Highlights of the Digital Imaging Network-Picture Archiving and Communications System Project

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The Department of Defense issued its requirements for a Digital Imaging Network—Picture Archiving and Communications System (DIN-PACS) in a Request for Proposals to industry in January, 1997. The DIN-PACS shall be an open systems network of digital devices designed for the effective acquisition, transmission, display and management of diagnostic imaging studies. This network is primarily based on two international standards, Digital Imaging and Communications in Medicine (DICOM) and Health Level 7 (HL7). The DIN-PACS is required to communicate in a bidirectional manner with the Department of Defense standard hospital information system called the Composite Health Care System (CHCS) through an HL7 compliant interface. The DIN-PACS model and its published specifications stress functionality and performance rather than system architecture to allow industry to propose optimal approaches for implementation. This paper discusses the functional requirements of the DIN-PACS in terms of its internal operations as well as its communication with external systems and components.

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KEY WORDS: Picture Archiving and Communications System (PACS), image management

THE DEPARTMENT OF DEFENSE issued its requirements for a Digital Imaging Network-Picture Archiving and Communications System (DIN-PACS) in a Request for Proposals¹ to industry in January, 1997. The specifications in this Request for Proposals define the performance and functional requirements for a DIN-PACS installed, made operational, and maintained at Department of Defense, as well as potentially other federal medical treatment facilities. The ultimate objective of this Request for Proposals is to support business

process changes throughout the Military Health Services System (MHSS) and within the practice of military radiology. The vision for radiology is to create a "virtual" radiology department by eliminating multiple "place" constraints that arise both within and between diagnostic centers. Within facilities, the DIN-PACS system is intended to eliminate the necessity of creating film and allow access to images by multiple users at any place and any time. Between facilities, the system is intended to create opportunities to dynamically shift workload at any time and to any location where clinical expertise is available.

SYSTEM DESCRIPTION

The DIN-PACS shall be an open systems network of digital devices designed for the effective acquisition, transmission, display, and management of diagnostic imaging studies. This network is primarily based on two international standards, Digital Imaging and Communications in Medicine (DICOM) and Health Level 7 (HL7). As the Department of Defense moves into its next phase of digital implementation in its medical treatment facilities, its goal is to achieve a minimum level of compliance on proprietary devices and dedicated systems and components. Compliance with these standards, as defined in the statement of work, as well as overall clinical and technical performance of the system have been identified as the key technical criteria to be used in the source selection process.

Figure 1 provides a logical representation of the DIN-PACS including the functional components of the core system as well as communication pathways between the DIN-PACS and external components and systems.

At the center of the DIN-PACS model is the archive. This archive is intended to be the permanent, long-term, safe storage area for all diagnostic imaging studies acquired into the DIN-PACS. The image storage layer of the model represents a combination of short-term and intermediate storage implementations. Such storage may be distributed

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Fig 1. DIN-PACS Model.

over several devices or centralized in nature. The primary differences between this storage layer and the archive are the time depth of studies resident in the storage level and the retrieval speed of studies from storage. Embedded throughout the core of the model is the DIN-PACS database and control subsystem responsible for overall integration of system function.

The Department of Defense has installed in its medical treatment facilities a standard hospital information system called the Composite Health Care System (CHCS). The DIN-PACS is required to communicate in a bidirectional manner with CHCS via an HL7 compliant interface. In addition to the interface to CHCS, the DIN-PACS shall incorporate a separate radiology information system (RIS), reflected in the outermost circle of the DIN-PACS model. This RIS shall provide additional functionality that CHCS does not currently support, as well as to provide a level of failover operations to allow clinical operations to continue in the event of failure of connection to CHCS.

The output and display component of the DIN-

PACS includes diagnostic and review workstations, as well as quality control workstations. The diagnostic and review workstations are defined to have identical functionality and differ only in the resolution of their respective monitors. The quality control workstation is a specialized form of a review workstation used as an interface device between the DIN-PACS and acquisition modalities, which currently do not provide all of the DICOM services required in the DIN-PACS model (eg, modality worklists).

The model includes representations for the DICOM and HL7, the standards for communication outside of the DIN-PACS core. The DIN-PACS, as specified, is not required to be internally based on DICOM and HL7, but must use these standards in its communication with external systems and components. The Request for Proposals includes explicit information on the DICOM conformance required across these interfaces, specifically addressed for each input and output device and system, which the DIN-PACS must communi-

cate with (eg, acquisition modalities, teleradiology, personal computers [PCs], laser printers).

CONCLUSION

The DIN-PACS model and its published specifications stress functionality and performance rather than system architecture to allow industry to propose optimal approaches for implementation. The Department of Defense expects this system to carry

its medical treatment facilities into the future and, therefore, has stressed a need for highly functional, robust system designs, capable of accommodating future implementations in digital imaging.

REFERENCES

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