

# Fleet Management Information Systems Selection and Procurement

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A successful fleet management information system selection process merges a structured approach with the user's professional knowledge. Two series of structured questions define needs: those asked of the organization and those asked of vendors. The North Carolina Department of Transportation (NCDOT) defined the equipment and fleet management needs through the structured methodology brought by Keane, Inc., a consulting firm.

The organization must examine itself. These questions set the general direction, and are not expected to be firm or unchanging:

- What are the goals for the fleet management system?
- What information is needed to make strategic and operational decisions?
- What is currently being done?
- What functions and processes do the work?
- What other units must be kept informed about the work?
- What are the functional, hardware, and network requirements?

A strong discovery process will determine what is available in the market to potentially meet the goals and requirements developed. A request for information (RFI) adds detail. Vendors' demonstrations in response to RFI measurements show how they meet most needs, along with how well they understand the way you manage your fleet. Learn from them, but also teach them. Refine the RFI evaluation process to measure responses to the request for proposal (RFP). Then, construct the RFP. Put the identified requirements into clear, concise language. Next, use the evaluation plan developed in the discovery process to evaluate the responses. Finally, select a vendor. Once the vendor has been selected, NC Purchasing and Contract executes a contract to purchase the goods and services selected.

## INTRODUCTION

A successful fleet management information system selection process is the result of merging a structured approach with the knowledge of professionals who will be using the software. The consultant developed its Packaged Software Selection and Implementation (PSS&I) methodology to successfully guide clients through packaged software search initiatives, from initial search to conversion and rollout (1). The consultant and North Carolina Department of Transportation (NCDOT) applied the methodology in the Business System Information Project (BSIP).

A methodology should provide clear and flexible structural guides rather than rigid rules. Where appropriate, rearrange, remove, or revise entire activities to adapt to the specific needs of the organization. Add activities where the organization requires additional information. It is this knowledge of how to apply the methodology that the consultant brings to the project. The organization brings professional knowledge and purpose. When the knowledge of the consultant is merged with that of the organization, the resulting software selection has a much higher likelihood of satisfying the needs of the professionals across the organization.

A complete and flexible methodology, PSS&I has three distinct phases: Packaged Software Evaluation and Selection, Packaged Software Design Reconciliation, and Packaged Software Implementation. This document will focus on the first of these phases, Packaged Software Evaluation and Selection (1).



**FIGURE 1 Packaged Software Selection and Implementation methodology.**

## **PACKAGED SOFTWARE EVALUATION AND SELECTION**

A prerequisite to beginning this phase is the decision to select a packaged software solution rather than build a custom application. In the case of North Carolina, the roots of that decision date back to the mid-1990s, when NCDOT and the Office of the State Controller concluded that the statewide accounting system could not meet NCDOT's extensive and unique requirements. NCDOT's unique accounting system identifies funding sources and provides management control to projects that construct and maintain the State's transportation infrastructure. Since the State's accounting system was not project oriented, the agencies jointly agreed that NCDOT would explore the packaged financial software marketplace to see if there was a fit. Equipment and fleet management, considered integral to the projects and financial systems being analyzed, was included in the software selection effort. BSIP resulted from that agreement, and subsequently identified and analyzed needs throughout NCDOT (2). This has resulted in an RFP for a financial management information system, which includes a fleet management system. This paper will address the fleet management system (FMS) portion of that effort.

Understanding of the information system requirements is essential in the selection of an appropriate software package. Current and future requirements must be considered to ensure that the recommended solution addresses both the short- and long-term needs of fleet managers at every level of the organization. A software application's functional capabilities must be considered in conjunction with the culture, stability, and stated future

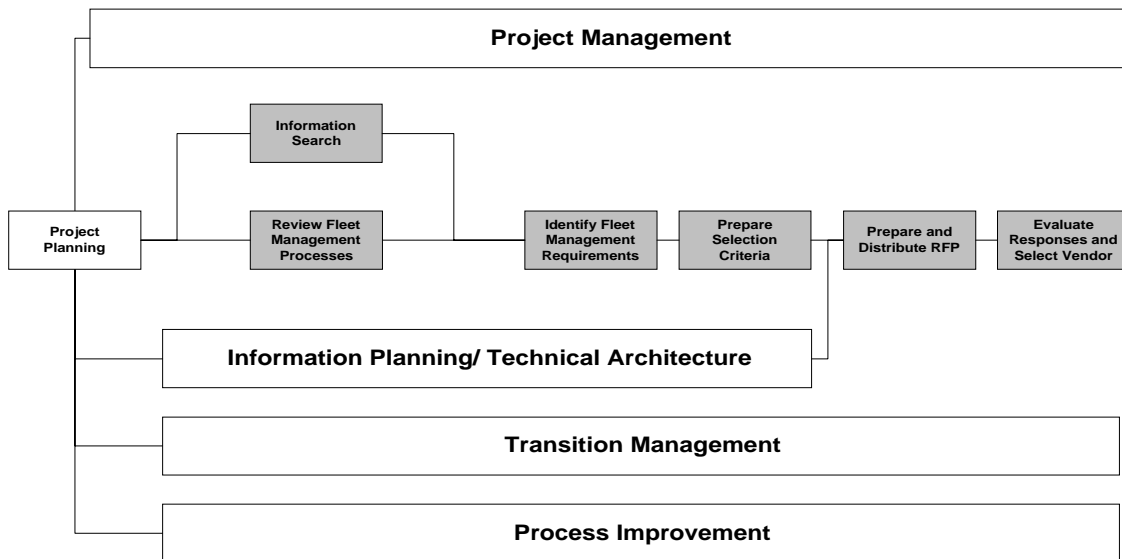
direction of the vendor. When governmental agencies and commercial software vendors will be working together for years, selecting an appropriate software vendor as a business partner is a challenging task.

A packaged software selection is made based on both the functional capabilities of the software and its fit to the target hardware environment. The preferred solution will satisfy requirements in both of these areas.

The objectives of the Packaged Software Evaluation and Selection phase are definition of the business and technical requirements that must be satisfied by the packaged software application, preparation of detailed selection criteria against which to evaluate vendor proposals, preparation of the RFP, and selection of appropriate packaged software based on business, technical, and business partner requirements (1).

Extensive interaction between the fleet management professional staff and the consultants is required during this phase, in both interview and workshop settings. There are basically two kinds of questions: those asked of the organization and those asked of vendors who hope to supply the software system. In our case, NCDOT defined the equipment and fleet management needs through the methodology brought by the consultant. In the project with NCDOT, BSIP adapted the consultant’s PSS&I methodology to use a five-path approach: Project Management, Software Selection, Information Planning and Technical Architecture, Transition Management, and Process Improvement.

For each path, BSIP formed teams composed approximately equally of NCDOT professionals and the consultants. Each team worked separately to develop its area requirements and to collaboratively maintain a common understanding of activities, requirements, and direction. Four of these paths—Project Management, Information Technology, Transition Management, and Process Improvement—are briefly discussed. Software Selection (the shaded path in Figure 2) is the focus and is discussed in more detail.



**FIGURE 2** NCDOT Software Selection model.

## Project Management

A project is a specific activity, with a discrete beginning and end, that produces predetermined results (3). The management of each project poses unique problems, yet all projects have common characteristics. Understanding these characteristics and their ramifications can change project management from a “work hard and hope for the best” effort into a rational process. In data processing, the term “project” usually refers to the installation of an entire system. The PSS&I methodology definition allows a different interpretation. Each phase is self-contained and can be a complete project in itself. The first phase, Packaged Software Evaluation and Selection, as adapted for NCDOT, has five paths. Each path consists of one or more activities, has a distinct beginning and end, and produces predetermined results or deliverables.

The consultant’s project management methodology, Productivity Management™ (PM), is the first activity in each phase of all the consultant’s projects. An ongoing process of accurate task definition, progress reporting, and integration of proven management principles into tasks, PM is a set of project management guidelines that helps ensure the delivery of quality products on time and within budget. Many project management techniques seem to assume that management of a technical undertaking requires a highly technical approach. The consultant’s PM has a different perspective. Simple and effective, it applies equally to managing all projects. PM is results-oriented and emphasizes the management and leadership of people. PM is based on six principles (3):

1. *Define the job in detail.* Determine exactly what work must be done and what products must be delivered. Explicitly evaluate the environment and address all assumptions.
2. *Involve the right people.* Involve the appropriate users throughout the project, particularly during planning. Involve the appropriate data-processing people. Ensure that each member of the project team participates in defining the goals of the project, including his or her own goals.
3. *Estimate the time and costs.* Develop a detailed estimate of each phase of the development process before undertaking that phase. Estimate components or activities of the job separately. Avoid premature precision. Do not estimate what you do not know.
4. *Break the job down.* Break the job into “tasks” that require no more than 80 hours to complete. Ensure that each task results in a tangible product. The 80-hour rule provides the framework for scheduling and assigning tasks, identifying problems early, confirming time and cost estimates, and evaluating project progress and individual performance.
5. *Set up change procedure.* Recognize that change is an inherent part of systems development. Establish a formal procedure for dealing with these changes and ensure that all parties agree to it in advance.
6. *Agree on acceptance criteria.* Determine in advance what will constitute an acceptable system. Obtain written user acceptance of products throughout the project so that the acceptance is a gradual and progressive process rather than a one-time event at the end.

Project Planning, the first activity within the Project Management path, is critical to the success of the Packaged Software Evaluation and Selection phase. Phase details, such as a detailed project work plan, will be finalized and communicated to all key project stakeholders and project team members.

As work progresses through the life of the plan, communication with user representatives will be ongoing. This is especially true when potential vendors are contacted and information received must be summarized and presented to project stakeholders. In order to minimize the risk of project delays, it is imperative to establish all necessary lines of communication during this start-up activity.

The project sponsor plays a key role in these preliminary tasks to reinforce the commitment of senior management to the project. This should facilitate the acquiring of personnel and resources throughout the project. All necessary project team orientation will be performed during this activity. To minimize the risk of resource conflicts at a later date, all project stakeholders should be made aware of their required involvement for the duration of the project. An additional consideration, one that is not a part of the software selection process but should be part of management's planning, is supplementary staffing. This staffing, either temporary or permanent, is necessary to perform the daily duties of project team members who have been re-deployed on the selection and implementation efforts.

### **Information Planning and Technical Architecture**

In this path, the technical architecture requirements for the packaged software must be determined and documented. This will involve extensive interaction between the technical Information Systems (IS) staff and the project team. The technical architecture team develops its requirements in collaboration with the other teams. It must ensure that the selected package fits into the NC Statewide Technical Architecture approved by the NC Information Resource Management Commission (NC IRMC). Technical requirements needed for the RFI should easily transfer to the RFP document, and should be timed to be complete as the RFP is prepared for distribution. Architecture limitations that affect the selection of a particular software package should be identified. All processing and transaction volumes should be identified and quantified. Technical architecture considerations include current and future hardware platforms, existing legacy systems and associated interfaces, remote access requirements, number of anticipated system users, database requirements, and performance requirements (4).

### **Transition Management**

Any system change of magnitude implies a host of accompanying non-system changes. Large amounts of energy are often expended in the selection of new software and hardware, but very little energy is put toward the impact these changes will have on the organization and its culture. New hardware and software will demand some fleet management processes to change, but more importantly, new hardware and software will free the organization to streamline and improve processes constrained by the current system. New technology alone will not increase productivity. Organizational and

procedural changes must also happen. Managers must integrate the technology, business processes, and organizational structure to achieve the goals they expect from technology (5).

Change is difficult for any organization; by definition, change is part of the implementation of any new system. Planning is necessary to meet the challenges of change. BSIP's five-path approach provided the opportunity to separately examine potential opportunities for change. All proposed changes have organizational impacts. Transitional issues are identified by envisioning the proposed changes in the context of the operational environment in which they will be implemented, comparing them to the current operational environment, and determining their impact. Methods must be in place to resolve the identified issues. Training, documentation, and organizational structure support the successful implementation of the software.

### **Process Improvement**

Often, as a result of examining the present system to determine the requirements for a new system, immediate modifications come to light, modifications that can improve the way the organization manages the fleet. Some of these initiatives require minor, easily implemented modifications to the current system. Others may only require procedural or policy changes. Where these initiatives can be implemented prior to a new system's being put into service, a method to get them in place should be established. NCDOT took a proactive stance on process improvement by analyzing and immediately implementing minor software changes, as well as some work process improvements, along with the software evaluation activities.

There are other benefits that come with the implementation of these initiatives. The organization will reap quick benefits while waiting for the long-term benefits that will result from the new system. The field organization is shown that this is not a management-oriented exercise without real, tangible benefits. Actions taken to implement improvements, especially those derived from field interviews, produce a positive attitude from the very beginning and maintain enthusiasm for the project throughout the entire cycle.

### **Software Selection**

The goal of the Software Selection effort is the selection of one or more software solutions to meet fleet management information requirements. This begins with a review of the current market place, conducted partly through standard market research techniques, but primarily through an RFI followed by vendor demonstrations. Following the evaluation of materials received through the RFI process, an RFP is prepared to evaluate and select the appropriate solution. The result of this effort will be the acquisition of a suitable software solution.

Activities in the Software Selection path are the focus of this paper. The activities are listed below, as well as in the shaded boxes shown in Figure 2: Review Fleet Management Processes, Information Search, Identify Fleet Management Requirements, Prepare Selection Criteria, Prepare and Distribute RFP, and Evaluate Responses and Select Vendor.

The purpose of these activities is to select the optimum package for the organization. Two sets of questions are the means to do so. First are the questions asked of the organization to define its software needs. Second are the questions asked of vendors to determine their ability to meet those needs.

Review Fleet Management Processes, Identify Fleet Management Requirements, and Prepare Selection Criteria are activities that ask questions of the organization. These questions define the current fleet management functions performed, requirements for the future, and selection criteria, including the prioritized importance of the functional requirements.

The Review Fleet Management Processes and Identify Fleet Management Requirements activities provide functional details required to perform the mission of the organization. The Prepare Selection Criteria activity develops a set of measurements used to identify the vendor's ability to meet the requirements developed in other activities. An early set of mandatory and highly desirable criteria is developed to measure the responses to the RFI. These criteria are refined and expanded as the RFP is prepared for distribution.

The Information Search activity asks questions of the vendors. It allows vendors to demonstrate new features and enhanced capabilities. It also defines the vendors' stability, growth, and future direction, as well as their software packages' potential abilities to meet the requirements. These questions and demonstrations increase the organization's knowledge and add to the detailed requirements in the RFP.

The three purposes of the Information Search activity are to expand the organization's knowledge about what capabilities are available on the packaged software market, to provide the organization with a clear base of understanding about vendors' packaged software capabilities in relation to specific requirements, and to add detail to the requirements in the RFP.

Demonstrations of software packages in real-life scenarios developed by the project team allow fleet managers and shop supervisors who will eventually be using the software to see how generic packaged products perform the functions they use daily.

The Prepare and Distribute RFP activity uses all that has been learned in earlier activities to develop clear requirements. Technical requirements gathered by the Information Planning and Technical Architecture team are brought into the Software Selection path for inclusion in the RFP. The Process Improvement path provides input. Lessons learned in the RFI process are incorporated in the RFP, and the RFP is issued.

The final activity in this path is the ultimate purpose of the entire phase. Evaluate Responses and Select Software applies the evaluation criteria to the responses received from vendors. The team may request additional demonstrations and may also travel to locations where similar installations that use the vendor's packages have been installed. At the end of this activity, the selection of the preferred software and vendor is complete. Each of these activities is discussed in the following paragraphs.

### *Review Fleet Management Processes*

Any software selection project, especially in a state government agency, does not exist in isolation. It is important to know the current environment, the relationship to other units

within the department, and possibly the relationship between other state agencies or departments. This activity begins by developing a high-level perspective of the current organization and its strategy, goals, and objectives.

The strategy statement, usually derived from existing organizational literature, is important in that it provides a guidepost for understanding the relationship of fleet management to the overall purpose of the department. With the strategy stated, specific goals for fleet and equipment management can be determined.

This review identifies objectives and essential functional capabilities used to drive the selection process for the packaged software. Four to five bullet points list overall objectives for the packaged software and relate to an organizational strategy to be enabled by the software. They should be fairly specific on any functional process objective such as reducing equipment downtime, reducing specific costs, providing information support for certain processes, and so forth.

The fleet's functional processes are mapped so that a high-level understanding of the organization can be developed. Next, the target processes are identified. Critical to success, target processes are required and form the core of the functional requirements. Large-scale software selection requirements are described here. This activity is the major input source in identifying the fleet management requirements.

This task is simpler if the organization has previously undergone a process mapping exercise to document the fleet management processes. If the organization has undergone a re-engineering exercise, then the redesigned processes should be considered as the target processes rather than the current processes.

The review of key process inputs and outputs involves interviews, work review sessions, and focused facilitated sessions to add depth and detail to the organization's target processes. Workshops and facilitated sessions were held across the state. Personnel at every organizational level contributed, including Division superintendents, office managers and data-entry clerks, shop supervisors, mechanics, and inventory and parts people.

This task gathers all the information required to develop detailed data flow or relational diagrams of the current processes. This includes the inputs to a process or sub-process, the outputs of that process, and any system interfaces or reports. Copies of relevant input forms, reports, and screens are used to determine data elements. Emerging requirements for the new system are documented.

### *Information Search*

The purpose of this activity is to develop or expand the fleet management professionals' base understanding of existing software package capabilities as solutions that can possibly satisfy their functional requirements. There are five tasks within this activity: Market Research, Preparation and Distribution of the RFI, RFI Assessment, Demonstrations, and Qualitative Assessment. This activity can occur in parallel with the Review Fleet Management Processes activity (see Figure 2).

**Market Research** This initial activity begins to identify suitable software packages and to determine potential software vendors. It involves a high-level investigation of software vendors in order to assemble a list that could satisfy the application's requirements.



Possible criteria include technical environment (such as target hardware and/or specific architectural configurations), specific database management system, fleet management software modules required, essential or market-specific functional requirements, and geographic location of the vendor.

The initial search can be made from a number of information sources, including an on-line vendor database, the Internet, industry publications, previous project experience, and fleet managers' and consultants' industry knowledge and contacts. Using knowledge gathered in the initial search and early requirements gathered in the Review Fleet Management Processes activity, the BSIP team prepared an RFI.

**Prepare and Distribute RFI** The BSIP team expanded its review of the current marketplace by issuing an RFI to equipment and fleet management information systems vendors. The RFI asked the vendors if, and how, their software could meet the requirements. Each vendor was encouraged to participate in this RFI process in order for NCDOT to consider the impact of its product on business practices and vice versa. No vendor was excluded from the RFI process, or from the subsequent RFP process.

The Software Selection, Information Technology, Transition Management, and Process Improvement teams worked together to develop an RFI that would solicit a full set of information from vendors. The RFI was constructed similarly to an RFP, so that later restructuring for the RFP would be minimized. The RFI solicited information about vendor characteristics; software upgrade history; available and recommended training; functional requirements; technology and architecture requirements; cross-functional requirements, such as reporting tools, security, and ease of use; and software, implementation, and ongoing costs (6).

**RFI Assessment** The RFI process provided both NCDOT and vendors the opportunity to learn. NCDOT gained knowledge about software applications available on the marketplace and also became more aware of how software functions could change the way it does business. This, in turn, sharpened the ability of NCDOT to clearly state requirements. Vendors gained an appreciation of the way NCDOT accomplishes its mission, and some vendors learned that it is not a good idea to insist that NCDOT perform a function to match their software.

The biggest challenge of this task is to determine the high-level screening criteria in parallel to determining the technical architecture and business requirements. The target business processes may not be prepared at the time that this task starts; however, a cursory understanding of the processes is sufficient to determine the high-level screening criteria (1). The teams work together to develop the criteria. The initial criteria are later expanded and modified to become the evaluation criteria for the RFP.

Systematic assessment of responses to the RFI informed NCDOT about vendor package capabilities and their applicability to NCDOT. The assessment process illustrated for NCDOT staff the discipline of software evaluation in preparation for the RFP cycle.

Information received from vendors during the RFI process was also used to develop high-level systems implementation and ongoing cost estimates. This provided NCDOT with the base information required to decide how best to proceed. The cost estimates were used to estimate funding for subsequent phases.

NCDOT conducted an initial assessment of responses to the RFI. After receipt of their response to the RFI, the software selection teams contacted vendors for further explanation. A key point is that packaged software vendors may respond positively to any criteria they can even remotely satisfy, although the way in which they satisfy the criteria may involve extensive workarounds (1). Telephone calls with NCDOT fleet managers and consultants participating often clarified some key points of RFI responses.

The responses were read by each of the teams and placed into one of three categories: appears to meet all or most of the requirements with only minor, or no, modifications; appears to meet some requirements, but would require extensive modifications; and does not appear to meet the requirements.

Keeping in mind that the RFI was for information gathering, and that no vendor could be excluded from the RFP process, NCDOT decided to focus on four vendors assigned to Category 1. This does not imply that only four were assigned to Category 1, but that NCDOT, with time limitations, decided to focus on four. The four vendors were invited to present demonstrations of their software packages.

**Demonstrations** Demonstrations were held to review software and technical functions and to generate ideas for potential process improvements. Demonstrations were scheduled with at least a day in between for review and documentation. Demonstration scripts or business case scenarios (BCS) outline the agenda, as well as some specific fleet management scenarios for the vendors to demonstrate. This avoids demonstrations that are “canned” marketing presentations and ensures more thorough demonstrations relevant to specific requirements (6). BSIP developed the BCS as a standard platform to allow each vendor to demonstrate its ability to meet NCDOT’s fleet management requirements. Software and procedural details, modified by the Process Improvement team’s analyses, were included. Within reason, the BCS balanced NCDOT’s requirements against what the vendors could provide. The scenarios attempted to supply an appropriate level of detail about NCDOT fleet management functions to the vendors, so that their resulting demonstrations would use information to which NCDOT staff could relate. At the same time, the vendors were expected to develop their demonstrations in a manner that made sense given the flow and functional capabilities of their product, versus proceeding bullet-by-bullet through the scenario.

**Qualitative Assessment** Several mechanisms captured comments and qualitative assessments of vendors. The project teams provided feedback after they read a vendor’s RFI response, throughout a demonstration, and through post-demonstration review meetings. A preliminary impact analysis of these packages identified the top positive and negative effects on fleet management as a result of implementing the product. Demonstration attendees differentiated between impacts of implementing a new FMS regardless of the specific package and impacts unique to a specific package. Any new system selected would impact NCDOT’s business processes in a number of ways. A specific package may have separate impacts on the processes.

Attendees were asked to identify each package’s strengths and weaknesses. The review solicited their concerns about the package, as well as about how they thought NCDOT would have to change its business if the package were implemented, and how the package would be an advantage to NCDOT.

The preliminary assessments were not intended to rank, score, or pre-qualify vendors or their products. They did assist BSIP in determining the feasibility of using vendors' packages to meet NCDOT's fleet management functional and technical requirements.

The Information Search activity and its successor, Identify Fleet Management Requirements, are iterative. Responses to the RFI and successive demonstrations provide increased awareness of application capabilities and identify additional fleet management requirements. The repetitive process of recognizing new capabilities and distilling and clarifying current requirements is one of the primary benefits of the RFI process.

### *Identify Fleet Management Requirements*

The purpose of this task is to review all relevant documentation and to identify and document the resulting fleet management requirements for the packaged software. This documentation typically includes the interview notes and process maps developed in the previous activity, as well as impact analyses from the demonstrations. Other documents include strategic planning documents, organization charts, relevant consulting studies, and so forth (I).

Fleet management requirements must include functional requirements that maintain information about the equipment and provide equipment operations with management tools; interface and integration requirements that connect the FMS with other NCDOT and state systems; security requirements; administrative requirements; data base management requirements; standard reporting requirements; query capabilities requirements; ad-hoc reporting requirements; and legacy system (data) integration and conversion requirements.

Fully documented functional requirements constitute a major portion of the final RFP. As such, the fleet management information system's functional requirements should be prepared in such a way that they are easily included as the RFP is written.

### *Prepare Selection Criteria*

The purpose of this activity is to identify criteria against which packaged software solutions will be measured and to establish an objective method to evaluate vendor proposals. Its goal is to determine if a vendor's product could satisfy the requests through the product's current capabilities, customization of functional options and table entries within the standard product, customization of the product's software, development of non-packaged custom solutions, and use of enabling technology.

As noted in the paragraphs on process improvement, this activity may also identify opportunities for improvement to the current system. The opportunities identified should be transferred to the parallel Process Improvement path, for analysis and possible inclusion in process improvement efforts. This activity comprises two tasks: Identify Selection Criteria and Establish Scoring System.

**Identify Selection Criteria** Based on functional and technology requirements, the project teams must prepare appropriate selection criteria to aid in determining the successful vendor. It is essential that the criteria system accommodate both qualitative

and quantitative selection criteria and allow automated measurements where possible. BSIP constructed proposal characteristics, mandatory technical requirements, and highly desirable technical requirements. Specific proposal characteristics are evaluated as part of the RFP. Included in the proposal characteristics is information about the vendor. NCDOT recognized that multiple vendors could associate in a partner relationship to meet RFP requirements. In order to maintain a single point of contact, they required that a primary vendor submit the proposal, with information about every member of the proposed relationship. Important considerations concerning vendors include number of years in operation, size of current installation base, financial viability and stability, and local support facilities (7).

Mandatory requirements were those that the fleet managers and field personnel considered as absolutely necessary for the new software to have as a part of the system. NC Purchasing and Contract (P&C) rules demand that all mandatory requirements be met. A “No” response to any mandatory requirement automatically removed the vendor from further consideration.

Highly desired features were those that the fleet managers and field personnel felt added value to the core mandatory requirements. No vendor was expected to offer all of the highly desired features. Each vendor whose package offered the desired feature(s), or who was able to modify the package to accommodate the feature(s), was required to identify the cost to provide that capability.

It is important to develop criteria to assess the vendor’s functional and technological vision during this task, despite subjectivity of such an evaluation. There is often a tension between software functionality and technology architecture. For instance, vendors who have converted from older platforms may have transported the functions without taking advantage of graphical user interface features available with newer technologies. The selection criteria should measure effective use of technology.

**Establish Scoring System** A scoring system is not necessarily an objective means of evaluation. The process one goes through to assign points can be subjective and not necessarily based on facts. In devising its scoring system, NCDOT strove to be as objective as possible. The vendor was required to respond to each requirement with one of four values (7):

1. System can accomplish requirement using existing capability.
2. System will accomplish requirement with package modification and will be included in future releases of the package without custom modification to the North Carolina package.
3. System will accomplish requirement with modification and will *not* be included in future releases of the package. Each future release will require custom modification to the North Carolina package.
4. System cannot accomplish feature.

Mandatory requirements only receive values of 1 through 3. Highly desirable features can receive a response of any of the four scoring values. For each desirable feature that receives a score of 2 or 3, a corresponding line in the Cost Proposal requires a cost estimate of the effort to implement. This scoring method takes customization issues into

consideration. It is an advantage to NCDOT if the vendor includes custom modifications in the core software package for future releases. If the vendor does not follow this practice, then the selection criteria must determine the methodology the vendor has in place to maintain the custom portion of the software as new releases are implemented.

### *Prepare and Distribute Request for Proposal (RFP)*

NCDOT's goal was to construct true, accurate, and complete requirements. The purpose of this activity is to construct the requirements and supporting information for distribution to vendors in order to accomplish that goal. Within governmental agencies, an RFP usually has a structure and boilerplate content specified by the purchasing unit. Most purchasing units require technical proposals to be completely separate from cost proposals. NCDOT worked closely with the NC Department of Administration's P&C organization to construct an RFP that would provide NCDOT with the optimum fleet management information system. This activity has two tasks: Prepare and Validate the RFP, and Issue the RFP.

**Prepare and Validate RFP** The RFI process gave NCDOT a running start toward the true, accurate, and complete goal. Vendors who responded to the RFI provided feedback to NCDOT. The business case scenarios (BCS), along with vendor demonstrations of those scenarios, provided an additional method of clarifying requirements. Ambiguous requirements either created numerous questions from vendors or inadequate responses. In either case, the result was that the ambiguous requirements were revised prior to inclusion in the RFP. The RFI process enlarged the scope of NCDOT's thought processes. Requiring the vendors to follow the BCS as closely as possible created a familiar arena for the demonstration attendees. When this method was coupled with the vendor's application of the BCS to the demonstrated software systems, new ideas were generated about the way NCDOT's fleet managers and field personnel could do business. This in turn created additional requirements beyond those of the RFI or BCS. The software selection teams began an iterative process of writing the requirements and reviewing them with professionals in their functional areas. Field focus groups, followed by fleet management interviews, determined which were to be mandatory requirements, and which highly desired features. The teams emphasized P&C's rule demanding that a vendor must meet all mandatory requirements. After several reviews, the functional area stakeholders signed a statement agreeing that the requirements were true, accurate, and complete.

The technical RFP was organized into four main sections, with appendices at the end. The objective was to clearly present the information once, eliminating redundant or confusing information. The sections were designed to be read in the order presented. Each section contains the following information (7):

1. *Introduction*—describes the purpose and organization of the RFP, provides the contact list, and defines some terminology.
2. *Request for Proposal Process*—explains the various activities and details of distributing the RFP, submitting proposals in response, evaluating the proposals, and awarding contracts.

3. *Background*—defines scope, outlines key aspects of NCDOT’s business environment as it exists today, and presents background information.

4. *Requirements*—divided into Software and Implementation Services. It also provides Functional Narratives, BCS, and supporting documentation.

5. *Appendices*—provides glossaries, additional reference information, and links (where it was not feasible to include the reference and supporting information).

In the cost RFP, it is critical to identify all costs, both one-time and ongoing, associated with each proposal so that a fair comparison may be made. One-time costs will typically include hardware, software (both system and vendor application software), implementation services (training, documentation, and so forth), and estimated cost of packaged software modifications, based on the gaps between the vendor’s package and the fleet management requirements.

Ongoing costs will typically include such items as hardware maintenance, software maintenance and support fees, network and telecommunication costs, and any costs associated with the upgrading of skills of technical and other support staff.

Each of the vendor’s RFP responses will differ in the number of workdays for modifications and interfaces as well as in the mix of required resources. The purpose of this task is to quantify the costs of these modifications and interfaces, and to identify any additional implementation costs. Costs were required for licensing, modification to meet mandatory requirements, implementation of service, facilities (for example, space, utilities, telephone, and insurance), and so forth. Highly desired features required costs for each group of defined features. In order to maintain fairness in evaluation, vendors are required to provide a cost for each defined group.

**Issue RFP** NCDOT and P&C issued the RFP by posting it on their Internet Web site and providing a CD-ROM. No paper copy was distributed. A one-page notification was distributed to those vendors on the RFP vendor list maintained by NCDOT and P&C. Text similar to the notification letter was also placed in public newspapers. Vendors could request a CD-ROM copy of the RFP from the designated P&C contact. NCDOT required that proposals be submitted in a combination of paper and electronic media. For both the technical and cost proposals, one signed paper original and two electronic copies were required. The cost proposal response to the RFP consisted of costs for the mandatory requirements and lines for each group of highly desired features.

#### *Evaluate Responses and Select Software*

**Activity** As with most governmental agencies, regulations prescribe a specific sequence of activities to evaluate software proposals. North Carolina’s sequence is (7)

- Issue RFP
- Submission of Vendor Questions
- Pre-proposal Conference
- Issue of RFP Addendum
- Proposals Due

- Proposal Evaluation
  - Site visits and demonstrations
  - Final technical proposal evaluation
  - Open cost proposals
- Contract Award and Execution

A less tangible but nevertheless important aspect that can be evaluated, but not used to exclude a vendor from the selection process, is the fit of the vendor “culture” to the fleet management environment. This is important because there will be a substantial implementation project with the selected vendor. Since fleet managers and field personnel will be working closely with the vendor over an extensive time period, it is important but not mandatory that they be compatible. At the time this paper is being prepared, the RFP has been issued, but vendor questions have not yet been received.

**Evaluation Methodology** The method NCDOT will use to evaluate responses to the RFP, developed in cooperation with P&C, allows a degree of flexibility in selecting the optimum package. A team of evaluators representing the various interests of the State will be formed. The team will be responsible for reviewing all technical proposals and evaluating each proposal based on its technical merit. Cost proposals will be opened and evaluated by the NCDOT team, in conjunction with P&C, only after the technical proposal evaluation has been completed and viable proposals identified.

The first evaluation is of proposal characteristics. A proposal will be excluded unless all proposal characteristics are satisfied. Vendors that satisfy the mandatory proposal characteristic criteria will have their technical proposal evaluated.

Technical proposals have two levels of evaluation. Upon receipt and opening of each proposal, responses to the software requirements will be examined and evaluated. Proposals that do not meet all of the mandatory requirements will be eliminated. The mandatory requirements will be evaluated using the schema devised in the Prepare Selection Criteria activity. Vendors must respond with values of 1, 2, or 3. A value of 4, or a “system cannot accomplish” response, is not a permissible response to a mandatory requirement.

Next, each highly desired feature will be evaluated, using the schema devised in the Prepare Selection Criteria activity. Responses to the highly desired category will also be evaluated using the description associated with each feature.

Vendors may be asked to demonstrate their software to NCDOT using the BCS prepared. These demonstrations, in contrast to those performed in the RFI process, are designed to determine the validity of the vendor’s responses to the RFP.

Site visits may be optional, depending on time, budget, and range of proposals received. The purpose of a site visit is to further investigate vendor reliability and strategies by visiting an installation of the vendor’s system. Vendor site visits can be a valuable way of validating vendor development and support in a similar operation. Visits should be to an operation similar to that in which the selected package will be implemented. Another state’s fleet operation in which the vendor has an installed system would be ideal. Barring that, NCDOT and the vendor will cooperatively identify a site that is as similar in size and operation as possible. Preparation is required to determine

who is going, what material is required, and what operations should be the focus at the vendor site. The persons performing the visit must have a clear method of evaluating the focus operations. Each person should complete an objective and subjective evaluation of the visit.

At this point in the final technical proposal evaluation process, NCDOT will have determined that a set of vendors meets all proposal characteristics and all mandatory requirements, that the set of vendors has demonstrated solutions that meet NCDOT requirements, and (through site visits) that the vendors have exhibited their installed operations in a similar environment.

The final technical proposal evaluation reviews the evaluation team's analyses from the demonstrations and site visits. Based on these analyses, NCDOT expects to be able to determine that a vendor's proposed solution to a mandatory requirement or highly desired feature is unacceptable. NCDOT will be able to exclude a vendor that meets all of the mandatory requirements but is unable to meet the highly desired features that NCDOT determines is critical to its business operations. The final technical proposal evaluation concludes with one or more vendors whose proposals are technically acceptable.

Upon NCDOT completion of the technical evaluation, the cost proposals of firms whose technical proposals are technically acceptable will be publicly opened. The total price of fulfilling the requirements plus the total price of the selected highly desired features offered by each firm will be tabulated. Lowest price will then be used to select the product that meets all of the mandatory requirements, plus the set of highly desired features that NCDOT determined as critical to its fleet management operations.

**Contract Award and Execution** Award of a contract to one vendor does not mean that the other proposals lacked merit, but that, all factors considered, the selected proposal was deemed to provide the best value to the State. At this point the State will enter into negotiations with the selected vendor to resolve issues related to options, hardware, support, terms and conditions, and other items.

## CONCLUSION

NCDOT has worked through the Packaged Software Evaluation and Selection phase of the consultant's PSS&I. It has been a long and tedious process, but one that has been and will continue to be rewarding to NCDOT. Among the benefits of going through the process is that the next phase (Packaged Software Design Reconciliation) and its successor (Implementation) will be easier. They will not be easy, but certainly easier, due to the discipline, knowledge, and relationships developed in this phase.

A set of expectations has been established. The methodology is flexible enough to select a software package to fit organizational needs as varied as financial and equipment operations. The needs of fleet managers, shop supervisors, inventory clerks, and mechanics were included in the RFP.

NCDOT examined its functional requirements, constructed an RFI to determine market capabilities to meet those needs, and required vendors to demonstrate their product in a real-world environment. As a result, the NCDOT knows more about its



needs and how it does business. It knows how to tell vendors and consultants exactly how it wants a particular function to work, and it knows not to be satisfied with protestations that the vendor's way will do it just as well. This skill will be increasingly important in the Design Reconciliation and Implementation phases. NCDOT has constructed an RFP explicitly stating its requirements and measurement criteria to determine the optimum package for the State.

BSIP is a fine example of merging methodology and professional knowledge. The RFP is solid evidence that NCDOT professionals expect top value for their State's dollars. The NC IRMC has determined that the RFP is a new statewide model for organization and approach for all of North Carolina's future procurements of packaged software solutions. The software package selected and implemented will enable NCDOT's fleet and equipment managers to more accurately measure the performance of their equipment, and to extract the maximum value for the State's equipment expenditures. Keane, Inc.—and, in particular, the author—have been proud to be a part of the process.

## REFERENCES

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