Designing a Request for Proposal for Picture Archiving and Communication System

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THE PURPOSE of a request for proposal (RFP) for a picture archiving and communication system (PACS) is to select a vendor to implement the PACS. It is a mechanism by which to do the following: (1) describe the institution to the vendors that have been selected to receive the RFP, (2) describe the radiology department, (3) describe the information systems in use at the institution, (4) describe the PACS that will be installed, and (5) give the vendors an opportunity to describe their company and products. The vendors' responses to the RFP should provide information on the various system alternatives that are available. This information will make it possible to select a PACS that fits both the functional requirements and the budget of the department and the institution.

INITIAL DATA GATHERING

Even before beginning to work on the RFP itself, a great deal of preparation must be done. In this phase, the following information must be collected in order to create a comprehensive RFP: a literature search to collect as much information as possible about existing PACS systems; site visits to institutions that have already implemented a PACS; attendance at radiological meetings and conventions where vendors demonstrate their products; consultations within the department that will define the functional requirements of the PACS; consultations with other departments and physicians that will determine the scope of the PACS and the functionality that other areas will require; and consultations with the facility's MIS and telecommunications departments to determine the network and computer systems infrastructure that is currently in place and that will need to be installed for the PACS implementation. In sum, the research should allow the authors of the RFP to define the

nature of the PACS in detail, select a subset of vendors to whom the RFP will be sent, and coordinate with other departments (orthopedics, ER, etc) and support services (MIS and telecommunications).

THE RFP AND ITS COMPONENTS

The RFP is divided logically into several components broadly falling into the following categories, each of which will be discussed in detail: information about the radiology department and the institution, information about the PACS to be installed, request information about the vendor and their PACS, and evaluation process guidelines.

Information About the Radiology Department and the Institution

There are several categories of information that need to be supplied. Firstly, the vendor must be provided with a general description of the facility as a whole: single site/multisite, number of beds/size, and affiliations. Secondly, a detailed description of the radiology department must be provided: description of computer systems in use (Radiology Information System or RIS, dictation system, etc), staffing, modalities supported (examination rooms, acquisition devices), exam statistics, and plans for future expansion. Thirdly, other (non-radiology) computer systems at the site must be described. The vendor needs to know about all the computer systems at the installation; in the future, the MIS department may want to use universal workstations scattered throughout the facility that can run all applications, including the PACS. If there is a need to interface not only the RIS to the PACS but also other systems, such as the hospital information system (HIS), this information should be provided. The existing systems and the hardware and software platforms on which they run should be described. It is also important to outline any plans the institution has for future expansion (greater integration of existing systems, addition of other systems to which the PACS may need to interface). In this section a general description of the existing network infrastructure should be included.

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Information About the PACS to be Installed

In defining the PACS to the vendor, it is critical to describe the system to be installed in as much detail as possible. This is very useful to the vendors and will allow them to tailor their proposal to the department's functional and financial requirements. In general, there should be a clear understanding between the institution and the PACS vendor as regards the following:

- image acquisition subsystem;
- image output and display subsystem;
- image database and storage subsystem.
- communications and network subsystem;
- interfaces; and
- support services and maintenance.

To enable the vendor to tailor each PACS component to the specifications, information pertinent to each component must be provided, together with more general requirements that pertain to several subsystems.

Image acquisition subsystem. In this section, the radiological modalities that are to be included in the PACS should be defined and a detailed description (make, model number, number of units) of each type of acquisition device should be provided. The degree of "filmlessness" envisioned for the PACS should be explicitly stated, and, if the intent is to become filmless, the vendor should be given a timetable by which this goal is to be achieved. The interface between the PACS and the acquisition systems should conform to the Digital Imaging and Communications in Medicine (DICOM) standard.

Image output and display subsystem. The output and display subsystem consists of the following types of devices: high-end display workstations, PCs, and printers. The number and type of these devices will define the size and the scope of the PACS to the vendor. For high-end diagnostic-quality workstations, the following information should be provided: number of 2-K and 1-K stations; locations where these devices will be installed—both within the department and in other areas such as ICUs, the ER, and conference rooms; number of monitors per station; software functionality (detailed hardware specifications should be avoided, unless there are budgetary or other constraints); speed/throughput requirements (detailed network specifications should be avoided because this is more properly the responsibility of the PACS

vendor); and amount of local storage required (this should be specified by means of functional criteria such as length of inpatient stay rather than in megabytes). For PCs, which are for use primarily in areas outside the department of radiology, both the teleradiology and the on-site locations should be specified: teleradiology link-up to off-site offices and clinics, teleradiology link-up to radiologists' homes, and on-site locations such as conference rooms, nursing stations, consulting rooms, and operating rooms. For printers, the type (diagnostic quality printers using film versus cheaper reference quality printers using paper), number, and location should be defined, together with functional specifications for their use.

Image database and storage subsystem. The storage subsystem is generally organized into an hierarchy: primary storage (local hard disks and RAID on viewing stations), secondary storage (RAID, CD-ROM attached to servers), and tertiary storage (magneto-optical disks, digital linear tape). Based on the examination statistics for your site, the storage capacity of each component in the hierarchy should be defined. Secondary and tertiary storage is generally located in the main computer room (together with backup storage at an off-site location for disaster recovery). This section should be used to describe the storage and functional requirements of the main computer room. It is important not to specify the hardware configuration in detail. This is more properly the task of the vendor based on the functional and storage requirements specified in this section. The central servers, storage systems, and gateways should be located in a specially designed computer room; it is strongly recommended that the main computer room be located within the department of radiology.

Communications and network subsystem. The network subsystem is vital to the success of the PACS. The local and wide area network (LAN/WAN) is one of the most critical (and one of the most complex) components of the entire system. It is the vendor's responsibility to design a network to meet the functional requirements of the PACS. In particular, the throughputs desired must be specified; this will allow the vendor to determine the type of transmission speeds required and hence the type of network that should be designed (ATM, FDDI, CDDI, switched Ethernet). Targets (in seconds) should be set for image transmission for each

modality: from acquisition system to PACS (eg, CT scanner console to PACS server), from main server to viewing station, from archive to viewing station, and from viewing station local storage to screen. If applicable, information about the degree of inter-site connectivity that will be required (ATM, FDDI, T1, or ISDN if a slower WAN is acceptable) should be included. Any teleradiology requirements, such as transmission of images to PCs in physicians' offices and homes, should also be specified.

To meet the requirements, the vendor needs as much information as possible about the existing network. With input from the telecommunications department, a detailed description of the network infrastructure that is already in place should be provided, including the LAN for intrasite communication, and, if the facility is multisite, the WAN for intersite communication. If at all possible, network diagrams of hubs, routers, and other telecommunications equipment, together with make and model numbers of all devices, should be provided. The scope of the network, the topologies supported (bus, ring, star), and the network protocols in use (eg, TCP/IP) should be delineated.

Interfaces. One of the key general components of a PACS is the interface it has with other computer systems.¹ The systems that will have an interface with the PACS should be described and the purpose of the interface should be clearly defined. The most important interfaces are: the PACS-RIS interface, the RIS-acquisition modality interface, the PACS-acquisition modality interface, and PACS as a component of a universal workstation. The interfaces should be based on commonly accepted standards such as DICOM (PACS-acquisition systems) and Health Level 7 (PACS-RIS). In the current PACS environment, compatibility with accepted standards is essential and will make the interface process far smoother.

Support services and maintenance. Finally, the support services that will be required for the PACS should be described: on-site and off-site support personnel provided by the vendor, support personnel provided by the department and institution, training and education, status meetings, acceptance testing, how program errors or bugs are identified and fixed, whether and how customizations requested by the institution will be incorporated into the product, how product enhancements (hardware and software) will be installed, new releases,

emergency services provided by the vendor to handle critical situations, and disaster recovery.

REQUEST INFORMATION ABOUT THE VENDOR AND THEIR PACS

In this section, the vendors are asked to describe their company and their PACS. The general description of the company should include the following information: organization (including names of key individuals), product lines, business stability, size of company, financial report, and data about any subcontractors that will be involved with the project. The information about the vendor's PACS should include the following: general description of the proposed application, proposed hardware configuration and technical features, operating software, support services, detailed network design, detailed system costs, any other information requested in the RFP (eg, response time warranties), governmental, and institutional regulations that must be met by the vendor, information about other sites with components of their PACS, and a detailed timetable for the implementation. The vendor should also be provided with guidelines regarding the structure of the response to the RFP.

EVALUATION PROCESS GUIDELINES

Finally, the vendor should understand the criteria that will be used to evaluate the RFP response.² Among the factors that are important in selecting a vendor are the following: capabilities of the software and how it meets the needs, hardware platform, network design and expertise, interfaces, vendor experience with product, cost, and support services. Once the RFP has been sent to the various vendors, a mechanism must be put in place to respond to vendor inquiries and to evaluate vendor responses. One individual should be the point-of-contact at the facility; s/he should be responsible for answering questions from the vendors and for coordinating communications between the vendor and personnel (eg, MIS, telecommunications) at the site. The evaluation process must be clearly defined and should include the following: analysis of proposals, reference checks with current vendor clients, elimination process, system demonstrations at the institution, and site visits.

In the first stage, after all responses have been received, it should be possible to eliminate all but two or three vendors from consideration. Once the

field has been narrowed to this point, time must be allowed to select one specific vendor. It may be necessary to ask vendors to re-visit the site, to consult with the networking and MIS personnel regarding system requirements, and to meet with the radiology staff to discuss functional specifications and demonstrate their product. Once a specific vendor has been selected, contract negotiations can begin. The contract should include not only the text of the RFP but also a functional

specifications document describing the requirements in detail. At this stage, the first phase of the PACS implementation can begin.

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