The BUSINESS IMPACT of GIS

Case studies from Utah

By Wade Kloos, GIS Director, Utah Department of Natural Resources

This article, the third in a series on GIS return on investment (ROI), provides ROI examples and offers a summary of findings after two years of using this ROI approach at the Utah Department of Natural Resources.

In an article in the Winter 2016 issue of *ArcUser*, I addressed the need for and benefits of documenting GIS results as well as the advantages of adopting the right ROI mind-set. In "Downsizing the ROI Report" in the Spring 2016 issue, I reviewed the target audience for ROI reports, shared a different approach to documenting ROI, and provided a one-page ROI and Benefits Report template that could be downloaded from the online version of the article.

The online version of this article has links to two reports created using the template. They are referenced in case you want to download them. Look at the ROI and Benefits Report for the Wildland Urban Interface (WUI) Project Geodatabase Compilation project carried out by the Division of Forestry, Fire, and State Lands (FFSL). The Executive Summary portion notes that not all the organization's relevant information could be used to make decisions. The Tangible Benefits section of this same report describes how a repeatable method for producing more timely, higher-quality data is now part of the organization's decision-support process.

Your leaders need to know the *bad* and the *ugly* of your current information and process limitations so they can accurately assess the *good* your GIS efforts are delivering. This report describes efforts to improve an outdated workflow. This problem is not an uncommon one for organizations, especially those with dispersed offices, multiple data editors, and an absence of data standards. This report also deftly describes the current and proposed workflows by describing details that the GIS staff in other departments can understand, learn from, and then apply.

The 60 hours required by this project to clean and organize years of data reduced the original 10-hour, unstructured job that had a high risk of error to a 12-minute, easy-to-repeat task that had the added benefit of standardizing the data. The fact that the task was repeated numerous times throughout the year and produced both ROI and tangible benefits made this GIS enhancement a no-brainer.

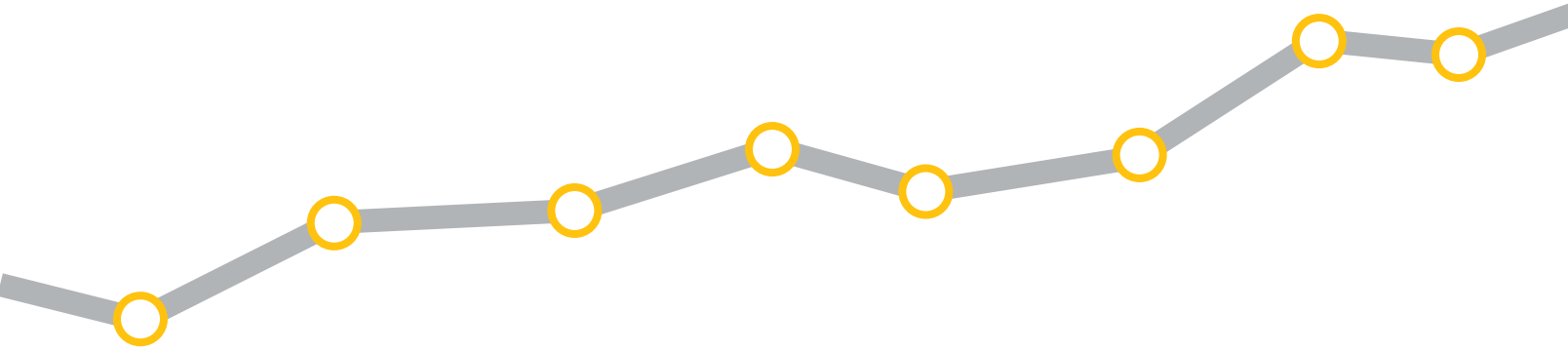
The measures of success at the bottom of this report are critical components of the report because they do two essential things. First, they describe the actions necessary to assess and validate the report's initial assumptions. Even if leadership doesn't ask for this information, the GIS professional should be compelled to discover these metrics. Second, the measurements provide expectations for the GIS professional, who should think in terms of business performance and accountability. As I stated in previous articles, ROI studies are not conducted enough in our discipline. If GIS managers don't start having higher expectations for GIS staff performance, we will keep getting the same results.

The ROI and Benefits Report for the Statewide 3-D Stereo Model Acquisition project describes a project done by the Utah Geological Survey (UGS). I wanted to share this report for a very important reason. Its most notable benefit is cost avoidance, and that is the gift that keeps on giving.

As you can imagine, fieldwork constitutes a core activity of geologic mapping. This fieldwork, along with associated expenses for hotels, per diem, transportation, fuel, and labor, represents a significant cost of doing business for the UGS. By addressing these

Year	Projects	Hours Saved	Labor Cost Savings	Workflow Improvement
2014	19	9,094	$185,000	75%
2015	12	9,996	$255,000	76%

↑ Table 1: ROI benefits



costs, this workflow enhancement hits a bulls-eye for the division's bottom line. The streamlined, in-house process for creating highly accurate and standardized geologic data not only reduced the need for fieldwork—and the time and expense it requires—but also helps accelerate the completion of the division's key deliverable: geologic information products. The tangible benefits listed in the report deliver considerable gains to the organization as well as universities and the public.

The UGS example also highlights the fact that even though the ROI calculation may be relatively low, GIS projects like this one can manifest so much positive benefit that an ROI value of some number of dollars can't reveal all of a project's contributions. For example, that $85,000 of cost avoidance keeps helping the division year after year. Even if the ROI was zero, or initially negative, this project suggests that the workflow improvements are still worth pursuing. Please try not to place too much emphasis on a project's ROI value. Always look deeper into the way business operations can improve and what can come from those improvements. This was the mindset behind naming the report the ROI and Benefits Report.

It should be noted that the ROI calculations in the template include the entire cost of the workflow so as to be reflective of all costs required to perform a given task. This produces more conservative ROI numbers. If only the cost associated with the GIS enhancement was considered in isolation, the ROI would be considerably higher. For example, using the formula *savings* minus *enhancement cost* divided by *enhancement cost* would generate a future annual ROI of 459 percent for the UGS project compared to the 45 percent shown.

I want to thank Sean Edwards of FFSL and Kent Brown of UGS for allowing me to share their ROI and Benefit Reports and for their excellent work in documenting their results. So far, Utah DNR has completed more than 30 ROI and Benefit Reports in the last two years, and the cumulative statistics gathered from tracking GIS ROI and benefits are shown in Table 1.

To convey the business benefits delivered as part of DNR's GIS results documentation effort, I summarized our deliverable benefits (shown in Table 2 on the next page) and distributed this information to our department and division leadership.

"We've asked our GIS staff to document the Return on Investment that has come about from our focused investment in GIS. I am pleased and somewhat surprised by the magnitude of the GIS contribution to our Department of Natural Resources. There is a documented, significant reduction in labor, and a significant increase in cost avoidance in our GIS delivery. We feel rewarded for searching out and embracing new ideas that push our old limits of comfort."

Mike Styler, DNR Executive Director

These examples of ROI and Benefit Reports will help you understand how GIS projects can improve organizational operations and realize the value of those improvements to the organization. I hope you can also appreciate not only the reasonable level of effort required to complete the abbreviated documentation of results required by the ROI and Benefits Report, but also how uniquely positioned GIS is to transform your organization's business processes.

Benefit	Example 1	Example 2
Revenue Growth If information and access to it impact revenue, how can GIS do more to get this information in the hands of others?	[1](FFSL) Geographically locating leases helped identify and analyze existing and future lease opportunities as well as delinquent leases.	[5](DWR) Web maps that convey timely and pertinent hunting and fishing information encourage these activities and the purchase of licenses.
Cost Reduction It may be possible to automate a process or restructure it to take advantage of the superior data organization or analysis capabilities of GIS.	[3](DWRe) Labor-intensive planning processes dependent on multiple meetings or public hearings, printed maps, and data editing workflows (like the water budget plan) can be performed with less labor via more efficient interactive web maps.	(DWRe) When tasks must be repeated many times a year, GIS can automate certain steps in the workflow, thereby saving time and money not just once but many times.
Cost Avoidance Just because a task has always been done a certain way does not mean that must continue if there is a better way (with GIS or without GIS).	[6](UGS) When information from the field must be collected, understood, and recorded, spatial data and aerial imagery (in this case, 3D stereo imagery) can be leveraged in the office to reduce the amount of fieldwork required and its associated cost.	(DWR) When multiple regional offices are required to share up-to-date information on statewide wildlife conditions, interactive and editable web maps can reduce or eliminate travel expenses.
Increase Efficiency and Throughput A faster or more accurate way to do business leads to greater efficiency. If this also increases a critical deliverable of your division, it's a double win.	(DWRe) Evaluating water reservoir location options can require significant calculations. GIS can automate spatial analysis functions so that more sites can be studied in less time, thereby supporting the delivery of timely and high-quality engineering throughput.	(FFSL) Sometimes a program's throughput is data-driven decisions, such as a yes/no determination for a lease or change application. GIS can combine operational data with other data, creating a solution that enables faster, more accurate decision making.
Save Time How much faster can a process be carried out with GIS?	[7](DOGM) To ensure that actual activity is in compliance with issued permits, GIS can convert documentation of conditions and legal descriptions into spatial features that can be checked against field observations.	(DOGM) A GIS request form creates a standard process that provides non-GIS staff who request maps or analysis with realistic expectations of the process. This reduces need for reworking maps.
Improved Effectiveness To be effective, a division must be both efficient and accurate. Good data that enables interpretation, insight, and communication is at the heart of what GIS staff can do.	(FFSL) GIS can enable better planning and more effective use of resources by tracking project locations in programs that involve the implementation of numerous projects dispersed over large areas (such as FFSL's Wildland Urban Interface projects).	(DWRe) When research into other division or department databases is needed, GIS can be used to integrate that data into easy-to-use web maps that can be overlaid with operational data for context. This allows faster research, fewer errors, and greater efficiencies.
Increased Customer Service How can GIS be leveraged to cast your division in a better light to your key stakeholders?	[4](DWRi) When requiring information from the public concerning location, GIS can validate and provide accurate spatial information, eliminating errors that lead to delays in processing or customer care.	(DWR) Whenever there are several spatially defined activities, such as hunt boundaries, GIS can deliver this information in an easy-to-view web map that allows customers to interact with the data so they can find the information they need.
Lower Risk What's the cost of a wrong or delayed decision? Does your division rely too much on the institutional knowledge held in the heads of a few key people? Examining your risk exposure and methods to leverage data and spatial analysis can be effective ways to lower existing division risk.	(DOGM) Understanding what is permitted is critical to enforcing compliance. Having this information in a GIS rather than paper documents saves time, creates actionable intelligence, and produces greater compliance and lower organizational risk.	(DOGM) Knowing where risks are most prevalent can guide how and when division work gets done. GIS can be used in the office to guide planning activities as well as in the field to make urgent decisions.

↑ Table 2: The business benefits of GIS to individual divisions in Utah DNR

[1]Division of Forestry, Fire and State Lands (FFSL); [2]Division of Oil, Gas and Mining (DOGM); [3]Division of Water Resources (DWRe); [4]Division of Water Right (DWRi); [5]Division of Wildlife Resources (DWR); [6]Utah Geological Survey (UGS)