

Part D. Health Services Applications Functional Specification

*Success is counted sweetest
By those who ne'er succeed.
To comprehend a nectar
Requires sorest need.*

Emily Dickinson (1830–1886)

This chapter contains detailed functional specifications for each of the basic application modules that are required for the operation and management of most health services and support units. The modules and functions here described are directed to support of the majority of the common tasks conducted in healthcare services and do not depict all possible particular applications that may be required by specialized services or administrative units.

Not every organization will have the desire, or the resources, for deploying all possible applications. The professionals responsible for the decisions regarding the implementation of information systems in a particular healthcare organization should base their decisions on careful deliberation with users and consideration of objectives, infrastructure, and resources. Smaller hospitals, for instance, may find that computerization of some departments may not be cost-effective.

To facilitate their usage, the functional specifications (*functionalities*) will be presented considering the following categories:

- **Generic Application Functionalities** - functions that are pertinent and common to all applications modules.
- **Generic Systems Functionalities** - technological functions, i.e., related to systems design, that are pertinent and common to all applications modules.
- **Application Specific Functionalities** - functions that are pertinent to each specific application module.

D.1. Utilization of Recommendations

The specifications described for each module are intended to be general guidelines, to be used as a departure point in developing a customized statement of requirements. They are a composite of features requested by users, offered commercially by healthcare IS&T vendors, or both.

To allow for the possibility that some of these applications may be implemented individually, there is some intentional overlap of features from one area to another. For example, Orders and Scheduling can be implemented as stand-alone applications or as components of integrated applications (e.g., Clinical Laboratory and Medical Imaging).

Healthcare organizations will need to apply rigorous due diligence in developing their own detailed system functional specification requirements. As part of such effort, the organization should have the initial listing of functional specifications reviewed by experts familiar with each of the specific application areas, either from within the organization or under an outsourcing contract.

D.2. The Complex Nature of Application Module Integration

The degree of integration and communication among the different modules will change according to each implementation environment's particular requirements; however, a categorization of the degree to which applications are integrated must be considered when defining the functionalities desired in each application area.

The following classes of systems are possible, considering the desired degree of application module integration:

- **Class A Systems** - Individual stand-alone applications that address specific requirements of single departments, specialties, or operational units (e.g., Current Accounts and Billing, Pharmacy, Materials Management, Clinical Laboratory, etc.)
- **Class B Systems** - Application use spans departmental or specialty boundaries and may include partial or full utilization of data elements from each individual application (e.g., Orders; Medical Records; Inpatient, Outpatient and Other Service Scheduling; Admissions / Discharge / Transfer; etc.)
- **Class C Systems** - Applications are integrated considering an orientation towards the patient and the medical record. These systems are similar to Class B Systems; the major difference lies in structure: while Class B Systems use administrative or financial applications as the basic link, Class C Systems by design include fully integrated ancillary subsystems modules.

The implementation of a fully integrated patient management information system (PMIS) is an extremely complex endeavor even in the best circumstances. The complex nature of the data interrelationships that must be maintained in a PMIS requires the ability to access and update individual module data in a controlled and consistent manner. However, current database technology provides the capability to maintain and access common data in any required sequence without regards to its physical location. Those capabilities set the stage for multiple concurrent use of data regardless of user location, function, or required procedure.

In the past decade the evolution of the health software market has been characterized by the proliferation of providers of departmental applications. Although there are many vendors that offer “integrated” products, the best applications frequently come from developers that are highly specialized and dedicated to a single line of product, such as laboratory, radiology, medical equipment maintenance, stock management, personnel management, etc. Their expertise and large number of clients allow their products to be regularly updated. The downside of this situation relates to the difficulty for the user in selecting the best provider for each specialized or departmental system and integrating products that may run in different hardware and software platforms. The most serious problem, for users, is that they must now deal with a number of vendors with application products developed in a variety of software platforms. The problem of integrating such applications and dealing with the technical aspects of a multi-vendor environment can be of frightening proportion. When selecting multiple-provider systems great care must be exercised regarding the identification of a single integrator responsible for the technical and managerial decisions and to act as a single line of contact with the vendors.

D.3. Health Services Information Systems Functions

There are many functions that can be incorporated into the technical (clinical) and the business (administrative) components of health services information systems. These fall into four types: transactional functions, control reporting, operational planning, and strategic planning.

- **Transactional Functions** - Handle the day-to-day operational and administrative tasks of the organization. Examples of transactional technical functions include: Order Entry; Consultation, Treatment and Service Scheduling; Nursing and other Health Personnel Staffing and Scheduling; Inpatient Census; Clinical Data Recording; Results Reporting; etc. Examples of transactional administrative functions include: Payroll; Current Accounts; Billing; Accounts Receivable and Payable; Laundry; Purchasing; Inventory Control; Maintenance Work Orders; etc.
- **Control Reporting Functions and Operational Planning Functions** - Provide summarized data about the operation of the organization to managers and healthcare professionals that will permit the monitoring of the various activities for which they are responsible. In addition, these systems provide executive management with resources to plan and control the organization. Examples of technical functions supported by these systems include: Medical Records Tracking; Medical Audit and Peer Review; Utilization Review; Medical Staff Education; Treatment Planning; Inpatient Occupancy, Patient Mix, and Discharge Planning; Drug Interactions; Infection Control; Drug Profiling; etc. Examples of administrative functions supported by these systems include: Materials Utilization; Supplier Analysis; Backorders and Stockouts; Contracted Services; Kitchen Planning; Preventive Maintenance; Personnel Benefits Administration; Personnel Absence and Turnover; Eligibility and Payment Delinquency; Cost Allocation; Patient Satisfaction; etc.
- **Strategic Planning Functions** - Provide a framework for decisions with long-range implications. Some issues in strategic planning requirements include: Patient Care

Strategy (levels of care, occupancy and service demand, requirements, and projected costs); Professional Staffing (forecasting, recruitment, community needs assessment and trend analysis); Facilities Planning; Budgeting; utilization of Contracted Services; Credit, Reimbursement, and Collection Policies; etc.

D.4. Health Services Information Systems Modularity

There are many possible ways to categorize applications into functional modules. For the objectives of this publication, a classification that would contemplate merely technical or administrative functions was not considered appropriate, as some functions have aspects of both, which led to a more operational approach being favored.

We elected to group all health services basic application modules in four groups: Logistics of Patient Care, Clinical Data Management, Technical Support Services Operation, and Administration and Resource Management. The Technical Support Services Operation group is further categorized into two subgroups: Diagnostic and Therapeutic, and Population and Environment Technical Support Services.

Any categorization must be, however, taken with caution. From a broader functional perspective, one should attempt to see all information related to patients comprehensively interconnected. This concept, sometimes referred to as a Patient Management Information System (PMIS), ideally consists of a fully integrated approach to maintaining patient-related administrative and clinical data considering the continuum of care, independent of site or provider. A PMIS provides the opportunity for enhancing communication between members of the healthcare team as is physically represented by a set of databases containing medical, financial, statistical, and other pertinent data. Typically, patient data would be captured directly from the day-to-day tasks associated with individual patient healthcare.

Each group (Logistics of Patient Care, Clinical Data Management, Technical Support Services Operation, and Administration and Resource Management) comprises a number of modules that are functionally related and, in many instances, modules can be independently implemented in a step-wise fashion. In these circumstances, a careful evaluation of the spectrum of functionalities of related modules must be done in order to verify if, how, and when they should be added to the ones selected for initial or subsequent implementation.

Although many application modules for healthcare services can be deployed in stand-alone mode, as for example in Class A systems, the degree of benefit to managers and decision-makers grows exponentially, as modules are progressively integrated and able to share their data.

The advantages of integrating application modules are evident. Case-related data can be used extensively in providing and managing present and future services to the patient and, in addition, a large number of data elements have multiple functions. For example, in a pharmacy the integrated PMIS would allow access to extensive pharmaceutical formulary data required to process medication orders; evaluation of prescribed drug interactivity with other drugs, dietary regimens, scheduled diagnostic or therapeutic procedures; check for eventual allergies and drug intolerance; cross-

reference with individual drug usage pattern; processing and distribution of prescribed drugs; interactive stock control and product reorder; automatic billing to patient current account or third parties; etc. A fully functional PMIS requires, therefore, the implementation of all patient-related modules.

The content to follow will be presented as a general tool that includes basic specifications. The intent of this information is to provide the reader with an overview of some of the basic and necessary clinical and administrative information systems functions. The list of specifications is not exhaustive and some of them depend on the needs and wants of the institution that will be implementing the system. Furthermore, It is necessary to emphasize the advancement of technology, which will make other options available in the future.

D.5. Health Services Information Systems Application Modules

For the purpose of this document the four basic functional groups of applications are further categorized into modules. Each group of applications is made up of the following modules:

Health Services Information Systems Module Groups

A. Logistics of Patient Care

- Registration
- Outpatient Admission
- Inpatient Admission, Discharge, and Transfer
- Service Scheduling and Appointment Management
- Orders

B. Clinical Data Management

- Medical Records
- Nursing Care
- Clinical Audit

C. Diagnostic and Therapeutic Technical Support Services Operation

- Clinical Laboratory
- Medical Imaging: Diagnostic and Interventional
- Radiation Therapy
- Pharmacy
- Transfusion and Blood Bank
- Dietary Service

D. Population and Environment Technical Support Services Operation

- Environmental Health
- Immunization
- Clinical Surveillance and Databases

E. Administration and Resource Management

- Finance Management
 - *Billing / Accounts Receivable*
 - *Accounts Payable*
 - *General Accounting / Bookkeeping*
 - *Cost Accounting*
 - *General Ledger*
- Human Resources
 - *Payroll*
 - *Human Resource Management*
 - *Staffing*
 - *Benefits*
- Materials Management
 - *Purchasing*
 - *Inventory Control*
- Fixed Assets Management
- Medical Equipment Maintenance
- Physical Facilities Maintenance
- Laundry Services
- Transportation Services
- Budgeting and Executive Support