BIOGRAPHICAL INFORMATION

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Specific Responsibilities

Bill Meehan joined ESRI in 2002. He has extensive background in utility operations management including the integration of IT and GIS. Bill is the director of the worldwide electric and gas utility solutions industry for ESRI. His specific responsibilities include strategic industry planning, business development, sales support, and project consulting.

Past Experience

While employed at NSTAR, Massachusetts's largest investor-owned electric and gas utility, Bill held the position of vice president of Electric Operations, vice president of Supply Chain, and manager of Engineering for NSTAR. He championed Boston Edison's GIS project and managed the NSTAR merger process of Boston Edison and Commonwealth Energy Systems. Bill also led the effort to comply with the Massachusetts Utility Restructuring (deregulation) Law.

Education

B.S. in Electrical Engineering, Northeastern University, Boston, Massachusetts
M.S. in Electric Power Engineering, Rensselaer Polytechnic Institute, Troy, New York

Professional Memberships and Affiliations

Registered Professional Engineer, Commonwealth of Massachusetts
Member GITA
IEEE, Power Engineering Society

Awards

Multiple GITA Speaker Award Winner

Publications and Presentations

Author of numerous papers, articles, and the textbook Power System Analysis by Digital Computer. Bill has lectured extensively and taught courses at Northeastern University and the University of Massachusetts. He has made a number of presentations and keynote addresses at a host of industry and business functions.

ENTERPRISE GIS: IF YOU BUILD IT, IT WILL FUND

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ABSTRACT

Utilities have justified GIS for network management, improved productivity, and accurate record keeping. Sadly, many of these implementations have not provided significant return on investment. Why? Narrow focus, viewing GIS as a mapping system, emphasis on engineering applications, lack of solid business case methodology, and failure to see GIS as an enabler for business transformation. Once the GIS is built, it will fund. It will fund if the geospatial information and functionality are broadened across the entire enterprise. The key to the deployment is the creation of solid enterprise GIS business cases and their relationship to critical utility business metrics.

This paper describes the underlying process of creating those business cases, common mistakes, and exposing what utility executives look for in successful business cases. A discussion of GIS applications in customer care, the environment, planning, supply chain, fleet, and other nonconventional areas of geospatial information follow.

BACKGROUND

Electric and gas utilities have used maps for years: from locating transformers, land holdings, pipes, and wires to analyzing leaks and electrical outages, managing evacuation of nuclear plants, and planning for the future. It was common for utilities to express business needs and business solutions in the form of maps. After all, utilities have assets everywhere. Workers need to find their way to customers, underground structures, poles, and equipment.

In the past, when faced with a request for a new service or equipment upgrade, technicians created sketches or work orders showing the crews where to install the new equipment. The source data was based on the company's operating maps. Not everything was built exactly as designed because of conditions in the field and inaccuracies in the source information. As crews replaced blown transformers and fuses, corroded and leaky gas pipes, downed wires and damaged poles, handwritten notes were sent by the crews to the mapping groups. Sometimes they were legible and accurate. Frequently, they were not. Sometimes there was no record of changes to the electric or gas distribution system. This created a vicious cycle of inaccurate designs, field modifications, a lack of good documentation of what was actually built, and so on.

This process created numerous problems for utilities. Getting an accurate and updated map in the hands of field-workers took a long time. Sometimes it took longer than a year to document a change in the utility infrastructure on the official maps. Often utilities reported backlogs that ranged from several months to a few years. There was no real process assurance that the information displayed on the maps was correct or even relevant anymore. Even if the information on the corporate map sheet was up-to-date, that information might not reach the right people. Utilities either had to rely on incomplete or inaccurate information on which to base their decisions or would be forced to travel to the job location to verify the information.

The negative implications on efficiency were obvious. All kinds of workarounds were invented including the creation of special jobs for people to verify what actually was installed in the field. Multiple sets of maps were often created for the higher voltage or high-pressure systems, adding to the map maintenance workload and increasing the chances for inconsistent and uncoordinated data. Nonetheless, utilities learned how to deal with this data management issue and the operating performance that resulted. Work still got done, customers' lights were restored, leaks were plugged, and new customers were added to the system in a more or less timely fashion. False starts, missing material, longer than acceptable outage restoration time, and rework resulted in higher costs than would not have occurred with timely and accurate records. Rarely did utilities measure the costs directly attributable to less than accurate records.

Another less obvious issue was the lack of recognition of the strategic value of the data that was contained on the maps. The maps were buried within the engineering and operating departments, hidden from strategic planning, rate design, customer service, financial reporting, marketing, environmental, and business groups. In addition to the huge pile of maps, utilities kept all kinds of lists. They kept lists about everything, from the history of inspections to safety events, outage events, streetlight replacements, customer complaints, and costs of material replacements. Utilities had large rooms full of books that tracked the history of each piece of equipment. Every time a pole was replaced or a new valve was installed, they kept track of the cost, retirement value, and information about the equipment. The chances that those financial records exactly matched the engineering records were slim.

Then GIS came along.

Aside from speeding up the actual map drafting process, did GIS help improve the process problems outlined above for utilities? Probably not much. Why? The business case for most early GIS implementations, which were actually AM/FM systems, focused on the map production process, not the underlying business of constructing, maintaining, and operating a complex infrastructure. For the most part, savings were limited to drafting time.

There are three things to learn from this

1. Most business cases that justified automating the mapping process did not consider the real problem.
2. The business case for automating the map drafting process was not very compelling, since it only addressed one or two of the symptoms of the real problem. For example, one symptom was that the operating maps were hard to maintain and out of date. In the above example, the real problem is getting customers' hooked up when the customer wanted service and do it as cheaply as possible.
3. Geographic data is strategic. The value on the business is underestimated because it is hard to quantify. By viewing the data only as a tactical tool, utilities were unable to see how GIS can solve the real problems and not just attack symptoms.

Thus, AM/FM systems did not shorten design times very much, reduce construction costs, or result in any significantly new or innovative solutions to utility problems. Since the business case really did not look at the real problem (only the symptoms), these process issues remained:

- Loss of data in the long journey from the field crews into the information system and its large impact on the business
- No single source of "official" data communicated to all the decision makers
- Lack of control on the quality of the data
- Long cycle times from work order inception to work closeout
- Lack of intelligent scheduling of work based on geographic proximity
- Lack of integration and reconciliation to corporate data
- No linkage to the supply chain, human resources, or customer care processes
- Lack of coordinated data from multiple data sources
- Lack of coordination of data from sources outside the utility

GIS improved the performance of the existing process, but adding more people would have had the same results. Few utilities actually changed their processes in a fundamental way because they did not look at their digital data in a new way despite the technological enhancement. Jobs stayed pretty much the same; only the drafting tools changed.

With the rapid change in utility structures, ownership, and demands on electric and gas utilities, things are changing. Utilities are looking for innovative and creative ways to operate. That is, they see the need to solve fundamental problems, not just attack symptoms. Finally, utilities are looking at the GIS as a strategic resource. That is the good news. The bad news is that utilities cannot afford to invest in long projects with paybacks longer than a year or two. So GIS professionals in utilities must be very creative in how they craft their GIS business cases. They must be relevant to the utility's corporate strategy.

The GIS business case becomes even more difficult if there is already an existing AM/FM system in place. It may have cost a fortune and perhaps did not live up to the advance publicity it originally received about all the savings it was going to deliver. Even if the technology is obsolete and not easy to work with, senior management may look with disdain at investing a lot of money to replace a legacy AM/FM system with a modern GIS.

BEATING THEM AT THEIR OWN GAME

So before approaching a utility executive with a business case, it is helpful to know the rules that executives live by when evaluating a business case. Here are the six executives practices that undermine business cases. Learn them. Memorize them.

The "Gimme Names" Rule

The biggest trap a novice can fall into when preparing a cost-benefit analysis is to claim FTE (full-time equivalent) savings. What this means is that the savings that offset the costs are in the form of labor savings translated into full-time equivalents. So if the new system, program, or material saves 4160 hours of labor per year due to increased productivity, the number of FTEs is equivalent to two. The savings then would be an average fully loaded salary times two. While this seems like a logical way to approach payback, the first thing the executive will demand is: Gimme names. Answers such as, "Well, these savings are truly partial FTEs, saving hours here and there, but not really getting rid of anyone," will doom the business case immediately. Citing attrition is a little better, but the executive's comeback will probably be, "we were not going to replace them whether we do this project or not, so there's no real savings." This rule can be deadly if the employees are union represented, covered by a strong contract that prevents layoffs. So, unless you come in with names or a better answer, forget it.

By the way, the proper comeback to these rules can be found at the end of the paper.

The "Time Isn't Really Money" Rule

This trap involves saving time, instead of money. "So the program costs a million dollars and shaves two days off the business process? So where is the savings?" While the novice may know instinctively that saving time might improve customer service and should save money, there is no easy way to articulate the dollar savings. If the timesavings translate into FTE savings, you traded your Time Isn't Really Money Rule for the Gimme Names Rule and you find yourself in the same place.

The "Compliment Without Commitment" Rule

This rule is the hardest one of all. You prepare your detailed business case and the executive agrees with it, likes it, gives you a great compliment, pats you on the back, and then dismisses it with "we cannot do this project this year due to tight budget constraints, but it is a sure thing next year." What makes it difficult is that you cannot tell if the business case is really valid or the executive does not want to tell you the truth. In either case, your business case is put on the shelf and the executive effectively killed it.

The "Pull the Rug Out From Under Your Feet" Rule

Your business case may be so compelling because processes are so inefficient and unproductive that it elicits a completely unexpected response. "Well, if the processes are that bad, it is clear that we cannot manage them; let's outsource the whole thing." At that point, the project is deader than anything. Variations on this theme could be something such as, "Well, we need to reorganize." Less severe but equally deadly to the business case is, "Let us form a study team." The stalling tactic is one of the most common ways to kill a business case. Again, you may never know whether the business case is compelling or not.

The "GIS Stands for Something Else" Rule

If the executive thinks GIS stands for Gas Insulated Switchgear (which it also does), the business case is doomed from the start.

The "So This Cuts Your Budget" Rule

Not showing a budget reduction somewhere that has been agreed to by all parties is a sure way to have the business case rejected. Almost as bad is showing budget reductions in an area that is outside the business case author's department without consulting with the manager of the impacted area. So the first question the executive will ask is, "You are showing savings in Distribution Engineering, right? Has Jeanne agreed to these savings number and submitted a budget reduction?" If Jeanne did not agree to the budget cut, your business case is dead.

ALIGNING TO CORPORATE STRATEGY

Alignment to the corporate strategy is a necessary condition for a business case to be accepted. A successful utility attempts to balance its attention on four stakeholders: customer, community, employee, and shareholder, often conceptualized as a balanced scorecard. However, some of these scorecard components may be in better shape than others. For example, a utility may have a good community record, but its service order process is archaic. The utility may be well managed financially but consistently suffer from frequent outages. Consequently, utilities will establish broad metrics that focus specifically on one or more areas of the scorecard for improvement. Examples of strategic corporate metrics are

- Shareholder
  - Total shareholder returns (investor-owned utilities)
  - Reduction or stabilization in rates (municipally-owned utilities)
  - Profit redistribution (rural electric co-ops)
- Customer
  - Total time to complete new customer connections
  - Improvement in reliability statistics (e.g., System Average Interruption Duration Index (SAIDI) or Customer Average Interruption Index (CAIDI)
  - Communication of when power will be restored (ETR – estimated time for restoration)
  - Response time to gas leaks
  - Improvement in customer satisfaction surveys
- Community
  - Reduction in spill notification time
  - Time to settle a rate case
  - Reduction in number of complaints to the local regulatory body
- Employee
  - Reduction in reportable injuries and motor vehicle accidents
  - Increase in employee training
  - Improvement in employee satisfaction

Each of these metrics will have one or more targets. The gap between the target and the actual performance will often determine the level of funding for an improvement initiative.

So the business case for GIS begins with the corporate strategy. Link the identified gaps from the corporate strategy and work collaboratively with people responsible for filling the gaps by showing how GIS can help close those gaps. While new ideas for improvement are fine, without a link to corporate strategy those ideas will likely get pushed off.

CRAFTING THE BUSINESS CASE

Since the business case is about costs and savings, the craftsperson of the business case needs to translate the business case into corporate financial metrics such as earnings per share impact or operations and maintenance cost reductions or capital investment reductions. Translating the business case into the language of the CFO, not the language of technology, is critical even if the primary gap happens to be service related. For example, assume that the utility has a large gap in outage restoration times. It can usually be shown that the longer the outage, the more expensive the restoration costs are. So in addition to the proposed improvement in service, a good business case should show financial rewards.

Here are a few simple steps to improve the business case

- Fully articulate the problem (the cause), not just the symptoms (the impact).
- Measure or estimate everything - both costs and performance metrics.
- Count, count, count.
- Start the business case years in advance of going to management.
- Think of the processes from beginning to end; think of the enterprise impact.
- Clearly link the business case to the corporate strategy; otherwise it will not get much attention.
- Leave no stone unturned.
- Do not bother with intangibles; statements such as "the new system will improve overall effectiveness" have no meaning. All savings need to be translated into either a financial impact or an improvement in some gap. If the system really is going to make things better, better has to be measured somehow.
- Educate the executive management on the problem well in advance of the business case.
- Learn how to articulate waste in performance in financial terms.
- Challenge "sacred cows."
- Rally support around the proposed solution well in advance of the business case; get testimonials from operating managers

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So where are the savings? The answer is that the savings exist throughout the utility in nearly every department or organization. Look for GIS applications that address performance gaps in these areas:

<u>Energy Procurement and Planning</u>

- Trading
- Load Estimation/Load Research
- Daily Load Forecasting
- Weather Integration
- Loss Assessment and Analysis
- Transmission Congestion

<u>Gas and Electric Transmission</u>

- Right-of-Way Modeling
- Transmission Line Siting and Design

- Visualization
- Inspection
- Structure Maintenance
- Lightning Strike Assessment
- Vegetation Management
- High-Consequence Area Modeling for Gas Transmission
- Code Compliance

Gas and Electric Distribution

- Distribution Engineering
- Distribution Design
- Mapping
- Leak Management
- Tree Trimming
- Field Force Management
- Asset Management
- Outage Management
- One Call
- SCADA Integration

Customer Care

- Meter Reading
- Service Order Tracking
- Collections by Demographics
- Outage Visualization
- Target Marketing for Gas Expansion
- Economic Development
- DSM and Conservation Monitoring
- Emergency Management

Supply Chain/Logistics

- Fleet Management
- AVL
- Buildings Care and Facilities Management
- Service Center Siting/Consolidation
- Optimal Crew Routing
- Optimal Warehousing
- Delivery
- Property/Real Estate Management

Finance and Accounting

- Continuing Property Records

- Street Light Management and Accounting
- Rate Research and Development
- Property Tax Management for Distributed Assets
- FERC Filings
- Merger and Acquisition Due Diligence of Utility Assets
- ERP Integration

Corporate Services

- Tracking Personnel
- Safety Tracking by Districts
- Regulatory Reporting of Reliability Stats
- Mapping of Customer Satisfaction Surveys
- Maps in Support of Lawsuits, Environmental Spills

THE EXECUTIVE DEFENSE PLAN

There are a number of areas where GIS can improve decision making, communication, and efficiency throughout the company. These improvements have to be articulated in the form of closing the gaps detailed in the company's strategic plan. So to improve your chances for success, here are the comebacks to the executive's gambits to kill your business case as discussed earlier in this paper.

The "Gimme Names" Rule

Recall that the executive does not support the concept of FTE savings unless you identify real people. So the comeback is to actually have a staffing redeployment plan. Specify exactly where the new staff will go and indicate any costs of retraining, redeployment, or possible settlement costs. In addition, identify any premium time that is being spent and apply the FTE savings to overtime costs. Finally, if there are contractor labor costs, the FTE savings, if possible, need to be applied to these out-of-pocket expenses. Rarely are utilities not hiring contractors or using overtime, so these are great sources of FTE savings.

The "Time Isn't Really Money" Rule

Shortening life cycle time usually shows up in improvements in customer care metrics such as meeting on time commitments of new customer connections. Apply the savings to these metrics. Also, shortening the elapsed time to do work often results in a reduction in total time to do the work, which results in the FTE savings. If so, translate FTE savings into a reduction in overtime or contractor labor. Often, savings in cycle time results in lower backlogs of work if staffing remains the same. Translate the backlog reduction into savings that would occur if the backlog work had to be contracted out.

The "Compliment Without Commitment" Rule

One effective countermove for this delay tactic is to show savings directly within the same budget year. Create an urgency to capture the savings. To avoid this business case killer, good advance work is required. The ideas and business cases should be tested against the executives before a formal submission is developed.

The "Pull the Rug Out From Under Your Feet" Rule

Be fully aware that detailing process inefficiencies may create political problems for executives. They may feel that since they are in charge of the areas of process inefficiencies, they are somehow being blamed for their persistence. As a result, they may get defensive or worse, might try to shuttle the problem away by suggesting an outsourcing approach. So be prepared to offer an outsourcing scenario. It may actually turn out to be one possible solution. If it is, present the pros and cons. In all cases, focus on the improvements in the overall process with the GIS as an enabler, with or without outsourcing.

The "GIS Stands for Something Else" Rule

This happens when executives are not informed about the technology and what it can do for the business. A well thought out education program that focuses on how GIS can be applied to business problems needs to be established, just to make sure that all decision makers are not surprised (and possibly embarrassed) by the lack of knowledge of GIS. Since executives will know all the corporate strategic objectives by heart, the GIS education needs to directly relate to each of the performance objectives. A more complete understanding of the corporate objectives and the underlying issues surrounding each of them will enhance the GIS business case. The notion will be that GIS is not just about mapping but directly related to corporate strategy.

The "So This Cuts Your Budget" Rule

Assuming that the business case saves money, then the business case should make recommendations that budgets be cut. However, they should be carefully managed. If the system results in savings in some future year, the budget cuts should be aligned with the timing of the savings.

SUMMARY

If you build it, GIS will fund provided that a solid business case is developed. The key to long-term funding of the GIS is to create outstanding data about the processes prior to the implementation so that savings can be accurately measured. Carefully measuring the savings and metrics going forward only supports the decision as created in the business case. Looking at the GIS very narrowly as a mapping application will result in a difficult justification. GIS professionals need to link the savings and applications directly to corporate strategy. In that way, GIS becomes part of the strategy, not as some costly annoyance to be tolerated.