

Solicitation and Contracts for Data Acquisition and Maintenance

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ABSTRACT

Outsourcing data acquisition and maintenance is often a natural and sound business decision. However, many organizations have limited experience in soliciting such services. The techniques required to outsource data acquisition or maintenance services are in many ways as unique as the services themselves. The organizational knowledge developed in contracting construction, engineering, or other information technology services can be helpful but do not ensure a successful project.

The risks typically associated with data acquisition and maintenance projects can be mitigated through careful investigation and planning. The request for proposal must communicate the information that suppliers need to develop an accurate response and establish a framework that eases comparison of the proposals. A contract that reflects the unique circumstances of a data acquisition or maintenance project offers greater security than a standard contract for goods or services. This presentation will review key components of successful implementations to enable you to establish an effective outsourcing process and achieve your organization's goals.

I. Introduction

Imagine two individuals planning to build a new home. The first offers prospective contractors a picture of a house that he likes and a scope of work indicating that it should be at least 2,500 square feet, have four bedrooms, and be energy efficient. The second researches modern building methods, consults with an architect to develop a plans that meet her needs, and requests bids from contractors whose references she has already confirmed.

Many reputable contractors will refuse to submit a bid to the less prepared customer. Those that do must offer a building according to a standard plan that may not address the home owner's needs. This may not be discovered until construction has begun, at which point changing the plans will increase costs and delay completion. When the home is finished, any attempt to compare it to the buyer's original request will be subjective at best.

Obviously, the second customer is much more likely to be satisfied with the resulting home. Having pre-qualified the contractors, she knows that they are all capable of understanding and following her plans. Since the plans were well-researched and detailed, she is unlikely to encounter cost increases and schedule delays. Finally, when the house is complete, her plans will provide an excellent resource to objectively measure compliance with the contract.

This common sense conclusion also applies to data acquisition and maintenance projects. Surprisingly, however, many purchasers of geographic data and related services unwittingly follow the path of the first home owner described above. They release an RFP with a vague statement of work to vendors they happen to know. In the best case, a barrage of vendors questions causes them to cancel the solicitation and return to the drawing board. More commonly, they convey just enough information to receive quotes based on varying specifications, select one of the lowest prices, and battle through change orders when the proposed solution does not meet their previously unstated expectations. They make concessions and accept a data set that does not fully address their users' needs. Users resist implementation of the less than ideal data and they wind up abandoning the project or facing a substantial investment in improving the data.

No one intends to take this approach. It results from any number of factors such as budget constraints that preclude investment in thorough planning or schedule demands for quick acquisition of the data. Ironically, a poorly planned solicitation often leads to budget overruns and schedule delays, defeating the purpose of well meaning shortcuts.

This paper will assist in avoiding this fate. By making the proper investment in planning and contracting your project, you can save money and time by procuring a data set that meets your precise needs on the first try.

II. Pre-Solicitation

Perhaps the most important part of the solicitation process is what takes place before the request for proposal (RFP) is released. A thorough *needs analysis* will produce a comprehensive *requirements definition*, setting the stage for effective communication with data vendors. Depending on the level of expertise available internally in an organization, *professional consultants* may offer invaluable assistance in performing these tasks correctly.

A. Needs Analysis

The first step is talking to representatives of all of the people who will use the data to be acquired. Develop a questionnaire that probes their needs. What objects and attributes are included in the data they use today? Are all of these necessary? How do they use the existing data? What additional objects or functionality would increase the efficiency of their operations? What are their minimum expectations for the data to be acquired? What aspects of the data need to be updated and how often? Busy end users will

inevitably leave out important information in response to a general question about their needs. Asking pointed questions in an interactive environment will uncover much more detail.

The goal of such questions is to pinpoint the minimum content and accuracy requirements for the data. Content consists of the objects, attributes, and relationships necessary to support end user operations. In the context of typical land base data, the most basic data are simple street centerlines. The level of complexity is determined by the need to support functionality such as route planning, address mapping, and locating underground network facilities. Questions to be answered in this scenario include whether address ranges are sufficient or building footprints are required and whether standard right of way lines based on road classifications will suffice or actual edge of pavement vectors derived from aerial imagery are needed.

Accuracy presents a question of relative or absolute. If the data will be used as a reference for visually locating objects in the field, individual objects may only need to be accurate relative to other objects in the data. If objects will be located using global positioning satellite coordinates or if new objects are to be inserted in the data by automatically placing them based on such coordinates, then sub-meter accuracy may be required.

From a solicitation perspective, the most important consideration is not establishing the accuracy requirements, which is the responsibility of the end users, but defining them correctly. Since the type and level of accuracy can greatly influence price, overstating the requirements may lead to excessive cost that does not deliver a corresponding value. On the other hand, underestimating user needs for accuracy may result in the acquisition of a data set that cannot achieve the goals of the project.

Once the content and accuracy requirements are established, the second step of the needs analysis is researching the available data sources. These may include legacy data from within the organization (e.g., facilities data to be re-positioned relative to new data or work orders to be addressed during data maintenance), commercial-off-the-shelf data (e.g., satellite imagery, street centerlines), publicly available data (e.g., municipal parcel databases, county orthophotography, digital ortho quarter quads), and custom developed data (e.g., aerial photography, orthophotography, facilities field survey). Each available source should be evaluated relative to the accuracy requirements to determine what existing data may be leveraged for the current project.

B. Requirements Definition

The results of the needs analysis are documented in the requirements definition. The key factors to remember are to segregate requirements from desires and to be specific.

For instance, as suggested above, overstating the accuracy requirements of the data can increase cost unnecessarily. If the primary use of the data is as a visual reference for locating objects in the field and there are no immediate plans to utilize GPS coordinates, sub-meter accuracy is not necessary. The requirements document should

state that relative accuracy of data objects to one another is paramount and increased absolute accuracy is a desirable option. If GPS coordinates will be used but guiding the user to within plus or minus fifteen meters of the object will suffice, that should be stated in the requirements. For the data vendor, these varying requirements could mean the difference between a low cost solution relying on legacy data, a mid-level solution based on digital ortho quarter quads, and a high price custom solution necessitating new aerial photography or field inventory.

Two other important aspects of specificity are a data model and source matrix. While it may not be possible to create final versions of these documents at this stage, it is worth the effort to develop a draft. A data model reveals to vendors the precise objects, attributes, and relationships to be included in the deliverables, while a source matrix informs them of the existing data of which the acquiring organization is aware. There is no clearer way to communicate the data requirements and including such documents in the RFP, even in draft form, ensures consistency amongst proposals.

C. Professional Consultants

The preceding description provides only a basic idea of what is required for a comprehensive needs analysis and requirements definition. Some organizations will have internal resources that understand this process and have the technical knowledge of GIS to apply it in this context. For those that do not, a professional GIS consultant is a wise investment. There are numerous qualified individuals and firms that specialize in such studies. Leveraging their expertise early in a data acquisition can greatly reduce the difficulty and expense encountered in the later stages.

Organizations that conduct the needs analysis and develop the requirements definition internally may be able to secure some free consulting from data vendors. Contact sales staff from appropriate vendors and ask them what information they need in order to develop an accurate price proposal. They should at least be willing to provide a list of important factors and may even offer a questionnaire that directs their customers to collect the required information. The feedback they provide can be useful in measuring the completeness of the requirements definition.

III. Solicitation

The solicitation shifts the focus from communicating with internal users to communicating with vendors. Following *vendor identification*, the primary channels for reaching vendors will be the *request for proposal*, *pre-bid meeting*, and *proposal evaluation*.

A. Vendor Identification

In one sense, this is perhaps the easiest step in the process. A simple web search or visit to a trade show will reveal numerous candidates, in addition to those who have already made themselves known through advertising or sales contacts. The biggest difficulty lies in determining which candidates to include in the solicitation. Organizations

subject to regulations that require public announcement of solicitations have this decision made for them. Others have discretion to limit the number of participants and, thus, the number of proposals to be evaluated.

This is not a concern if there are a limited number of vendors who offer the required data or services. However, if there are numerous vendors and no discernible method to select the most reliable to receive the RFP, the consultant who participated in pre-solicitation may be able to offer recommendations or a request for qualifications may be in order. The latter permits a limited review of a larger number of vendors to eliminate those with less experience.

B. Request for Proposal

The quality of this document is among the primary factors in the success of a solicitation. It has two goals: conveying enough information about the project to provide vendors with a thorough understanding of the requirements and providing explicit instructions for the response format to facilitate comparison of proposals.

The key elements to include are as follows:

- Introduction: Provide an explanation of the acquiring organization's business and use of the data, background information on the project, and a summary of the scope of work.
- Project Specifications: Insert the requirements definition, omitting any internal confidential information or recommendations that are not necessary to prepare a proposal. Explain content and accuracy requirements in detail and attach copies of the data model and source matrix. Remember to distinguish clearly between mandatory requirements for the data and options that may be selected if the cost is not excessive. Also include any performance schedule requirements and mandatory deadlines, if applicable.
- Response Instructions: Explain the steps necessary to submit a response such as schedule milestones, where to submit questions, deadline for questions, pre-bid meeting requirements, number of copies required, and shipping instructions. Note that supporting information not specifically requested in the RFP (e.g., corporate brochures, technical papers, etc.) may be included only as an attachment, or exclude such information altogether. Make clear that proposals not conforming to the response requirements will be rejected without further consideration.
- Technical Proposal Format: Provide a mandatory response outline with instructions and/or questions detailing the expectations for each section. Possible topics to address include vendor background, financial information, location(s), number of employees, experience in similar projects, profiles of similar projects, client references, resumes of proposed project team members, project management procedures, quality management system, proposed schedule,

proposed technical approach, and explanation of any noncompliance with the project specifications. Consider detailing desired aspects of the technical approach, such as a prototype or pilot to allow an early review of the data. Specify what information (e.g., experience description, resumes, financial information, etc.) must be provided for subcontractors proposed for use on the project.

- **Price Proposal Format:** Specify a format so as to avoid difficult to compare variations (e.g., lump sums, unit prices, etc.). Provide a spreadsheet detailing enough information to enable meaningful comparison of proposals. Require express statement of any assumptions made to supplement the information provided in the RFP. Indicate whether the use of offshore labor is permitted.
- **Contract Terms:** Include a copy of the contract under which the project will be performed. Require vendors to identify any exceptions and propose alternative language.
- **Evaluation Criteria:** Describe how the proposals will be evaluated to encourage vendors to focus on the area(s) of most importance. If possible, assign a percentage value to each criterion (i.e., cost – 40%, experience – 30%, technical approach – 30%).

Be sure to allow adequate time for preparation of proposals. An unrealistic schedule may cause some vendors not to respond and will undoubtedly affect the quality of proposals received. Consider the time required for vendor review of the RFP, compilation of questions, response to questions, researching data sources, and preparing a proposal. A simple solicitation of “off-the-shelf” data may only take a week or two. For highly customized data acquisition or maintenance services, a month is more realistic.

While the RFP should detail the expectations for the project, it should not preclude innovative vendor solutions. If appropriate background information on the project has been provided, a vendor may identify an alternative approach that achieves the project goals at a lower cost or with other value-added benefits. The response format should allow space to describe such alternatives in conjunction with submittal of a compliant proposal.

C. Pre-Bid Meeting

For a complex solicitation, a pre-bid meeting can be valuable. It provides an opportunity to meet with vendors and allow them to ask questions in a shared, interactive environment. This can enhance their shared understanding of the project requirements and improve the consistency of the resulting proposals.

Two primary decision-making factors in determining whether a pre-bid meeting is appropriate are the scope and the complexity of the project. The scope must be large enough to justify the vendors’ investment in attending to ensure meaningful

participation. The project must also be complex enough to generate questions, clarifications, and further communication with the vendors. If a standard, defined data product is being requested, a clear RFP should provide all of the information required for a sound proposal.

D. Proposal Evaluation

Proposal evaluation for a large project will typically involve multiple reviewers. As in the earlier stages of the solicitation, expectations must be clearly communicated to the participants in order to select the most qualified vendor in an efficient and objective manner.

A common method is an evaluation score sheet that assigns a predefined number of points to various evaluation categories such as experience, technical approach, financial viability, references, staff qualifications, and price. The resulting totals from each evaluator provide a clear framework for further discussion.

This approach supports weighting of individual factors as suggested in the above discussion of evaluation criteria. As with any purchase, the value of experience relative to cost must be considered and the score sheet provides a mechanism for doing so. The lowest cost proposal may be revealed as risky by a low overall evaluation score due to poor ratings in the experience and technical approach categories.

It should go without saying that references should be contacted to verify the experience claims made in vendor proposals. Even though vendors will not intentionally provide bad references, the fact that several past clients will attest to the quality of a vendor's services does lend credibility to the proposal. Using a predefined questionnaire to delve for information can also reveal insights that may not otherwise have become apparent.

Vendor presentations are another technique to identify the best proposal. All vendors, or perhaps only the two or three with the highest scores, may be invited to present their experience and solution to the acquiring organizations project team. Vendors should be asked to bring the key staff proposed for assignment to the project to the presentation. This provides an opportunity to meet and ask questions of potential project partners, and perhaps view a sample of similar data if appropriate.

Presentations should be scheduled to last at least two hours. Shorter presentations tend to consist of a cursory restatement of the proposal and lack adequate time for questions. The objective is to learn more about the vendors and their solutions in a setting that permits an in-depth discussion.

IV. Award and Contracting

With a well written RFP and a responsive proposal, contracting with the selected vendor can be one of the easiest steps of the process. Negotiations will be limited to resolving any exceptions to the contract terms taken and any discrepancies between the RFP

scope of work and the technical proposal. Nonetheless, adequate time should be allowed for negotiation. The contract is arguably the most important project document and time should be taken to ensure that it is accurate and comprehensive.

Key elements to be addressed during contract negotiations include:

- **Terms and Conditions:** If using a standard contract, select terms that are appropriate for the scope of work. With the possible exception of photogrammetric services, a licensed profession in some states, data acquisition and maintenance projects have more in common with IT consulting services than construction or professional engineering. Fewer exceptions will be taken to the contract if the terms are applicable to the data and services in question. If the acquiring organization does not have an appropriate template, vendors may be invited to include standard contracts in their proposals for consideration.
- **Ownership of Data:** The assignment of ownership interests deserves special attention in data project contracts. Standard client terms normally transfer full ownership of anything developed for the project to the acquiring organization. This may be appropriate for a data maintenance project where the acquiring organization owns the source GIS data and the updates to be integrated into the data. When acquiring new data, however, vendors may not be able to transfer full ownership. Even if they can, it may be financially advantageous to allow the vendor to retain ownership of, and the right to resell, non-proprietary data (e.g., orthophotographs). In such situations, verify that the license rights in the contract include all of the activities for which the data will be used (e.g., rights to copy for internal use, prepare derivative works, etc.).
- **Scope of Work:** Clearly define all required deliverables and reference the requirements definition, data model, source matrix, and any other specifications with which the deliverables must comply. The project specifications section of the RFP and the selected vendor's technical proposal should contain most of the required information. The contract will supersede these documents in most cases, so ensure that all necessary details are included in the scope of work. To the extent possible, avoid references to specifications to be agreed upon during the project. When the time to agree on such specifications arrives, it can be difficult to determine precisely what was intended to be included in the scope of work.
- **Price:** The price will correspond to the accepted price proposal, as modified during negotiations. In addition to the standard price, it is worthwhile to state the assumptions and parameters on which the price is based and, if possible, the effect on the price if the assumptions and parameters change. For instance, a data acquisition price may be valid for a defined area. Including a price per additional square mile or other meaningful unit would make the cost of a change order predictable and easy to negotiate if the acquiring organization determines that additional areas should be mapped under the contract.

- **Acceptance Criteria:** Define the method and criteria by which compliance with the scope of work will be determined. The cost of one hundred percent accuracy is often prohibitive. In a data set with millions of objects, some error is inevitable. Distinguish between characteristics that can be checked via automated means (e.g., certain aspects of connectivity, compliance of attributes with data model definitions, etc.) and those that must be checked manually. One hundred percent accuracy may be required for the former but a reasonable error percentage should be permitted for the latter.
- **Customer Performance Responsibilities:** While the scope of work defines the vendor's obligations, it is also important to define the customer's obligations under the contracts. Examples may include providing source data, responding to vendor questions, and performing acceptance testing. Asking the vendor what is expected and documenting it in the contract helps to avoid a claim of delay to lack of customer support.
- **Schedule:** State deadlines for both vendor and customer obligation milestones, as well as requirements for deliverables.

Vendor exceptions to contract terms should be given fair consideration, which requires time for legal review and discussion. Even if all of the vendors exceptions are not accepted, offering a fair hearing sets the stage for cooperation during implementation. A "take it or leave it" attitude during contract negotiations may introduce an adversarial tone to the relationship before the project begins.

V. Contract Management

Project management in data acquisition and maintenance is a subject unto itself and is beyond the scope of this paper. Nevertheless, there are a few elements that relate closely to the contract document and merit mention:

- **Freeze Specifications:** The most successful GIS data projects have specifications that are developed during pre-solicitation and frozen during project implementation. While some minor changes may be necessary, attempting to begin implementation and work out a half-finished specification along the way is an invitation to increased costs and schedule delays.
- **Document Problem Resolution:** During implementation, questions of how to apply the specifications will arise and require resolution by the customer. Establish a system for submitting, tracking, and documenting the response to these questions. This will serve as a helpful reminder during acceptance testing and as a record of communication in the event of a disagreement over how a particular issue was resolved in the data.

- Prompt Acceptance Testing: Feedback on data products is a critical aspect of vendor communications. Performing acceptance testing promptly will identify any systematic process errors or errors resulting from differences of opinion concerning the specifications before they are repeated in subsequent deliveries.
- Change Management: Establish a change management process and use it to document every change in the project schedule, scope of work, and price. This may result in numerous change orders that do not increase the project price but most of them will be quickly and easily approved. They ensure a shared understanding of the requirements and an accurate contract document for use in measuring performance. The administrative burden may be eased by creating a change order template that can be used to efficiently document non-contested changes.

VI. Conclusion

Data acquisition and maintenance projects are often complex and labor intensive. Following the guidelines outlined herein will help to set the framework for success. Your data users, management, and vendor will appreciate the effort.

There are three things to keep in mind in order to ensure a successful data acquisition or maintenance solicitation. *Plan* your RFP by clearly defining your needs and expectations. *Communicate* your needs and expectations clearly to vendors in the RFP. *Cooperate* with the selected vendor to negotiate and manage a fair contract.