MIRIAM: The PACS Project in Paris: Overview and Implementation

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In this article the authors describe the Management Informatique de la Radiologie et de l'Imagerie Médicale (MIRIAM) major picture archiving and communication system (PACS) project in Paris, France. The Assistance Publique de Paris, France is a healthcare provider and took the initiative to start the largest PACS program in Europe to date. The MIRIAM project will start in 1997 and will be used in different, consecutive phases. A consortium of several companies is in charge of the implementation. Thirty-three hospitals with 54 imaging departments will be integrated in one system. Copyright © 1997 by W.B. Saunders Company

KEY WORDS: integration, PACS, Paris, MIRIAM, telecommunications.

IN THIS REPORT, we describe a major PACS (picture archiving and communication system) to be implemented in Paris, France.

MIRIAM: WHAT?

MIRIAM is the acronym of Management Informatique de la Radiologie et de l'Imagerie Médicale, translated Management with information technology of radiology and medical imaging.

MIRIAM is a mammoth-size project of a French health care provider called Assistance Publique Hôpitaux de Paris (AP-HP). This health care provider is controlled by the city authority of Paris. MIRIAM has the goal to reorganize and improve the access to and flow of medical images by providing tools for communication, diagnosis, teaching, research, and quality assurance to 33 hospitals and 54 imaging services in the metropolitan Paris region. This project is the largest planned PACS implementation in Europe at this time. It is believed that the initiative of AP-HP will raise interest and confidence of other health care providers throughout Europe in the ability of PACS technology to deliver cost-effective solutions for more efficient health care.

Three important areas of functionality can be identified in MIRIAM.

Radiology Information Services

Radiology Information Systems (RIS) (called MIRIAM 1) will be used to provide scheduling, examination management, image and patient identification data, data pertinent for conducting the examination, and finally to provide the full report with the diagnostic conclusions made by the radiologist. MIRIAM 1 will have to replace the former RIS system, which has already been deployed by 19 participating hospitals since 1985.

The Image Acquisition and Archiving Systems

This part of the project is called MIRIAM 2. MIRIAM 2 will acquire and archive images and keep them available for distribution and presentation on hard or soft copy for the users of the diagnostic imaging information, eg, to radiologists and the radiological departments. Also, hospital departments, which are not generally recognized as image generating entities, but where access to diagnostic imaging is mission critical such as intensive care, emergency room, and operating theaters, will be included in this phase.

Distribution and Communication

The third area of activities in the MIRIAM project is called MIRIAM 3. MIRIAM 3 will distribute the images with all relevant contextual information for viewing and printing towards users inside and outside participating hospitals.

Workflow automation and full transparent access to imaging information, regardless of where the images or reports are physically stored, is part of the functionality.

MIRIAM: GOALS AND OBJECTIVES

The goals of the MIRIAM project are the following.

Organizational Goals

MIRIAM will make the management and operation of the imaging services more efficient. Information technology and workflow automation will shorten the communication lines and improve the quality of the communication. More efficient access to vital data is essential to shorten procedure

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times and length-of-stay in the hospital. Further, the control and overview on the different activities in the imaging departments and their outcome will become possible. AP-HP Management will be able to use the outcome analysis as a Management Information System to assess the current workflow processes and to re-engineer these processes into more efficient proceedings.

Medical Goals

MIRIAM will facilitate access to images. This will give an opportunity to many users of diagnostic information to have access to the patient files in a well organized, transparent, and secure way. Providing this information to the individual users will increase the level of confidence in diagnostic and therapeutic decisions. Hospital staff will dedicate more attention to the medical and clinical aspects of their assignments, and less time will be wasted in clerical and administrative activities such as the down-tracking of a patient folder that turns out to be inaccessible ("lost") at a critical moment.

Economic Goals

The goal is to achieve shorter hospital stay by the use of electronics. Further, a significant decrease in use of conventional x-ray film will reduce the cost of purchasing these films and, more importantly, will reduce the handling cost of these films (archiving, dearchiving, processing, "tracking").

MIRIAM and the Electronic Medical Record (EMR)

MIRIAM is an essential part of an electronic medical record. MIRIAM will provide to the electronic medical record, the multimedia patient data generated by the respective imaging departments or image generating departments. By providing these data to a wide number of specialists in a transparent and user-friendly format, the quality, completeness, and above all, usefulness of the multimedia EMR will increase and could allow eventually the implementation of a true holistic paradigm in patient and disease management.

HISTORY

For 2 years, a team responsible for networks and telecommunications in the Assistance Publique Hôpitaux de Paris has been working on the collection of the user requirements, the selection of the different standards to be used, and the creation

of architectural models to formulate the MIRIAM concept.

Once this study was completed, a tendering procedure was initiated and two consortia were selected for conducting a study. The main goal of the study was the following: (1) defining different scenarios for the architecture and their effect on technical and functional issues. (2) The identification of the influence of the architecture on the organization. (3) Estimation and evaluation of possible potentials for improvement in the current work flow and the selection of criteria of quality. (4) Detailed study and recommendation regarding the products to be used in this project. (5) The planning of the MIRIAM project (realization, deployment).

These quantitative and qualitative additions to the MIRIAM project have been presented to the hospital group in April 1996. At that time, the interest and support of the hospital group was reconfirmed and there was a general consensus on the feasibility of the project on the condition that the technology deployed in MIRIAM would be based mainly, on of-the-shelf technology with open standards.

To restrict the complexity of the total MIRIAM project, it was decided to implement MIRIAM in two phases.

THE PLANNING

The first phase will be the implementation of MIRIAM 1 and 2.

MIRIAM 1 and 2 (RIS and PACS) will be composed of industry standard available products for RIS and PACS, with standard interfaces towards the imaging modalities and using DICOM and Health Level 7 (HL7) standards for the communication between the imaging modalities, RIS, and PACS.

Further, an HL7 interface will be provided towards the EMR. At this time, the image distribution will be limited to the radiology departments and the departments where an urgent and immediate need is present to have access to the images (ICU, ER, OP).

In a second phase, MIRIAM 3 will be installed. MIRIAM 3 will address the distribution of the information to all the other users in the participating hospitals.

THE IMPLEMENTATION

The Companies

After a tendering process, the Assistance Publique Hôpitaux de Paris has selected a consortium headed by Alcatel (Meylan, France) for the realization of MIRIAM. The consortium constituted different industrial partners that each have specific products and the know how that is needed in the MIRIAM project.

AGFA GEVAERT N.V., a Belgium-based manufacturer (Mortsel, Belgium) and vendor of x-ray film, X-ray imaging systems and PACS systems, will be supplying the IMPAX system. IMPAX consists of the required hardware and software needed for the realization of the functionality for MIRIAM 2 and 3, in other words, the PACS functionality. IMPAX was developed by AGFA GEVAERT and is already deployed in more than 200 hospitals worldwide.

The RIS systems will be installed and delivered by Philips Medical Systems (PMS; Best, The Netherlands). PMS is a Dutch-based Diagnostic Imaging Systems Manufacturer and Supplier. PMS will use their RADOS product for that purpose.

Alcatel is a French telecommunication manufacturer. Alcatel will provide the networks such as Local and Wide Area Networks (LANs, WAN). Further, Alcatel will be the contractor and provide the project management structure and project coordination between various subcontractors.

Finally, Eurodim, a French Information Technology company (Vanves, France), will work on the connection from the IMPAX and RADOS systems to and from the electronic medical record and the other information systems from the different hospitals.

Phases

In this project, we will move forward in five subphases.

Phase 1: Validation of the interfaces and parametrisation of MIRIAM 1, the preparation of the

predeployment of MIRIAM 1 throughout the participating hospitals, a trial in four pilot institutions.

Phase 2: Deployment of MIRIAM 1.

Phase 3: AGFA-GEVAERT's IMPAX installation in one to six pilot sites.

Phase 4: Complete deployment of IMPAX together with the purchasing of extra hard and software that will be needed to distribute images through all the participating hospitals.

Phase 5: Maintenance and updating of the systems.

The management of AP-HP will be in charge of the acquisition of the RADOS licenses, the cost of the development of interfaces, and the project management cost. The MIRIAM 1 systems and the hard and software of MIRIAM 2 and the cost related for installing these systems will be the responsibility of the participating hospitals.

Introduction Plan 1997

A pilot committee composed of representatives of the different sites has been selected and has a mission to guide the deployment of the project and to watch over the strategic orientation. First implementation of MIRIAM 1 is foreseen in the second trimester of 1997.

During the third and fourth quarter of 1997, MIRIAM 1 and 2 will become gradually operational. Several follow up meetings on the project are planned in the coming months. All hospitals of the Assistance Publique Hôpitaux de Paris have been invited to join the project officially before the end of January 1997 and have indicated the contact person who will be responsible for MIRIAM management in each of the respective hospitals. Further, the management team of MIRIAM at the Assistance Publique and the Hôpitaux de Paris will provide the support that may be required in each of the hospitals. In the presentation during SCAR97, further quantitative data regarding MIRIAM, flow diagrams regarding workflow organization, and architecture of the IMPAX implementation will be communicated and will be available as a handout.