Chapter XIV
Human Factors and Culture

BACKGROUND

Human factors engineering (HFE) is the science of designing systems to fit human capabilities and limitations. These include limitations in perception, cognition, and physical performance. HFE involves the application of specific methods and tools in the design of systems.

Human information processing is influenced by multiple factors:

- **Attention**: May be limited in duration or focus, especially if attention to several things is necessary.
- **Memory constraints**: Working memory is limited, especially when active processing of information is required.
- **Automaticity**: Consistent, over learned responses may become automatic, and completed without conscious thought.
- **Situation awareness**: A person’s perception of elements in the environment may affect their processing of information.

Humans have certain tendencies and biases that can predispose them to error. These heuristics are usually very useful and successful, but at times can get us
into trouble. The objectives of this chapter are to provide practical Human Factors guidance to professionals concerned with PACS operation and management and to introduce the non-specialist to Human Factors issues in PACS operation and management. It is intended to show how human capabilities and limitations can influence field performance and quality within the PACS environment.

This chapter also discusses the quality improvement likely to result from the provision of a proper work environment. First the importance of communications and information exchange among PACS users, maintenance staff, manufacturers, suppliers, and so forth, is discussed. The need to introduce self-paced computer-based PACS training for hospital staff is stressed. Then a comparison of the western and eastern cultural dimensions is illustrated through a case study. Finally a feasible PACS HF model is suggested. Obviously, a PACS environment that works for one hospital does not necessarily work for another; hence it is imperative that the organizational culture must be considered when a PACS project is being planned.

COMMUNICATION AND INFORMATION EXCHANGE

Communication is probably the most important Human Factor issue in PACS operation and management. Without communication among referring clinicians, radiologists, technologists, nursing staff, maintenance engineers and suppliers, high PACS quality standards would be difficult to maintain. In the PACS environment, there is an enormous volume of information that must be created, conveyed, assimilated, used and recorded in delivering quality medical imaging service. A frequently quoted example in the aviation sector is the paper stack, supposedly exceeding the height of Mt. Everest, that the Boeing Aircraft Company produces annually in order to support its aircraft operators. Airlines literally have warehouses full of paper that contain the historical records of maintenance of their aircraft.

As part of a national program in the Department of Veterans Affairs to improve communication within the healthcare environment, a Medical Team Training questionnaire was developed to assess organizational culture, communication, teamwork, and awareness of human factors engineering principles (Mills et al. 2008). First, the Medical Team Training questionnaire was pilot tested with 300 healthcare clinicians. The final version of the Medical Team Training questionnaire was administered to an interdisciplinary group of 384 surgical staff members in 6 facilities as part of the Medical Team Training pilot project in the Department of Veterans Affairs. The results revealed a pattern of discrepancies among physicians and nurses in which surgeons perceive a stronger organizational culture of safety, better communication, and better teamwork than either nurses or anesthesiologists do. It was concluded that the Medical Team Training questionnaire was helpful in