BIOGRAPHICAL INFORMATION

Donald E. Ramsay
Senior Project Manager
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Specific Responsibilities

Mr. Ramsay joined LogicaCMG in 2000 and is responsible for managing the implementation of GIS products and services to our clients. In addition Mr. Ramsay supports the sales and marketing team in GIS opportunities, along with performing consulting engagements for our existing client base.

Past Experience

Mr. Ramsay has 21 years of experience in implementing GIS projects for clients from a wide variety of industry sectors. These include, electric and gas utilities, telephone and communication providers, public works departments, oil and gas providers and municipalities. He has implemented projects that have utilized all of the major GIS vendors with a number of third party applications. His implementation experience includes, system selection, requirements development, database design and modeling, data conversion, data migration, acceptance testing and system training and deployment.

Educational Information

BA – Electrical Engineering Technology, Metro State College, Denver, CO

Professional Memberships

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KEEPING GIS PROJECT TEAMS ON TRACK – MANAGING EXPECTATIONS AND CONTROLLING SCOPE

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ABSTRACT

You've been assigned to manage your company's new GIS project. The GIS team is set, the cost benefit analysis and business plan are complete, project approval has been received, and your team has selected a GIS vendor. Now it's time to implement -- and quite possibly, to put your credibility on the line. Quickly you recognize you cannot control all the factors that impact your project. But in the realm of what you can control, one factor may be key to making your project a success story. That critical factor is managing your team's expectations, and concurrently controlling the project's scope, cost and timeline. Managing expectations means enabling your people to understand what functionality the project will and won't deliver and what company objectives it meets. Controlling scope means creating a well-defined plan containing functional requirements and objectives so all work associated with the project is focused only on those areas. This paper will explain how to create a project plan that manages people and scope; review the importance of keeping both expectations and costs are on track throughout your project; and discuss expediting delivery of functionality that engages your user community and retains their interest in supporting the project.

INTRODUCTION

Now that you've gone through an extensive cost benefit analysis, completed your business plan, received project approval from Executive Management, and selected your GIS vendor, its now time to actually implement the GIS, and quite possibly your credibility is on the line to ensure this project is a complete success. If this seems like a challenge, you're absolutely correct. Without a clearly defined project plan, implementing a GIS can be a never-ending project battle with many seemingly unsolvable problems. But have faith, many GIS users have successfully gone through these very same issues that you will be going through and by following a proven project implementation plan, it can be accomplished on time and within budget.

Although there are many critical components to successfully implementing a GIS project that can be affected by multiple internal and external actions, there are several key project principles and project tasks that if planned in sufficient detail and executed correctly, can greatly assist in ensuring your project's success. One of the key project principles that should be adhered to and constantly revisited throughout the project, to verify that it is still true, is to "clearly define and prioritize your project's objectives and functional requirements and keep all work associated with the project focused on these objectives". Too often, GIS projects get infected with "scope creep" and before anyone even notices, it has been three to four years later and there still is not even basic core product functionality available to the users. Management gets frustrated by the continual schedule delays, the continual funding calls and soon the project's budget is pulled and no one seems to have an answer as to what when wrong.

There are however some time tested GIS project management techniques that can be utilized to greatly increase your project's ultimate success probability. The most important of these are to prioritize your implementation requirements, tie the schedule to these requirement deliverables, keep open lines of communications with your vendors, control your users expectations, and finally, keep new requirements and change orders to an absolute minimum.

Although this paper cannot describe in exacting detail every step in a GIS project implementation plan or provide a step by step instruction manual, I will at least describe in the space available, some of the major areas of system implementation that you should focus your efforts on getting correct.

PROJECT TEAM

The project team assembled to manage a successful GIS implementation should be made up of members from each of the departments that will have access to the system. This includes both the end users of the system and those departments that will maintain and support the system. The size of the core team will be directly related to the number of potential departments and users that will access the GIS information. Because of the high number of software and hardware related technical tasks associated with implementing a GIS, most of the more successful projects have had the "IT" department manage the implementation and hand it off to the end users after the system has been moved into the production environment. There should be a core team that is assigned to the project on a full time basis and departmental subject matter experts that are assigned on an as needed basis. The core team should have a project manager with the authority to assign resources as needed and make critical decisions that will keep the project on track. With most projects, even with the best project plan, issues will most certainly arise during the project's life cycle that will require a decision to be made. Having to wait for a decision by committee will negatively impact the project schedule and result in more costs than if the decision was made immediately. The project should have a budget with sufficient contingency to accommodate the majority of these change orders and additional costs and project manager should have the authority to allocate those funds.

MANAGING THE PROJECT SCHEDULE

During the initial project planning sessions and even prior to that in the procurement process, a project schedule was submitted. Although the project schedule submitted during the procurement process can be used as a starting point, the final project schedule should be the one developed in the project planning sessions, and even better a new schedule should be revised after the standard requirements and custom requirements have been defined. To be a realistic schedule, all parties involved in the implementation should have input to their portion of the project that they are responsible for and commit to their scope of work in their timeframe. Once the schedule has been finalized and all project team members have signed off, the schedule should be distributed to all team members with a very clear understanding that everyone is expected to live up to their commitments. The Project Manager should then manage each team member's activities by the schedule and even be proactive prompting team members on future tasks that are scheduled to be started in the short term. It should also be understood that even though it will not be accepted lightly, there would most likely be some slippage in incremental deliveries as long as the overall final deliverable component is completed on time.

TECHNOLOGY REVIEW

As part of the selection process the GIS vendor listed in great detail the hardware and software requirements necessary to install and operate their system. What they didn't inform you of is how this ideal system configuration fits into your legacy systems and current hardware, software and communications infrastructure. You may already be a user of the GIS' core database product but is your current version compatible with the new GIS and if it is, is it configured correctly? A correctly configured database can dramatically increase your performance parameters and vise versa a database that is not correctly tuned can dramatically reduce your system's performance parameters. Traditionally, graphic data files are large network hogs so be certain to validate network capacity to ensure all future users in all remote locations will experience satisfactory system performance.

FUNCTIONAL REQUIREMENTS DEVELOPMENT

The functional requirements review and the subsequent functional requirements document (FRD) is the one of the most critical items used in planning and ensuring a successful implementation. The FRD describes all of the functionality that will be delivered and implemented. During this stage, input from the various potential users is extremely valuable. Each of the requirements are classified as one of the following:

- Fully functional with current release
- Fully functional with future release
- Fully functional with some configuration
- Fully functional with custom programming

The requirements are prioritized and assigned an implementation phase if a phased implementation is planned. Those requirements that are identified as “to be implemented” are described in the requirements document in as great a detail as possible and reviewed by the project team for completeness and agreement by all team members. The FRD is the main source of setting expectations for the system users in describing what will and will not be included in the final implementation. In addition the FRD is used to identify what is included in the project’s scope of work and what is out of scope. It should be assumed and understood that any additional or modified functionality that is requested after the FRD has been finalized is additional scope and will most certainly mean an increase in the project’s implementation time and an increase in the project’s costs.

The project schedule and the contractual scope of work document should be directly tied to the FRD. If possible, this tie should even be to the detail that the section numbers of the FRD and the scope of work document along with the project schedule task numbers should all match. This will ensure that everyone involved in the project, including both in house personnel and outside vendors, know exactly what is expected and when it is scheduled for delivery and implementation.

DATA AVAILABILITY REVIEW

The data to be incorporated into the GIS should be reviewed as to its accuracy and completeness to ensure that it will support the expected applications. Should the engineering and design department expect to complete project designs with the GIS, then the accuracy and content of the data loaded into the system needs to support this functionality. If the field crews or service technicians expect to use the GIS for routing and or vehicle tracking, the data needs to support this functionality. When reviewing the data, the following areas should be validated and if the data is found to be incomplete or inaccurate in these areas, alternate data sources should be identified or the functionality expectations need to be modified.

- Positional accuracy
- Data feature content
- Database attribute content
- Connectivity

In addition, the data sources should be categorized by source type and evaluated as to the best way to incorporate into the digital data model. The potential types that are most common are:

- Paper maps and records
- Digital CAD maps
- Digital databases
- Existing spatial or GIS data

OBJECT MODELING AND DATABASE DESIGN

In this workshop, the project team will start with an introduction to object modeling concepts, vocabulary and techniques and an introduction to the selected GIS Data Model. This is followed with a review of the Logical GIS object model (sometimes referred to as the 'conceptual model') and then step through it with the project team. This is best done by projecting the Visio model on a screen and working through the classes. Following the review of the Logical models, the team will begin a review of the physical object models. Changes will be noted as required during this process. The team will review all entities in the model to make sure they are necessary (maintained by the utility) and add in those that are not in the off-the-shelf model but are required for the implementation. Also, the team will examine relationships between the entities as well as domains provided in the model. At the end of the workshop, the project team will be able to begin putting together the physical model to be used.

The project team will produce a physical object model in Visio to reflect updates discussed in the Object Modeling workshop. Performing a test import to validate the model is the final step in this process.

Each model will include all system feature classes, all fields, all subtypes, all relationships, all domains (and domain assignment), and all tagged values. Once complete, the project team will export the models into the GIS to review results. Note that domains may be imported into the Geodatabase after the schema has been built.

Some of the expected deliverables from the object modeling and database design workshops should be:

- Produce Logical Model
- Produce Draft Physical Object Model
- Complete Physical Object Models
- Review Annotation and Labeling Requirements
- Review Symbology Requirements
- Define Snapping Requirements

CUSTOM COMPONENTS REQUIREMENTS AND DESIGN

Although it is most likely is the intention of many GIS projects to implement "out of the box" solutions, more times than not sometime during the functionality requirements workshops it becomes apparent that there will need to be a certain amount of custom components developed to support the business processes. This is really not that uncommon and handled correctly will not largely impact the implementation schedule in a negative way, even though the majority of these custom applications were not identified during the initial project planning sessions. The key to completing these custom applications in a timely manner is to handle their design, development and deployment in a similar fashion as the previously described standard requirements.

Each custom component needs to have a detailed requirement written up and agreed to by all project team members. Any custom components that will require an interface to an existing operational system needs to have the interface points clearly defined.

The majority of these custom components will require a change order to complete due to the fact that they will most likely not be identified and clearly defined until after the original scope of work has been completed, and everyone on the team should be made aware of the impact of each of these custom components. As a general rule, each change order will require additional time onto the project schedule and an increase in project costs. The amount of additional time and monies is directly related to the complexity of each custom component.

INTERFACE REQUIREMENTS REVIEW

In years past the GIS was typically only used by the engineering and or mapping departments to maintain the distribution and or transmission networks. In today's typical implementation, the GIS is accessed by many different departments and is considered an enterprise wide system. In order to successfully implement a GIS throughout the enterprise, the system needs to have interfaces to and from many legacy systems currently utilized by the firm. Each of these interfaces needs to be analyzed and designed so that the systems interface at the correct points in the work flow and the correct data is passed back and forth accurately and efficiently.

The most common of these systems that are integrated with a GIS are as follows:

- Graphic Design Tool
- Work Management System
- Outage Management System
- Mobile Workforce and or Dispatch Application
- Customer Information and or Service System
- SCADA
- Network Modeling and or Analysis Application

As with the functional requirements, the interface requirements should be documented in as much detail as possible and submitted to the project team for review and acceptance. Even though it may mean additional time in describing each interface, treat each individual interface as its own requirement and get input from the persons who are responsible for maintaining the application you intend to interface with. Be certain to take care to identify if the interface will be a one-way only interface or if it will be a two-way interface. Care should also be given to ensure that everyone understands and agrees with when and if any data will be updated by either of the systems and how that data will be maintained and validated in each system.

Prior to today's XML messaging and other interfacing middleware, this interface process was a manual coding process that was very expensive and once completed, very difficult to modify if needs changed over time. With today's interface tools the actual coding of the interface is almost a configuration procedure completed with drop down menus. This technology means that more systems can be interfaced to the GIS and future modifications to these interfaces to accommodate either data model changes or workflow changes can be completed faster and with fewer resources.

SITE ACCEPTANCE TESTING

The objective of conducting Site Acceptance Testing (SATs) is to test the functionality defined in the specification documents developed during the project and mutually agreed to between the client and the vendor. The product tests will demonstrate that the application components perform their defined functionality. The integration test will demonstrate that the applications work together as mutually agreed. If agreed to there may also be a test to demonstrate system performance during certain predefined functions.

Typically, acceptance tests of this nature are completed in 10-15 days for each SAT. SAT plans and scripts should be developed that can be executed in the time allotted and will fully test the delivered solution. Even with a good plan it should be understand that if the SAT can not be completed on schedule due to quality of the solution components, it is the entire project team's responsibility to support the test until the team agrees the delivered components meets the mutually agreed acceptance criteria. It should also be understood that the SAT test scripts should be adhered to with no deviation that would needlessly extend the time in SAT.

During the course of the testing, possible defects will be uncovered. These defects should be classified into one of the three following categories:

- <u>Priority 1</u>: The defect renders the software unusable or a critical task cannot be completed and there is no known workaround.

- <u>Priority 2</u>: The defect seriously affects production but there is a difficult workaround.

- <u>Priority 3</u>: The defect may affect production but a relatively simple workaround is available (if applicable) or the defect is cosmetic or represents a nuisance.

During the SAT, the project teams should hold daily "wash-up" meetings at which all identified defects are listed, given an agreed priority, and assigned for action. Also the status of defects that were identified from previous days will be reviewed in each meeting. These meetings will help the two teams ensure that all issues have visibility and are being addressed. It should be agreed that all Priority 1 and Priority 2 defects must be resolved prior to the close of SAT and acceptance of the system.

A common trap that many implementations fall into is a never ending SAT where testing continuing with no end in sight because defect resolutions keep being delivered and as the resolutions are tested new defects are discovered. There needs to be an end date to testing and then the vendor is allowed to resolve all defects and deliver the updated builds. After this time period, only those delivered fixes can be tested.

SAT testing is a critical component in ensuring that all expected functionality and performance has been delivered but it is not a means to request additional functionality. There will many times where users will say, “well it works, but not the way I expected it to work”. It takes a strong and knowledgeable project team to determine if this is truly a defect or just a user preference.

SYSTEM DEPLOYMENT

Although every department that will be accessing the GIS may want to use the system as soon as it has passed the SAT, it maybe more advantageous to roll the system out in a phased approach. The roll out can be phased by the same priorities that the applications were developed to maintain a consistent plan. Prior to any users being allowed to access the system in a production environment, an aggressive training plan should be implemented. There will be a certain number of people in the organization that were very happy with the way things were before having to use a new system and will be looking for any excuse to find fault. By placing every full time user in a hands-on training class the instances of false errors will be greatly diminished. These training classes can either be provided to the users by the GIS vendor or by a train the trainer program where a select set of super users are trained by the GIS vendor and it becomes their responsibility to train their fellow employees. Both methods have their advantages and disadvantages but the main focus should be on ensuring all users receive adequate training to perform their expected responsibilities.

SUMMARY

The implementation of a GIS involves three main areas of focus. These are:

- Design
- Development
- Deploy

Although all three are critical in the implementation process, the design phase is where the project is defined and the scope of effort necessary to complete the project is realized. By controlling the design phase of the project and ensuring that all team members understand and agree with the scope of the project prior to proceeding, the project has a much greater probability of success. The design phase is also where the most realistic project schedule is generated and a more accurate picture of what is in scope and what is not is developed.

Once the design phase is complete and the project progresses into the development phase, the project manager needs to closely monitor the project schedule to ensure that all deliverables are meeting the timeline and if not, making alternative plans. It is also during the development phase where the greatest possibility of scope creep will occur. While the applications and functionality are being developed it is very easy for users to request additional functionality that was not in original requirements. This needs to be watched closely and controlled before it gets out of hand and negatively affects the project schedule and budget. This scope creep is not always initiated by the users but can also be initiated by the developers themselves who while developing the code to support a requirement, go a little further and add functionality the was not originally specified. This may seem like a good thing but can lead to complications in SAT and interface requirements.

During the deployment phase, the most critical area to ensuring a successful project is the training. Without sufficient training, the project is at a high risk of not gaining users acceptance. No matter how successful the project is in regards to meeting the implementation schedule or staying within its budgetary constraints, if the users don't use the system because they don't understand the system the implementation is not a success.

These projects are judged on many success factors; schedule, budget, functionality, user acceptance, return on investment, and other internal criteria. The most important of these is user acceptance. The best way to ensure user acceptance is to fully understand what the users want to system to do for them, get the users involved in the initial design phase of the project, make certain the users agree with the final functional requirements, hold the implementation team to the project plan and finally have the users involved in the acceptance criteria and testing.