the two hours to document the work they have invested their sweat equity. Data users now know what they are getting and using.

Statewide data development

VGIS has contracted for much of its statewide, base data layer development. This includes the SCS' progressive soils maps, surface waters, municipal property maps and a statewide road, railroad, and transmission corridor centerline coverages. Each of these efforts has resulted in many lessons. Vermont adopted the 1:5,000 scale as the base for data development whenever possible.

Contracting and the RFP process. The more time spent in developing the data specifications the happier everyone will be with the results. For each contract effort undertaken you can expect at least one surprise. Contractors are not perfect (of course neither were we!). Treat them as supporting partners in your GIS production. This view of contractors is essential. Their importance to your ability to deliver the goods cannot be undervalued. Invest in them and most likely they will invest in you. Vermont has now a proud, home-grown GIS consultant industry. Building this capacity makes good local economic development sense.

Do not be afraid to amend work specifications when problems arise. Encourage your contractor to help you work through a difficult issue. Two heads are much better than one. Every time I have tried to use someone else's RFP as a model, it gets

rewritten. It's a GIS law of nature. We always seem to find another idea that would make project better.

Set realistic time schedules. Do forget that you have to approve the work before okaying payment. Invoices are usually due within thirty days--a large one time data delivery can blow any thirty day review time. Always act in good faith with your contractor. Criticism should be kept at the technical level. Do not let your anger get the better of your dialogue, unless you clearly want to end a contract. Ending a contract that is nearly two-thirds complete is a terrible choice to have to make.

Beware of low bids. Contractors are cut-throat. If your proposals come in differing by a price factor greater than two be leery. Your specifications may have been vague or your contractor is so desperate to get your work that they low ball the price. That is fine when the project is well understood and the methods are standard. Any deviation from the norm will spell contractor trouble and cost overruns may mean no delivery. Once a contractor starts losing more money than they are receiving for the project both parties are in danger.

Quality assurance and quality control. Experience-to-date suggests that you can expect to spend an average of twenty percent of the cost of a contract on quality control and acceptance. This figure rises when you add in the time necessary to correct known errors. The QA/QC plan should be written while your organization executes the contract. When scoring proposals, pay close attention to the contractor's internal quality control effort. Ask the contractor for specific examples of how they do conduct quality control. We witnessed a dramatic drop in errors in the middle of a project when the contractor changed their existing practice of scrubbing the source documents. The method not only reduced errors, but also sped up the project.

Data sharing

The Vermont legislature established the VGIS to make sure that data developed in Vermont be shareable and useable. Given this legislative mandate has been fundamental to selling GIS ideas. Simple as this mandate is, government departments have tended to keep their data inside. This widely held practice is slowly disintegrating in Vermont. GIS technology has changed the institutional nature of how persons in organizations think and act. This radical change is now affecting how organizations themselves think and act.

VGIS Data Catalog. One our most valuable assets is our *VGIS Data Catalog*. Providing a source document that contains all the summary and detailed documentation of all data coverages and associated attributes enable the user community to know what is available. Regular updates are important not only to keep the publication current, but to remind your users that you are really doing something. Charging a modest fee for a subscription to this document creates an environment where the user connects to a long term relationship with the organization.

Data distribution. Any organization with responsibility for distributing information requires good written procedures. OGIS developed an order form that made the assembly of the request simple. All requests should be shipped in a timely fashion--no more than a five day turn-around. Developing standard formats for data distribution are not easy. Every time one more format is added, someone else will want it in a different data format. If you distribute another organization's data, make sure to provide them with regular reports on how often users request their data.

Education and outreach

An organization can never provide enough education and outreach activities. At a minimum the GIS organization should: publish a newsletter, quarterly if possible; offer your services as a speaker at association meetings, civic groups, and agency meetings; sponsor an annual GIS conference focused on what GIS can do; conduct annual mapping contests; develop training materials; team up with educational institutions in offering.

Organization and staffing

The original consultant plan for the GIS organization provided a balance of administration and technical staffing. Flexibility in the organization is premium. Multi-talented staff are critical. Energy, enthusiasm, and ability are the proper mix in running a high performance operation. There is no room for staff who require constant attention or direction. Each staff person needs to know that they operate in an environment in each staff expects the other staff person to contribute more than their weight. The organization norm is much different from the usual government organization. Every staff person acknowledges their own contribution, but mainly driven by a certain sense of self-consumption in over-achievement. Management needs to recognize potential burnout at all times. Management needs to provide cathartic relief periodically to keep the organization sane.

Needs. Any organization charged with implementation of a statewide, intergovernmental GIS requires a balance of GIS and administrative talent. The database manager and the application specialist are key to keep the technical end of the operation together. The institutional process of juggling the executive branch, legislative, regional planning, local government and the public is consumptive of the Director's time. The glue keeping the office functioning falls on the shoulders of the operations administrator.

Classification and recruitment. Any organization starting from scratch must recognize that most personnel systems of any organization have not included a GIS function before. Educating the people who administer the organization's personnel system is important if you want to recruit the proper people at the right salaries. The first encounter with the classification specialist is why can't you use an existing job classification. Drafting highly specialized position descriptions with sufficient

technical detail are critical. Personnel classification specialists are sharp. After convincing them that new class of positions are necessary, the challenge becomes raising the grade level that they want to put your newly classed position in. Be sure to start two to three grades higher than your bottom line. The classification specialist will most likely downgrade the grade level. Provide comparable level positions to justify the grade level needed.

Financial support and budgeting

Act 200 provided for a five funding appropriation to implement Vermont's GIS. No government can legally or practically appropriate funds that far out in the future. Legislatures appropriate money annually. Well intentioned legislation gave everyone hope that funding would go on for five years. Sad to say lean economic times make it very difficult to secure the needed base funding for the system envisioned.

Budget process. Become indispensable to the two constituencies that count--the legislature and the chief executive. Bend over backwards to prove the merit of investing in the future information economy.

Surviving in lean times. Write creative project applications for any projects which may have funding that fit within the mission of the organization. Become an invaluable asset to any constituent who wants implement GIS and has financial resources. Current candidates are transportation organizations, hazardous waste siting bodies, and possibly emergency management operations. Seek out partners or underwriters at all levels of government and private business.

Building a constituency. If you can prevent one disaster from occurring your support will rise immeasurably. Become a booster for efficiency. Develop programs and applications which the non-programmer can use and understand. VGIS in cooperation with ESRI has developed a town menu program for use at the municipal level.

CONCLUSION AND EPILOGUE

Vermont is still developing and building a statewide, intergovernmental GIS. Vermont has just enacted a new law authorizing the Governor to create a new, not-for-profit corporation, the Vermont Center for Geographic Information, Inc., to assume all the functions of the Office of Geographic Information Services. This step became a logical outcome of declining financial support and the need to become an entrepreneurial enterprise. The legislature has appropriated core funding for the next year. The next four years are sure to present challenge and unique opportunities.