

Applying a benefits driven approach to GIS implementation

Why model GIS Program benefits?

It is recognized that GIS technology and spatial information provides vast opportunities to add value within any organization – indeed many of us act as champions for our industry all the time. However, articulating and quantifying the monetary return of investment (ROI) in a GIS program is not always easy.

During startup, GIS programs tend to be capital intensive. Typically work involves data capture, purchase and cleansing costs; complex deployment, bespoke development, and high license prices all add to the overall bill. Operationally budgets get hit with expensive dataset, software, and license maintenance costs. From an outside perspective – often the finance department's – GIS systems sometimes appear to have a huge budget, but only support a small, specialized user base.

Conversely, business value attributable to other corporate systems (eg billing, CRM, PoS, etc), may not be as immediately obvious for a GIS. Even though

business knowledge of GIS is increasing, you may still be dealing with decision makers who do not know or understand the technology or the potential value it can deliver.

Given this situation, GIS program managers are often asked to demonstrate the value delivered by GIS programs. This could be when building the initial program business case, as part of the yearly budget request or even that of a business review.

Developing a Return on Investment (ROI)-driven strategy should be the first step to making the program benefits-driven rather than technology-driven,



a common problem as GIS technology matures. Delivery of business benefit should become the yardstick for program success and be communicated to the business. However, a full ROI (with its cost and time implications) may not be necessary. In many cases, a simpler approach to identifying, communicating, and quantifying program benefits can be just as effective.

The remainder of this paper will focus on the steps to developing your benefits model and will highlight how this model can be the program's central driver.

Building the model

Structuring your approach to building the model will simplify the process, ensuring the output is easy to communicate and, most importantly, defensible when challenged. The key building blocks are the following tasks:

1. Identifying benefits
2. Capturing metrics
3. Defining the 'base case'
4. Defining the 'GIS case'.

Identifying benefits

Isolating in advance the benefits you want to model will simplify the process and allow you to focus on the next three tasks in building the model.

Almost all quantifiable benefits can be traced back to monetary return, specifically:

- cost reduction/avoidance (eg increased efficiency, regulatory penalties)
- revenue generation/protection (eg increasing customers, defending market share).

Other benefits, which are less obvious than monetary value but no less important, can be grouped under the heading Service Excellence. For example, you can calculate the monetary value of a reduction in response time to a customer's request for information through better technology (ie increased sales potential) but you would be just as persuasive with a decrease in response time. Remember, you are building a Benefits Model and are not calculating full ROI.

Regardless of which benefits you identify, being clear about how the GIS program will deliver them over time makes modeling a lot easier.

Capturing the metrics

The financial model's underlying numbers must be sound, logical and justifiable for the model to gain acceptance. Engaging and obtaining agreement from key people are often the most arduous part of the process. Take the time to meet with business owners and educate them on the GIS in order to help them understand what you are looking to do and how it will affect their part of the business. Using a benefits roadmap here can be extremely useful.

Where metrics do not exist, take a pragmatic approach and ask business owners for realistic estimates based on their experience. Even when metrics have not been formally gathered, numbers based on a business owner's 'gut feel' will stand up to external scrutiny if challenged. In the long-term, work with the owners on capturing the supporting metrics you need to update the model.

Teaming with finance early in the process will give you better access to sound financial figures and also help you better understand how other programs approach submitting and supporting budget requests.

With the underlying numbers as the model's foundations, you can start building up.

Defining the base case

The base case is the current 'as-is' state against which any improvement will be measured and serves as the first step to articulating the benefits we have identified.

A common mistake during the early stages of building a model is attempting to account for more complex factors like time, other business initiatives, market forces, etc.

The model can account for these considerations with the help of more complex techniques further downstream, but for now think of the base case as a simple 'snapshot' of the situation. Fix this at a single point in time and do not factor in external influences yet.

To demonstrate our approach, we will model a simple example based on a delivery business. We have purposely oversimplified the application of GIS in order to demonstrate the techniques, not the technology.

By gathering simple inputs from the operations manager of the delivery business (fuel cost, truck mileages, number of deliveries, etc) we are able to quickly build the base case for yearly fuel cost of operating a truck.

Figure 1: Simple base case

Input	Base case
Average fuel price (per gallon)	\$3.10
Average number of miles per delivery	2.30
Average number of deliveries (per truck per day)	47.00
Average delivery days per year	240.00

Base case

Defining the GIS case

Having defined the 'base Case,' we can now move onto the 'GIS Case.' This represents the 'to-be' state – ie how the business will operate with the benefits GIS can bring.

Again, the trick is to stick to the basics. You are looking to identify a single input into your calculations, which the GIS project/program will influence. Isolating a single factor simplifies determining what the snapshot of the business would look like with GIS.

In this example, the GIS initiative will have an impact on the distance driven for each delivery. Implementing better route navigation, for instance, through shortest path analysis, will save an average of 0.2 miles per delivery.

Figure 2: Simple GIS case

Average number of deliveries (per truck per day)	47.00
Average delivery days per year	240.00

Base case

Base case	Average fuel cost per truck per year	\$80, 426.40
GIS case	Average fuel cost per truck per year	\$73,432.80



Over the course of a year you can see that the GIS makes a positive impact, saving the business close to 8% on the operating costs of a single truck in the fleet.

In reality the GIS may influence a number of the inputs into your model, and the base and GIS cases will probably contain more metrics.

Calculating true benefits

Once you have reached the point where you can clearly define the current situation and the program's impact, you can consider other factors and turn this model into one that is robust and defensible. The following section will explore more complex techniques.

Year on year benefits

As previously stated, the base and GIS cases are only a snapshot in time. An accurate model must address the impact of the GIS over time in order to demonstrate its increasing benefit over the program's lifetime and factor for changing inputs over time (eg market changes that increase or decrease costs).

Bringing these into the model provides a more complete picture, increasing the acceptance of both benefits and numbers generated.

Expanding on the previous example, we can easily factor for the expected increase in operating costs, such as increased fuel costs over a five-year period. This is beyond the influence of the GIS and only affects the base case numbers.

Figure 3: Accounting for changing costs

Input	Base case	GIS case
Average fuel price (per gallon)	\$3.10	

Yearly values					
	2008	2009	2010	2011	2012
Base:	\$3.26	\$3.42	\$3.59	\$3.77	\$3.96



With this change, the GIS case will remain the same, but over time the savings will increase as a result of rising operating costs to the business.

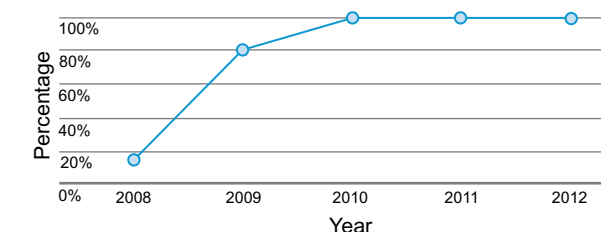
Realization curves

As with many projects, the results of your initiative will not manifest themselves immediately.

For example, we know that it will take three months to purchase the hardware, software, and undertake the project implementation. Given that we won't have resources available to start the project until the middle of Q3 2008, no benefit from the project will be gained until at least the middle of Q4 2008. Factor in process changes and training, among others, and the full benefit will not show until sometime in the middle of Q1 2009. To account for this we apply a 'benefits realization' curve to the final numbers. In this case, our realization curve looks a little something like this:

Figure 4: Benefits realization curve

Benefit realization					
2008	2009	2010	2011	2012	
15%	80%	100%	100%	100%	



We are only going to claim 15% of the full benefit this year (due to the Q4 delivery timeframe) and, as we won't be fully functional until probably February 2009, we will only claim 80% of the full benefit for next year. Of course, by 2010 we will reach 100% and will continue at this rate for the duration of the timeframe.

As this influences the year on year benefit, this curve should be applied to the GIS Case. The figure below demonstrates how we are only claiming a partial saving on miles driven in the first two years and the full 0.2 mile saving is not realized until 2010.

Figure 5: Realizing benefits over time

Input	Base case	GIS case
Average number of miles per delivery	2.30	2.10

Yearly values					
	2008	2009	2010	2011	2012
Base:	2.30	2.30	2.30	2.30	2.30
GIS:	2.27	2.14	2.10	2.10	2.10



This adjustment will ensure that the final numbers account for any known offset in delivering benefits to the business over time.

Sensitivity analysis

When defending the numbers that you have arrived at, you should make sure you account for external influences. Be mindful that other internal or external projects or initiatives are acting on the situation you are modeling.

One of the resulting problems of failing to account for external influences is 'double counting' benefits when projects overlap and claim value for the same results. Your model will risk losing credibility unless you factor in external influences.

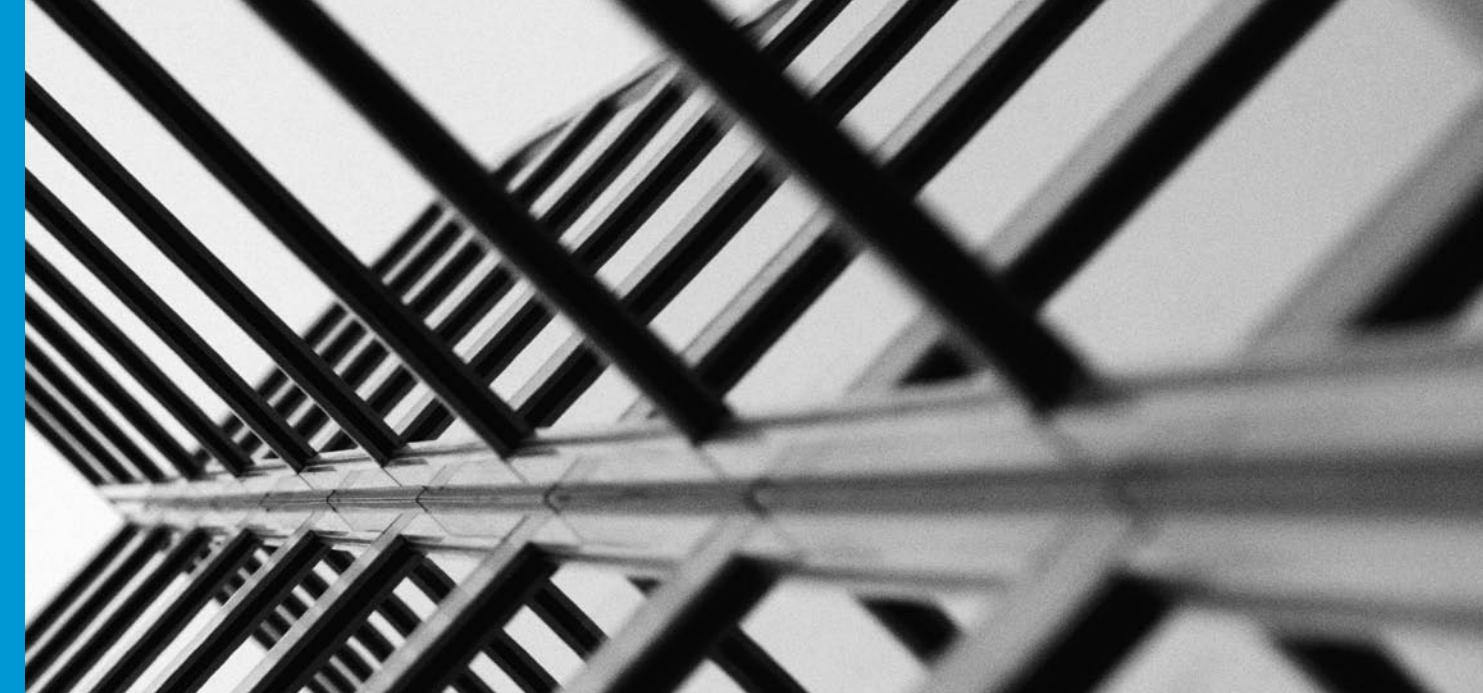
Applying a broad sensitivity analysis to the end numbers can provide this adjustment and simplify the initial model construction, in other words, keep the focus on selecting

good metrics for the GIS rather than for other projects. When presenting the results, additional factors can be listed and benefits reduced accordingly (eg realizing that 'x, y and z are at work, we will only claim 50% of the benefit).

Summarizing benefits

As the applications of GIS often touch many parts of the business, you will be modeling not only a single benefit but, over time, a wide range of supporting cases.

Rolling these up into an overall summary – perhaps under benefit groupings, such as cost, revenue and service excellence – will provide an overall picture of how the program is having a positive impact on the business over time. This will result in a compelling executive summary supported by a robust foundation of clearly structured and defensible numbers.



Summary

Developing new GIS technology can be exciting from a technologist's perspective and the benefits easily apparent. The most challenging part of implementing a project like this is convincing both the money men and the wider business that the technology is worth the investment.

Using this simple technique provides several gains:

- the task of building a sufficiently robust benefits model need not be as daunting as expected
- by following this process, the project is more likely to deliver the business what it needs to improve performance rather than a 'cool gizmo' that doesn't work very well
- the budget request is less likely to be challenged and future funding made easier to obtain.

All this liberates the GIS implementation team to focus on what really matters – delivering the benefits.

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