CHAPTER

4

CREATING THE PACS REQUEST FOR PROPOSAL AND SELECTING A VENDOR

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The selection of a PACS vendor that can meet the needs of the healthcare enterprise can be a complex and painstaking process. A well-written request for proposal (RFP) is a key step in this process. Although it may be tempting to short cut this process and simply request proposals and/or quotations from the vendors in which you are interested, it is important to understand that a well-written RFP should satisfy the following objectives:

1. The RFP should provide information about the site to enable the vendor to provide a solution that best matches the unique requirements of the site. This should minimize the time required to communicate requirements verbally to each vendor individually.
2. The RFP should establish a framework for contractual requirements related to system function, implementation, training, and service and support.
3. The RFP should create a format for responses that facilitate vendor comparisons. This provides a mechanism for "leveling the playing field" among vendors.

All of these objectives should all be kept in mind as guidelines when drafting the RFP. In addition to these objectives, it is useful to consider a few further guidelines.

1. The RFP should be written as a functional specification. Specifications are written as a list of requirements (e.g., "The monitor shall be blue.") It is helpful to structure the RFP so that each requirement is defined by a single statement in a uniquely numbered paragraph. Additional clarifying language may be used to help in the interpretation of the requirement.
2. The RFP should not overprescribe or engineer the solution. It is important to distinguish between requirements and design. The key is to clearly describe your operational requirements and allow the vendor to describe how his solution meets the requirement. If you have no specific requirement regarding some aspect of the specification but rather have either a preference or a desire to simply know the specification (e.g., in order to compare it with other vendors' offerings), it is appropriate to request the vendor to define the specification for the system being proposed.
3. Before writing the RFP, it is important to consider what your primary evaluation criteria and process for vendor selection will be (see "Vendor Evaluation and Selection Process" later in this chapter). The evaluation and selection process will be facilitated if you can structure your RFP around these criteria and include content in the RFP that will solicit responses that easily differentiate the vendors from each other.
4. It is helpful to include forms that encourage vendors to summarize and condense their responses so that you can compare vendor responses side by side. This format, however, may constrain the

responses to the extent that you may not get as much detail or explanation as you would like. It is best to provide formats for both summary and detailed responses.

RFP CONTENT

INTRODUCTION

The introduction should include general information about the healthcare enterprise (e.g., descriptions of each site, number of beds, medical specialties, and any plans for expansion). General information can also include a statement of the enterprise business strategy and a description of the healthcare market in the local area (e.g., population, competition, etc.). This section should also include information about the Radiology department (e.g., the imaging services offered at each site, total number of procedures), a list or table of imaging modalities at each site, and general information about the professional practice (e.g., number of radiologists in the practice, number of radiologists reading during peak hours, etc.).

This section is provided as information to the vendor and generally does not require a response.

STRATEGIC GOALS

You will want to include a section outlining the strategic goals you hope to achieve with PACS and how the realization of these goals will contribute to strategic objectives of the enterprise as a whole. This section should communicate the expectations the stake holders have of PACS and a sense of the prioritization of these goals. This section is provided as information to the vendor and generally does not require a response.

CLINICAL OPERATIONS OVERVIEW AND REQUIREMENTS

The vendor needs to understand the unique aspects of your clinical operations and workflow and any general requirements or expectations that you have of a PACS to support your workflow. This section focuses on those aspects of your clinical operations that you believe will either impact or be

impacted by PACS. You will want to describe both your current workflow and how you envision the workflow in a PACS environment. You should include scenarios to describe both the pre- and post-PACS workflow and request that the vendor describe how his system will either optimize this workflow or be impacted by it.

This section is intended to both provide information to the vendor and to solicit general responses from the vendor that describe features that might not easily be described in a technical specification. In general this will break the rules of defining functional specifications in simple normative statements, but this section can give the vendor an opportunity to describe features of his product offering that you may not anticipate in the technical specification and that may, in fact, provide value in your environment.

SITE-SPECIFIC OPERATIONS

For multisite operations, characteristics of the workflow that are unique to each site should be described. If each site has a unique HIS and/or RIS or independent master patient index, this should be highlighted. Patient registration, scheduling, and exam order entry should be described for each site.

IMAGING-MODALITY BASED OPERATIONS

For each imaging modality, the workflow description should include exam scheduling, patient registration, exam order entry, patient identification, image acquisition, quality assurance, introduction of images to PACS, and any unique requirements (by modality) for diagnostic review and reporting. Workflow and processes that are unique to handling STAT exams should be described. Any paper processes that are in place should be described with an eye towards replacing these processes with an electronic analog. Some measure of peak throughput and staffing should be provided as a part of the description. The workflow should be evaluated and described for each site and area (e.g., outpatient vs. inpatient vs. ED).

Imaging modalities described should include the following:

- Diagnostic X-ray
- Portable X-ray
- Computed tomography (CT)

- Magnetic resonance imaging (MRI)
- Ultrasound (US)
- Nuclear medicine
- Special procedures
- Mammography (if included for PACS)

DIAGNOSTIC REVIEW

This section can include information that would detail your vision for workstation deployment. This would include how many radiologists could be reading simultaneously, from which locations, and the division of work within the department. Additional workstations to support physical proximity of radiologists to imaging services they support should also be included. The section should also describe how exams would be reported, key image presentation functions to be used, and how the report transcription and approval functions work.

CLINICAL REVIEW

Most of the requirement for clinical review is typically addressed by general purpose PC's using a web browser to access images in the PACS. Clinicians in areas such as ED and ICU that rely heavily on imaging services and routinely make treatment decisions without the radiologists' final interpretation may want dual monitor workstations with high-brightness monitors to more closely approximate the diagnostic workstations used by the radiologists. This section should describe your expectations of the needs of the clinicians, specific medical specialties, locations, and expected deployment for clinical review workstations.

You may also wish to describe the physical locations of physicians' offices for your major referrers and how you expect to provide access to any physicians that require access to images remotely from the main facility.

EXTERNAL SYSTEMS

Describe any other systems that will need to have access to images from the PACS, such as radiotherapy, surgical planning, or another PACS.

TELERADIOLOGY OPERATIONS

Describe how exams would be acquired and transmitted from remote sites to the PACS or viewed remotely by a radiologist at home or a remote teleradiology service. Describe how reports would be handled. Focus on needs and requirements, not on technology.

TECHNICAL REQUIREMENTS

SYSTEM ARCHITECTURE

The RFP should request the vendor to provide an overview of the system architecture and provide specific information regarding the architecture that would help to differentiate vendors' solutions.

Examples are:

- Platform (e.g., Unix, Linux, MS Windows)
- Web-based vs. Hybrid (Client/Server diagnostic workstations + Web distribution
- All images online vs. online and nearline hierarchical storage
- Redundancy features
- Architecture for multiple sites

CORE SYSTEM

The core system of the PACS includes all hardware and software necessary to support the acquisition of images, image storage/archive, database management, image management and image retrieval. The RFP should describe these components in a general way, specify the requirements for each, and ask the vendor to describe specifics regarding each of these.

IMAGE ACQUISITION The RFP should list all current and planned imaging modalities, including vendor, model number, age, software revision level, and supported DICOM services classes for each. The RFP should require the vendor to assume responsibility for the success-

ful integration of all modalities. For modalities that cannot be made "DICOM ready," with a software upgrade, the RFP should request the vendor to propose a solution to interface to the modality. The RFP should request that the vendor describe the architecture used for image acquisition and to describe the upgrade path for adding additional modalities, for example, if additional acquisition hardware is required. The vendor should be asked to describe the mechanism by which validation of image data against RIS data occurs for modalities that do not have DICOM modality worklist functionality. The vendor should also describe if the technologist is provided with feedback when validation fails and the means to correct any exams that fail validation.

ONLINE STORAGE Online storage, typically RAID storage, is the primary storage component of the PACS and is used to store images that are available for fast retrieval of newly acquired studies. Current storage costs have made it economically feasible for many vendors to configure PACS so that all images are available online, expanding storage as needed to accommodate newly acquired images. The RFP should estimate projected storage requirements over the life of the PACS or provide enough information for the vendor to make this estimate. Online storage capacity is heavily dependent upon the ability of the vendor to store priors in lossy compressed format (while preserving the original uncompressed or lossless compressed image in long-term storage) and the willingness of the site to utilize this technique to reduce storage costs. If this is a desirable strategy, the RFP should state this as a requirement.

Many sites are beginning to consider an enterprise storage strategy for all their storage needs, purchasing storage directly from a storage vendor. This decision is frequently driven by PACS. If this is the direction to be taken, the RFP should specify that the PACS be compatible with the preferred storage vendor. If storage is to be purchased from the PACS vendor, the RFP should specify how much online storage is required initially.

LONG-TERM ARCHIVE AND DISASTER RECOVERY Long-Term Archival (LTA) storage is required for legal archive, backup, and disaster recovery. The RFP should require that the vendor specify the total capacity of the storage device used. If the site has a preference for the technology to be used (e.g., DVD, tape, content-addressed storage), the RFP should

specify this. You will want to include a requirement for the vendor to describe their disaster recovery plan including an estimated length of time to restore the system to operation and the length of time required to restore access to prior exams. In addition, the vendor should describe how offline (shelf) storage is managed.

If the online storage will not be expanded to accommodate all prior exams and the LTA is to be used as a nearline storage device, the RFP should require that the system automatically retrieve images from the LTA if unavailable in online storage in response to an ad-hoc query or selection from a worklist. In addition, pre-fetch of relevant priors should be supported and require the vendor to include a description of the algorithm used to pre-fetch prior exams.

The RFP should request that the vendor describe available image compression used in conjunction with the LTA and if compression is a requirement, the RFP should state this.

DATABASE MANAGER The database manager in PACS systems is utilized to store the patient and exam data, maintain pointers to the image data to permit efficient retrieval, track exam statuses (e.g., acquired, validated, and dictated), store user account information, and maintain system information (e.g., DICOM parameters for each modality). It effectively serves as the "memory" of the system with the Image Manager serving as the "intelligence" of the system.

PACS vendors typically imbed a commercial off-the-shelf database management product to implement the PACS database (e.g., Oracle, MS/SQL, Sybase) and if it is important to you to know which one, and/or you have a preference, the RFP should state this.

The database manager is a single point of failure in a PACS and if you want optimal reliability, you will want the vendor to specify redundant database servers with automatic failover. The RFP should request the vendor to describe included or optional redundancy features.

A unique feature of a PACS database is that it grows indefinitely as exams are acquired. System performance may be adequate at the time of installation, but as the database grows, if the database manager hardware and software is not specified and configured to support the potential growth in the database size, system performance can degrade over time. The RFP should require that the database manager maintain system performance for at least five years of operation.

The vendor should provide the hardware and software necessary to automatically backup the database to removable media with no human inter-

vention. The RFP should also request the vendor to describe the database restoration procedure.

The vendor's response should describe how data that was entered incorrectly can be corrected, and what tools are available to effect these corrections.

The RFP should require the database manager, in conjunction with all applications that access the PACS database, to be compliant with all regulations associated with HIPAA, including security and auditing.

IMAGE MANAGER The Image Manager typically handles functions related to how images are introduced and moved through the system. The RFP should request that the vendor describe these and specify features that you consider to be a requirement. Examples are as follows:

- Automatic archiving to the near-line archive
- Automatic purging of the online storage archive
- Automatic retrieval from nearline archive in response to ad hoc query
- Pre-fetch of prior exams from nearline archive
- Validation of data against exams scheduled in the radiology information system (RIS)
- Autorouting to an external device
- DICOM query/retrieve
- DICOM Copy

RIS INTERFACE

A robust interface to the RIS is key to supporting the overall radiology workflow. The RIS interface is necessary to support the following PACS functionality:

- Modality worklist management support for any modality that has DICOM worklist management as a feature.
- Validation of data sent to PACS from any modality by comparing key data fields in the image header against data fields from the RIS.
- Display of diagnostic reports on PACS workstations.
- Automatic pre-fetch from the nearline archive (jukebox) based on scheduled exam information from RIS.

The RFP should specify the site's RIS, including the software revision level. If scheduling is done in a different system, and support for pre-fetch is required, the scheduling system should also be specified. The RFP should require that an interface to the site's RIS be included in the proposal and request a complete description. In addition, the RFP should specify that the functions listed above be supported.

You will want to specify if you want film-based exams and their associated reports to be available in the PACS. Exams completed prior to the PACS implementation may require a historical data upload. You should specify both requirements in the RFP.

DIAGNOSTIC REVIEW WORKSTATION

The diagnostic review workstation is by the radiologist for primary interpretation and is one of the most important components of the PACS system. Its functionality will significantly impact the radiologists' productivity and it is therefore important to carefully specify the requirements for this component. A suggested organization for specifying these requirements is as follows:

- General System Requirements
- Monitors
- User Interface and Profiles
- Worklists and Queries
- Diagnostic Report Display
- Examination Display and Arrangement
- Image Display and Paging
- Grayscale Operations
- Image Orientation, Zoom, Pan, and Magnifying Glass
- Region of Interest, Distance and Angle Measurement
- Image Annotation
- Image Identification
- 3D Processing
- Hard Copy Printing
- Speech Recognition
- Scanned Documents

In addition to the explicit response to the requirements, the RFP should invite the vendor to describe other options available either directly from the vendor, or via a third party, for example, advanced 3D processing, Orthopedic templates, Nuclear Medicine, Computer-Aided Diagnosis, etc.

A more detailed discussion regarding diagnostic workstation functionality and a source for deriving requirements can be found in Chapter 17.

IMAGE DISTRIBUTION VIA WEB SERVER

Most enterprise PACS deployments include the ability to provide images to users outside of the department of radiology. The use of a Web server in conjunction with the hospital Intranet and Internet allows for distribution inside and outside the hospital walls. The Web server can secondarily support radiologists providing off-hours coverage by making images available for review on a home PC. Some PACS vendors now have Web-based PACS implementations where the there is no distinction between the diagnostic workstation and the functionality provided to the clinician other than the monitors used and the privileges granted to the user. Many vendors, however, have a client-server application for the diagnostic workstation and a separate Web-enabled application used for enterprise distribution of images to desktop PCs. In general, the functionality of the Web-enabled application will be a subset of that offered on the diagnostic workstation. Many vendors are moving toward a common user interface between the two products distinguished only by the inability of the Web product to mark an exam as having been dictated and the lack of integration with third-party software packages (e.g., advanced 3D).

The RFP should specify the minimum functionality required for the Web-enabled image distribution subsystem and invite the vendor to fully describe the functionality of their Web distribution offering.

CLINICAL REVIEW WORKSTATION

In clinical areas that are heavy users of radiological services, such as the ED and ICU, it may be useful to deploy dual-monitor viewing stations to provide the ability to view AP and lateral, or current and prior true-size chest images simultaneously. Vendors whose diagnostic workstation products differ

significantly from their Web-distribution products will sometimes offer an "intermediate" clinical review workstation product that more closely resembles their diagnostic workstation for clinicians whom feel they need functionality equivalent to that of the radiologist. The decision regarding which software product to deploy in these areas should be made after selecting the vendor based upon the suitability of the Web-distribution product to each area's needs. If any of the vendors you are soliciting have products that are intended for this application, you will want to include a specification of the functionality required for these clinical areas. The RFP can invite the vendor to simply respond with how their clinical workstation offering differs from the diagnostic workstation.

TECHNOLOGIST Q/A WORKSTATION

Depending on your intended workflow, it may be helpful for technologists to confirm the successful transmission of studies to the PACS, to have the ability to "fix" study information that does not correlate with corresponding RIS data, view historical exams on PACS, and to print images from PACS in response to requests from referring physicians. Ad hoc printing is a capability you may also wish to provide to the film library. Some vendors provide these capabilities via a web client which can be accessed from any PC, however many vendors require at a minimum a software license for each workstation or PC that has this software installed. You will want to specify the minimum functionality required by the technologists and film library.

NETWORK

The RFP should include a description of each site's networking infrastructure, including both the local area network (LAN) and the wide area network interconnecting the sites that will have PACS deployed or will be utilized for enterprise distribution. The description should include the vendor(s) and models used for the core routers and switches, bandwidth, and services that provide the wide area network connections. The PACS vendor should be asked to respond regarding the suitability of the existing networking infrastructure and to propose any upgrades they believe necessary to achieve acceptable performance. In addition, the RFP should request the solicited vendors to propose any additional storage cache hardware that would be needed to minimize traffic on the wide area network connections.

SYSTEM THROUGHPUT AND PERFORMANCE

System performance in PACS is of importance primarily to the radiologist using the display workstation. This section should define performance requirements for the PACS that the vendor will commit to. Performance requirements should be defined based on a reference set of images which would define a typical study for CR, CT, and MRI. Ultrasound and Nuclear Medicine studies are typically less demanding so these do not need to be included. Performance benchmarks defined can be as follows:

- Image load time from selection from the worklist to appearance of the first image
- Time to display the complete study
- Time to display the results of a database query (note that this is for display of a list of studies; not the images in a study)
- Time to display images retrieved from nearline archive (if this is applicable)
- Time to send a complete study from the modality and display on a workstation

Most vendors will hedge their response based on their inability to control network traffic, so it is appropriate to include language that requires that the defined benchmarks be met presuming that non-imaging networking traffic is negligible.

IMPLEMENTATION PLAN

It is important that the vendor understands your environment and has an overview of your vision for the rollout of the system. Some departments will want the "big-bang" approach where the entire system is installed in the department and the transition covers every area of the department at once. The disadvantage to this method is the disruption to the department and the demands that are placed upon the deployment staff to ensure the process is successful. In addition, this approach may place demands on the financial resources of an institution that cannot be met. An alternative to the "big bang" is a phased implementation with each phase focusing on a specific objective. This type of conversion has less of an impact on operations and allows the staff to be trained sequentially as each phase is rolled out.

Typically the first phase focuses on project planning, communication, and implementation of the infrastructure, including networking, PACS core components, HIS/RIS interface, modality upgrades and DICOM integration, and EMR interface.

The following phases focus on implementation within the radiology department. This can proceed either by modality or by site, with digital modalities (CT, MRI, US, NucMed) being implemented first, followed by general radiography (plain film x-ray) and mammography. For most sites, implementation of general radiography requires conversion to computed radiography or digital radiography, and implementation of mammography requires conversion to digital mammography, both of which represent a major investment. Postponing implementation of these modalities until later phases can ease both the cash flow and the demand on human resources.

It is typically recommended that electronic distribution of images throughout the enterprise be planned as the final phase of the PACS implementation. This gives radiology the opportunity to fully absorb the technology, refine processes and procedures, and adjust workflow to optimize the use of the new technology before having to address the change management required to convert the whole enterprise to utilization of soft-copy distribution of images.

The RFP should present a high-level implementation plan to the vendor to provide an understanding of the resources you will expect from the vendor for a successful deployment. The vendor should be required to present a proposed implementation plan that meets your expectations and includes the following elements:

- Vendor support to be provided, including specific personnel.
- Qualifications of staff assigned to the implementation
- Equipment to be installed during each phase.
- Amount of time the vendor expects to spend on-site.
- Staff support required by the department
- Proposed implementation timeline
- Costs associated with each implementation phase.

TRAINING

A robust training program is an absolute necessity for a successful PACS implementation. This section of the RFP should define your training requirements and give the vendor enough information to realistically esti-

mate the resources that will be required. Training should include the PACS Administrator, radiologists, technologists, clerical staff (including film librarians), and clinicians. The RFP should estimate the number of personnel in each discipline that will need to be trained.

The RFP should solicit the vendor to describe their training methodology for each user category and outline the number of hours of training to be provided. The vendor should be asked to specify if training is to be provided in a classroom or one-on-one setting and which training modules include hands-on training. The vendor should be required to specify if they intend to provide end-user training or follow a train-the-trainer strategy.

Required reference materials, such as manuals, online help, computer-based training, reference cards, etc. should be specified by the vendor in this section. The vendor should be asked to specify if their training includes a competency-based evaluation to validate that trainees have effectively absorbed the material covered.

SUPPORT AND MAINTENANCE

Vendor support and maintenance throughout the implementation and life of the PACS is a key component of the services that a PACS vendor must provide in order to maximize the benefits that PACS can provide. The RFP should specify your expectations for the following services:

- Project planning and installation
- System reliability, uptime and response time
- Warranty
- Maintenance and support

PROJECT PLANNING AND INSTALLATION

This section should solicit the vendor(s) to describe their implementation methodology and explicitly state the site's expectations regarding the vendor(s) responsibilities.

The following are some specific areas to cover in the RFP:

- Project management services
- Installation of all vendor-supplied system components

- Interfacing of imaging modalities
- Interfacing to the existing laser printers
- RIS interface validation
- User training

SYSTEM RELIABILITY, UP TIME, AND RESPONSE TIME

This section of the RFP is most likely be the area of greatest contention in the entire process. This is where the customer will be reducing the profitability of the sale by increasing the service levels that the vendor is being held against. This is where the customer needs to insist and only bend if the vendor offers another area of savings that is just as advantageous. Be careful here; what may seem as a good deal financially may be at the sacrifice of prudent clinical services. To ensure these requirements force compliance, financial penalties should be assessed for each violation. It is imperative that the practice keep independent records of downtime in order to ensure compliance.

This section of the RFP specifies your expectations regarding system up-time and the vendor's response time to resolve critical problems. For the new initiate, it is important to note that only a few tenths of a percentage of guaranteed uptime can work out to a significant amount of time. For example, if the customer agrees to 99.5% uptime, this means that the system can be off-line for only 4 hours a month whereas when the uptime guarantee is 99.95%, downtime is restricted to 20 minutes per month. In most practices, a 4-hour outage per month would be unacceptable, particularly if it was a single 4 hour outage that occurred during peak hours.

The industry standard is to distinguish between downtime that renders the entire system unusable and downtime affecting a single component such as a workstation or single modality interface. You will want to require that the core system be held to 99.9% uptime at a minimum. The other aspects of the PACS system relating to clinical viewing, web-distribution, and near-line storage can be held to a different service level agreement such as 99% uptime.

The vendor(s) responses will also typically distinguish between planned (e.g. software upgrades) and unplanned downtime, with planned downtime being exempt from the requirements. Distinctions may also be made between downtime experienced during "normal business hours" and "off-hours" where the impact to the operation may be somewhat less severe.

This section should also solicit the vendor(s) to commit to a maximum response time to reported problems. The RFP should distinguish between remote support and onsite support. The majority of problems with PACS can typically be handled remotely, but hardware problems require onsite support, and most vendors will not commit to less than 4 hours to dispatch a service technician for onsite support. It is important to keep in mind the geographic location of the vendor's support team closest to your institution and the RFP should request that the vendor(s) indicate where their onsite support personnel will be dispatched from.

To ensure these requirements force compliance, the RFP should define the financial penalties to be assessed for each violation, typically in the form of an extension of the warranty or service contract or a replacement option for hardware components that repeatedly cause downtime. It is imperative that the site keep independent records of downtime in order to ensure compliance.

WARRANTY

Standard warranty coverage for PACS is typically one year, with some vendors offering only 90 day coverage on hardware: The RFP should define the site's expectations regarding the warranty. Examples of areas to cover are:

- When the warranty starts
- Length of the warranty
- Coverage (e.g., parts and labor)
- Service response time during the warranty period
- Software upgrades to be included during the warranty period
- Penalty clauses for failure to meet the requirements of the RFP

MAINTENANCE AND SUPPORT

Maintenance and support should always be negotiated at the time of the initial PACS purchase since this is when the customer has the most leverage. The RFP, as a precursor to the contract should therefore define the site's expectations and attempt to get the vendor to commit to a service pricing for coverage for the expected life of the system. The vendors quotations should include options to purchase on an annual basis or commit to a more

extended coverage period in return for guaranteed pricing. This is the area of the RFP that will define the ongoing relationship between the customer and the vendor. The most important negotiation point that can be passed along in this book is that NOTHING IS STANDARD, especially in the PACS industry.

Below are some key points to be covered in the RFP are:

- Request for quotation of one year and four year contract
- Specification of ordering and payment terms
- Penalty clauses for failure to meet the requirements of the RFP
- Coverage details (e.g., parts, labor, software upgrades)
- Expected software release schedule (e.g., quarterly, biannually)
- Operating system(s) security patches and antivirus software updates
- Support mechanisms (e.g., telephone, Web submissions, e-mail, etc.
- Priority levels for incident reporting (e.g., critical, urgent, high) and the associated guaranteed response times
- Call escalation procedures
- Maintenance activities, if any, that are the responsibility of the site
- Costs associated with on-site technical support
- Minimum qualifications of staff assigned for technical support

VENDOR INFORMATION AND SELECTION SCHEDULE

This section gives the vendor an overview of the response expectations and details regarding the process for the response and final vendor selection.

- Confidentiality and nondisclosure
- Format for the response
- Selection schedule
- Remittance of proposals
- Contact and procedure for submitting questions regarding the RFP
- General response requirements
  - Primary vendor contact person
  - Overall responsibility for delivery, implementation, and maintenance of hardware, software, and services

- Conformance to federal, HIPAA, state, local, JCAHO, and American College of Radiology requirements.
- Delivery of works-in-progress
- Evaluation criteria
- Evaluation process
- Disclaimers

APPENDICES

The appendices provide information to the vendor that may not be conveniently presented in the body of the RFP or that is cross-referenced by multiple sections of the RFP. Recommended examples are:

- List of modalities and their supported DICOM service classes
- List of laser printers
- Exam volume broken down by site and modality
- Growth projections broken down by site and modality
- Estimated storage requirements broken down by site and modality

RESPONSE FORMS

In order to facilitate the comparison of multiple vendors, it is helpful to provide a response form that vendors are required to complete. The response forms should force the vendor to respond in a tabular format with summarized responses that facilitate comparison of critical requirements, features, and vendor capabilities. In preparation for designing these forms, it is helpful to map out the criteria you will use for evaluating the vendors. Once this has been determined, the forms can be designed to assist with the differentiation of vendors around these criteria. Some suggested response forms are as follows.

GENERAL DESCRIPTION OF THE VENDOR

Include year established, company ownership (e.g., private, public), parent company, number of personnel in R&D, Sales & Marketing, Service & Support, gross revenues and net income from PACS, R&D investment.

CLIENT BASE

Include number of sites live, implementing, and contract signed for current year and two prior years. Also include number of sites which are more than 70% filmless.

CLIENT REFERENCE

Include site profile (e.g., institution name, number of beds, exam volume, HIS/RIS) and contact information.

TECHNICAL REQUIREMENTS, TRAINING, AND SERVICE AND MAINTENANCE

These forms can be structured to mirror the corresponding sections of the RFP. The response forms should not necessarily replace a comprehensive response to these sections of the RFP, which is used to insure compliance to a specification, but should rather be designed to highlight major differences among vendors.

ITEMIZED PRICING

This form is perhaps the most important of all, as it not only facilitates comparison among vendors, but requires the responses to provide line-item pricing for each major system component. Forcing the vendor to expose the detailed cost structure of the purchase gives the site added leverage in the negotiation.

It is recommended that pricing for software and hardware be broken out separately, and that line-item pricing for each major component described in the RFP (e.g., PACS core, Web server, modality interfaces, HIS/RIS interface, diagnostic workstations, clinical review workstations) be required. The form should also include pricing for systems integration, implementation, training services, and extended maintenance services. This gives you the ability to compare pricing for a software-only purchase, for the grand total including services, and for the total cost of ownership over the life of the PACS. Line-item pricing also gives you the ability to estimate costs if you wish to adjust the purchase to either add or eliminate individual line items or, for example, to increase the number of workstations.

DISTRIBUTING THE RFP

The first temptation after all the hard work that went into the creation of the RFP is to send it out to every PACS vendor the site can think of. Remember that for every RFP you send out you will receive a response ranging from 100 to more than 500 pages. Reviewing these can be challenging.

Based upon the work that has gone into the RFP, the site should have a very good idea of its requirements. With some homework, you should be able to narrow down the number of possible vendors to a manageable number. You can further refine that list by requesting vendor presentations at your site or by visiting any of the tradeshows featuring radiology vendors. Once a manageable list of vendors (4 to 6) is determined, the RFPs should be sent out with a firm due date giving the vendors 4 to 6 weeks to respond.

Vendors should be given a contact for clarification of any questions they may have regarding the RFP. If inconsistencies or ambiguities are uncovered during this process, it is best to provide clarification to all vendors to insure a level playing field among all vendors, and that individual vendors are not making erroneous assumptions based on their interpretation of the RFP.

VENDOR EVALUATION AND SELECTION PROCESS

REVIEW PROPOSALS

Once the proposals are received the process of reviewing each in detail begins. The review should ensure that all the requirements outlined in the RFP have been responded to properly and that the answers to the questions are relevant to the requests made of the vendor. This can be a tedious task, but it is one that is quite important to ensure that improper assumptions are not carried forward into the evaluation process.

Selection of a PACS is typically done by a committee in order to ensure that the views of all critical stakeholders are incorporated in the decision process. Few members of the committee will have the time to review in detail the entire response from all vendors, so it is helpful to summarize the responses in a tabular format, laying out all vendors' responses side-by-side in a comparison table. This can be done by utilizing the responses to the forms included in the RFP. The summaries should then be distributed to the members of the selection committee for their review.

CLARIFY QUESTIONS

Prior to proceeding with a decision, it is important to clarify any omissions or ambiguities in the vendor responses and to ask the vendor to revise their response appropriately. If discrepancies are discovered between the responses and the RFP, it is a good idea to review how the request was stated and if it needs further clarification. This clarification should then be distributed to all vendors as it would be if the ambiguity was discovered before the responses were due.

MODEL THE DECISION

Once the responses have been evaluated and summary information compiled, it is suggested that some form of decision model be used to help facilitate the decision process, and to make it as objective as possible. The decision model forces the stakeholders who are involved in the decision to base their decision on an agreed-upon set of criteria and can help prevent a decision based on a single criteria that may seem to be overwhelmingly important, or the bias of a single member of the selection committee.

The recommended process is to establish a set of criteria by which the vendors will be evaluated. A set of "attributes" or subcategories for each major criteria should also be established to facilitate the rating of each criteria. Each major criteria should be weighted in relationship to other criteria based upon the perceived value to the site. For example, if "technology" is an agreed upon major category and it is perceived as the most important, then it can be weighted as a "10." If "price" is the next most important criteria, but is considered to be somewhat less important than "technology" then it can be weighted as an "8." Other criteria can then be weighted in comparison to these criteria. Attributes within each category should also be weighted in comparison to one another. The total of all attribute weights within a single criteria should be consistent across all major criteria.

The decision model, including the criteria, attributes, and assigned weights should be developed by consensus of the selection committee. Once the model has been developed, vendors should be rated against each attribute in relationship to one another. It is suggested that a rating system of 1 to 5 be used, with a score of 1 indicating a weak rating for a given attribute and a score of 5 indicating a strong rating. Rating can be done independently by each selection committee member, and then averaged across all committee members' responses. Each attribute score is then weighted by the agreed-upon model and the weighted scores totaled for each vendor. The highest score "wins."

Scoring is typically based on the responses to the RFP, but committee members should also rely on their knowledge of vendors' products and reputations gleaned from demonstrations at trade shows, onsite presentations, reference checks, experience of colleagues, prior experience with individual vendors, and so on.

An example of the decision model described is shown Table 4.1 below. It is helpful for the model to be created in a spreadsheet format, so that weights and ratings can easily be changed.

During this process it can be very helpful to employ an independent facilitator who is not invested in the outcome to guide the development of the decision model and facilitate a discussion of the scoring. If the facilitator is involved in the RFP review process as well, and is knowledgeable about the vendors being considered, the process can potentially be streamlined by using the facilitator to provide a "straw horse" scoring model that can then be adjusted by the consensus of the committee.

If, after the model is developed, the ratings established, and the total scores tallied, the results are not consistent with the apparent leanings of the committee, it may be appropriate to re-evaluate the model, adding criteria and adjusting the weights and ratings to be consistent with the apparent consensus of the committee. It is important to keep in mind that the purpose of the model is to facilitate objective discussion and reach consensus and not to single-mindedly drive the process. the reasons should be objectively evaluated and the ratings or weights possibly changed.

NARROW TO TWO VENDORS

The objective of the decision model is to choose two semifinalists, either of which is acceptable to the selection committee. Limiting the number of semifinalists will help make the planning of site visits and contract negotiation more manageable, but it is important to proceed to negotiation with more than one vendor to insure that the vendors stay competitive, even if there is a clear preference.

CONDUCT SITE VISITS

This is probably one of the most important steps in the decision process. This is the opportunity for the physicians and staff to see the system in action and ask detailed questions about the advertised functionality versus reality. The most important thing to remember in this step is not to allow the vendor to escort you during the entire visit. Many of the vendors arrange the visits;

TABLE 4.1
Decision Model

Vendor Category	Weight	Vendor 1 Raw Score	Vendor 1 Weighted Score	Vendor 2 Raw Score	Vendor 2 Weighted Score	Vendor 3 Raw Score	Vendor 3 Weighted Score	Vendor 4 Raw Score	Vendor 4 Weighted Score
TECHNOLOGY	10.00	22	38.00	23	40.00	27	47.00	19	31.00
Compliance to Specification	0.10	2	0.20	4	0.40	4	0.40	4	0.40
Perceived Workability	0.20	4	0.80	3	0.60	5	1.00	4	0.80
Use of Current Technology	0.30	4	1.20	5	1.50	5	1.50	3	0.90
Flexibility	0.20	4	0.80	4	0.80	5	1.00	2	0.40
Adherence to Standards	0.10	4	0.40	5	0.50	4	0.40	4	0.40
RIS/PACS Integration	0.10	4	0.40	2	0.20	4	0.40	2	0.20
PRICE	10.00	15	39.00	13	31.00	19	48.00	8	21.00
Software	0.20	4	0.80	3	0.60	4	0.80	3	0.60
Hardware	0.10	5	0.50	4	0.40	5	0.50	2	0.20
Services	0.10	2	0.20	3	0.30	5	0.50	1	0.10
PACS Grand Total	0.60	4	2.40	3	1.80	5	3.00	2	1.20
VENDOR VIABILITY	10.00	18	36.00	12	24.00	22	44.00	21	42.00
Vendor Overall Experience	0.20	3	0.60	2	0.40	4	0.80	5	1.00
Vendor/Product Stability	0.20	4	0.80	1	0.20	5	1.00	4	0.80
Site Sophistication	0.20	4	0.80	4	0.80	5	1.00	4	0.80

PACS Implementation Experience	0.20	2	0.40	2	0.40	4	0.80	5	1.00
Perceived Responsiveness	0.20	5	1.00	3	0.60	4	0.80	3	0.60
TRAINING	2.00	6	4.00	13	8.67	13	8.67	13	8.67
Overall Philosophy	0.33	3	1.00	3	1.00	5	1.67	3	1.00
Manuals	0.33	2	0.67	5	1.67	5	1.67	5	1.67
Training Classes	0.33	1	0.33	5	1.67	3	1.00	5	1.67
SUPPORT	4.00	10	13.33	11	14.67	11	14.67	14	18.67
Support Strategy	0.33	3	1.00	3	1.00	3	1.00	4	1.33
Service Responsiveness	0.33	4	1.33	5	1.67	4	1.33	5	1.67
Uptime Guarantee	0.33	3	1.00	3	1.00	4	1.33	5	1.67
CLIENT RELATIONSHIP	2.00	8	5.33	8	5.33	10	6.67	7	4.67
Existing relationship	0.33	3	1.00	1	0.33	2	0.67	2	0.67
Contact during RFP process	0.33	3	1.00	2	0.67	4	1.33	2	0.67
RFP Quality	0.33	2	0.67	5	1.67	4	1.33	3	1.00
Summary			**136**		**124**		**169**		**126**

however it is very important that they not interfere with the candid responses from the site you are looking for. The site visits should not be limited to just the physicians; support and I.T. staff should also be part of the visit to evaluate the operational and technical issues.

Try to schedule the site visits as close to each other as possible. It is sa good idea to perform a review session with the visit team after each visit and to compare your experiences against the responses and results of the RFP measurements. You are making a decision that represents a major investment and will be very difficult to change once the system is deployed. This does not mean that the process should get bogged down into analysis paralysis. Once two vendors have been selected, it is time to move to the next step.

NEGOTIATE THE CONTRACT

The RFP process can be long, difficult, and sometimes very frustrating. The final decision for two vendors has been made, and it is time to "put the two vendors in a room and let them fight it out." This is where two vendors are played off against each in order to get the best value. Remember that value includes not only price but system options, hardware, software licensing, service contracts, committed functionality, all of which should be included in the negotiation.

The basics of negotiation skills are to understand that any negotiation breaks down into three principal focus areas (known as the dimensions of negotiation); tactics, deal design and setup. Tactics are based upon people and processes. Deal design is based upon value and substance, and setup is the scope and sequence of the deal.

Barriers to successful tactics are interpersonal issues, poor communication and "hard ball" attitudes. A barrier to deal design is the lack of feasible or desirable arguments. The barrier to setup is that the parties do not support a viable process or valuable agreement.

The approach that can help resolve tactical issues is to act "at the table" to improve interpersonal processes and tactics. Deal design issues are best resolved by redesigning a deal that unlocks value. For a successful setup, a change in focus needs to be made away from the table to create a more favorable scope and sequence for the approach.

How does this information relate to negotiating a PACS deal? Being able to identify an area of weakness in the focus areas described above will help provide a very general way of measuring how you should initiate and change course as you head through the negotiation process.

In addition to the theory presented, the best practical advice available is to come to the table prepared. Make sure when you begin the negotiation session you have a clear set of objectives for that session. Realize that you may not make it past the first objective in that meeting and that you do not have to solve everything before leaving the table. It is important to understand that the person speaking is usually on the defensive and is trying to convince the other party.

A "hard ball" attitude is very likely to fail because a negotiation is a process of coming to a mutually beneficial arrangement. It is not realistic to expect a PACS vendor to enter into a business relationship where they will not make a profit. Keep this in mind when the deal looks like it may be going south. If the deal design is breaking down a re-thinking of the deal may be needed. This can be especially true as you continue to play the competing vendors against each other.

In the long run, the goal is to get the deal you can feel comfortable with. If you are not comfortable, then there is doubt about the value of the deal. It needs to reevaluated or even renegotiated until the doubt is eliminated.

CONCLUSION

The process of creating an RFP and selecting a vendor requires attention to detail, patience, and the willingness to look deep within your own institution to realistically determine your requirements and expected benefits. Your understanding your institution's objectives, expected benefits, and your operation is used to develop a vision of the future. This must be translated into a set of requirements that describes the operations of the department and defines the technical, implementation, training, and support needs in order to best achieve a solid Request for Proposal that best reflects the needs of organization and obligates the vendor to meet those needs.

To put it simply, when creating an RFP the end result is proportional to the effort put into it. The RFP and the decision process that follows set the stage for a favorable contract negotiation and a successful implementation and should be undertaken with care.

REFERENCE

1. Lax DA, Sebenus JK. 3-D negotiation. *Harvard Bus Rev.* 2003;81(11):65–74