Technology Assessment and Requirements Analysis: A Process to Facilitate Decision Making in Picture Archiving and Communications System Implementation

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In a time of decreasing resources, managers need a tool to manage their resources effectively, support clinical requirements, and replace aging equipment in order to ensure adequate clinical care. To do this successfully, one must be able to perform technology assessment and capital equipment asset management. The lack of a commercial system that adequately performed technology needs assessment and addressed the unique needs of the military led to the development of an in-house Technology Assessment and Requirements Analysis (TARA) program. The TARA is a tool that provides an unbiased review of clinical operations and the resulting capital equipment requirements for military hospitals. The TARA report allows for the development of acquisition strategies for new equipment, enhances personnel management, and improves and streamlines clinical operations and processes.

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THE TECHNOLOGY SUPPORT Division, Materiel Acquisition Directorate, US Army Medical Materiel Agency (USAMMA), Fort Detrick, MD, is responsible for executing the Technology Assessment and Requirements Analysis (TARA) program. The radiology TARA is conducted on site, by a team consisting of a radiology consultant, clinicians, and USAMMA specialists in the areas of maintenance, biomedical engineering, and telecommunications. The team performs a preliminary evaluation and then an on-site evaluation. At the end of the visit, an out-brief is given followed by a formal written report.

PREPARATION FOR THE SITE VISIT

Prior to the site visit, the TARA team requests specific information about the site. This includes (1) a list of all equipment and maintenance histo-

ries, (2) number and type of procedures performed annually for the last 3 to 4 years, (3) a business plan addressing services provided and services to be initiated or discontinued, (4) patient demographics, (5) a blueprint or diagram of the radiology department, (6) staffing information, and (7) plans, diagrams, or descriptions of existing telecommunications and networking infrastructure.

Specific information related to information management is also needed. The following data should be available: (1) network topology, (2) bandwidth to desktop and bandwidth to backplane, (3) a list of outlying clinics supported by the network, and (4) the router in place and the network(s) to which the router interfaces.

THE SITE VISIT

The purpose of the site visit is to gather information and validate the previously submitted data. There are four major components to the TARA site visit: (1) assessment of clinical operations, (2) assessment of requirements, (3) assessment of operations, and (4) assessment of equipment. A team approach is necessary given the large amount of data that must be collected, organized, and reviewed. Assembling the TARA team from other institutions ensures an unbiased review.

Assessment of clinical operations is performed by the radiology member of the team and senior clinicians. This portion of the review focuses on staffing, customer service, quality and risk management, patient flow, and integration with other care areas. Departmental staff are interviewed, scheduling and patient flow patterns are observed, and the quality of service is evaluated.

Assessment of requirements uses commercial for-profit equipment utilization factors, modified to account for issues unique to the military, to evaluate the workload and determine how the hospital compares with civilian counterparts. This provides a starting point that the TARA team can use to begin the evaluation process.

Assessment of operations evaluates the procedural mix, staffing, work schedule, patient flow, throughput, and risk management. These factors

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are used to make recommendations to improve the flow of work and, ultimately, patient care and satisfaction.

The equipment assessment is the most technical portion of the evaluation and requires the most technical expertise. Accurate assessment of existing equipment, as well as evaluation of trends and developments that will affect diagnostic imaging, necessitates the presence of the members on the team with expertise in maintenance, biomedical engineering, and telecommunications.

MEMBERS OF THE TARA TEAM

The radiologist and clinicians work with the other members of the TARA team to assure that the end users, the radiologists and clinicians, obtain a useable product. Without this component, there is a danger that the end users of the equipment are forgotten, and recommendations that appear to improve service and patient care may not be feasible or may not be acceptable as other factors are evaluated.

The maintenance portion of the TARA team is necessary to evaluate the hospital's equipment. Expensive, unscheduled maintenance must be considered for both new and old equipment. A new piece of equipment that has required extensive maintenance may be cheaper to replace. The maintenance contracts are reviewed in light of the resources. If there is sufficient redundancy, a maintenance contract that is less expensive but provides slower service may still be appropriate, based on the workload.

The biomedical engineering component provides expertise in the area of equipment evaluation.

The evaluation determines whether the existing equipment is outdated or meets standards for acceptability. These specialists are responsible for writing documentation, creating design drawings, and developing acquisition strategies for new equipment within their subspecialty area.

The telecommunications specialist is responsible for assessing the information management infrastructure of the facility. This person must be able to evaluate current requirements, networks, image management, as well as integration with other hospital-based information systems. The specialist must be familiar with current technology and trends in telecommunications, as well as equipment analysis.

RESULTS

The TARA program has been in place since 1994. During this time, approximately 40 military hospitals have been evaluated. By providing unbiased and timely evaluation of radiology resources, throughput and patient care have improved, with increased patient satisfaction. The process of upgrading, replacing, repairing, and maintaining equipment has been streamlined resulting in cost avoidance of \$65 million dollars since the program was initiated. This process has been so effective that it now includes clinical laboratory teams and there are plans to expand this program to other clinical areas as well. USAMMA is using this model to determine the Army's requirements for the digital imaging network-picture archiving and communication system (DIN-PACS) currently being developed by the Department of Defense.

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