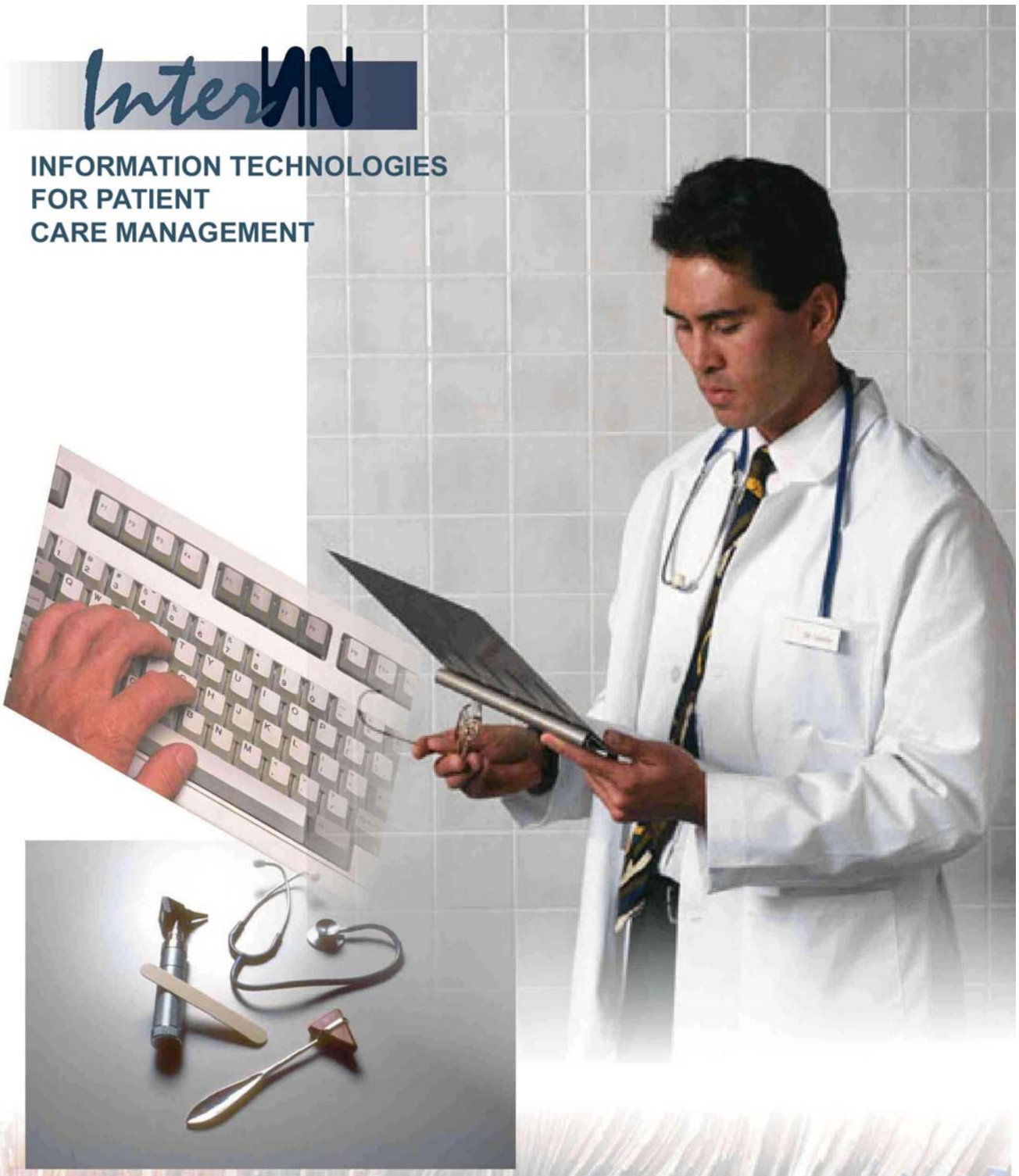
InterMN

INFORMATION TECHNOLOGIES FOR PATIENT CARE MANAGEMENT



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SUMMARY

INTERIN Technology, a complex of software tools and techniques for building health care information systems, was developed in the Program Systems Institute, Russian Academy of Sciences.

This technology has been the basis for several implementations of health care information systems.

In 2004, **Interin PROMIS**, a model information system for a large health care institution, was released. This product, generalising the ten years of system development experience and relying on INTERIN technological solutions, can be put to work in virtually any health care setting.

Interin PROMIS is an integrated informational and functional environment incorporating elements of different classes of health care information systems. The system provides information support to the entire range of services involved in patient care: from document management and accounting to patient record keeping, integration with clinical equipment, and decision support.

FEATURES

The salient feature of INTERIN-based applications is the shift from local document handling and medical information management subsystems of a health care delivery institution to an integrated system providing seamless access to information throughout the entire enterprise. The technology being totally paperless, one can always get a hard copy of whatever data or document.

A unique combination of properties sets the INTERIN-based system apart from other solutions.

- **Scalability & customisability.** Incorporating a set of easy-to-customise computer workplaces developed to cover the comprehensive nomenclature of clinical specialties, the INTERIN-based application can be tailored to meet specific tasks and user requirements.
- **Integration of information flows** ensures that information stored in the system is up-to-date, complete and consistent.
- **Information** is **patient-centred.** For the purpose of review and analysis, patient information can be arranged in a variety of ways.
- **Common service space.** Every patient-related operation is filed as a composition of elementary services, making for easy cost accounting.
- **Automated document management** facilities include:
  - replication-free multiple access to data;
  - auto fill options;
  - extensive use of document templates;
  - format-free data entry into special forms with the subsequent auto compiling of documents for printing;
  - planning the steps and sequence of care;
  - auto generation of statistical reports;
  - creating dynamical desktop selections of documents;
  - summarizing data for a specific period or date, and preparing summaries for printing.
- Tools for **capturing the dynamics of patient information** enable continuous monitoring of the care process.
- User-edited **reference guides and directories** containing domain specific information facilitate customisation and "on-the-fly" updating of the system – either to accommodate changes in business logic or when porting the system to another care setting.

- The use of **advanced health care data representation and communication technologies** provides for interoperability within the organization, as well as for communication with other domestic and international health care centres.
- Incorporating **elements of telemedicine** reduces care costs, contributes to the quality of care, and helps care providers overcome professional isolation.
- **Visual information management** system gives access to medical images, including remote access to archives and image repositories.
- **Information security** is guaranteed by the use of licensed ORACLE database server software.

CAPABILITIES

The various capabilities of the INTERIN-based system are implemented by several specialized and tightly interrelated subsystems.

Medical office streamlines the administrative, accounting and executive functions by offering such features as:

- document management;
- information support;
- resource planning and management (physician scheduling, appointment and treatment scheduling, room and equipment scheduling, etc.).

Patient care monitoring is made possible through creating and maintaining patient's electronic medical record, which can be reviewed, processed and analysed. The electronic medical record contains documentation of history and physical examination, diagnosis and treatment plan, consultation notes, prescriptions, diary notes, diagnosis history, etc.

Laboratory management subsystems are intended for the input, storage, processing and analysis of diagnostic test data.

Decision support subsystems perform expert assessment and quality control of care, work out recommendations and plans of care based on incoming information.

Reference & information service. User-edited reference guides and directories containing general and special information constitute a substantial part of the INTERIN-based application. These include, to name just a few:

- IDC-9 and IDC-10;
- State registry of medicines;
- types of examinations and analyses;
- reference guide for surgeons, cardiologists and other specialists;
- catalogue of surgical interventions;
- clinical guidelines;
- diagnosis and treatment charts;
- telephone directory of the organization;
- information desk (useful information for callers: personnel data, schedules, service location maps, etc.);
- visual aids, medical literature, etc.;
- archives.

Reference materials can be either global (the data they contain are relevant for any health care setting) or local (the information is specific for the institution).

FUNCTIONS

In most general terms, the INTERIN-based integrated information system is designed to support the entire spectrum of activities involved in health care delivery and management.

Administrative tasks

- Scheduling for physicians, nurses and other care providers.
- Generation of physicians' working time reports. Scheduling and tracking of room and equipment usage.
- Assessment of unit performance.
- Statistical data processing. Medical and administrative statistics management.
- Service tracking and billing, payment tracking.
- Resource and expenditure tracking.

Diagnosis and treatment support

- Patient registration.
- Maintaining databases on every aspect of patient care.
- Electronic record keeping (inpatient and outpatient records).
- Providing storage and access to the results of functional, laboratory and radiology tests and procedures.
- Generating physician's statements.
- Appointment scheduling.
- Automated planning of steps and sequence of care, based on standard clinical guidelines (orders, consultations, investigations, medications; control of the proper execution of orders, etc.).
- Critical value tracking. Defining the lists of symptoms and parameters to be tracked, frequency and duration of monitoring, value (dynamics) to be monitored (fall, rise, norm, numeric).

Laboratory and diagnostic examination support

- Entry and storage of laboratory and diagnostic results.
- Analysis of diagnostic data.
- Easy access to diagnostic data and their processing results.

Expert supervision

The system allows the care process to be supervised by health care experts, heads of departments and other officials, by featuring tools to:

- control the timely completion of diagnostic studies;
- generate medication summaries for a given period (specifying date, start and finish time, duration, cost, place, who administered);
- make up lists of patients that require observation;
- generate reports on various aspects of diagnostic and treatment events.

Care quality evaluation

The INTERIN-based application offers tools to support:

- control of the efficacy and length of care, the degree of functional recovery;
- effectiveness evaluation of the providers' performance;
- statistical data processing; periodical reporting (annual, quarterly, etc.).

Accounting tasks

- Service cost accounting.
- Detailed invoicing.
- Payment registration.
- Account balance management for patients, units, outside organizations.

Communication and interaction with the outside world

- Dispatching ambulance units. Enabling remote operation in several modes.
- Rapid exchange of information with allied health care providers. Providing for the continuity of patient care.
- Instant access to the inpatient database via the computer network, remote monitoring and adjustment of the care process.
- Teleconsulting and teleconferencing facilities for specialist physicians.
- Ensuring that patient information originating from a different practice will be accepted by the system (input of scanned images or paper-based documents).
- Interaction with similar health care information systems and those of other vendors.

Streamlining business processes

- Unified interface for handling electronic documents of any format.
- Tools to support collegiate work and decision-making.
- Electronic document exchange facility. Desktop organizer for electronic documents.
- Implementation of user-specified document routing schemes.
- Access authorization in terms of operations on computer-stored documents.
- Dynamic generation of per-user access profile based on the appropriate meta-user access profile.
- Information authored by a user (author) can be entered into the system by another user (operator) to whom the author has delegated the access rights. In this case, both the author and the operator's names are documented.

WORKPLACES

INTERIN technological solutions ensure that the information system can be scaled and configured to meet the customer's organizational and functional demands. Any piece of information created as part of the organization's activities is represented as a special component – an information object, which has a set of methods associated with it (create, display, edit, etc.).

The user workplace (the Desktop) is a set of information objects that are hierarchically arranged in folders and can be generated dynamically depending on the given parameters. Thus, any particular workplace can be constructed from a set of information objects. Typically, the user is offered a model Desktop that is chosen according to his/her job profile. For better fit, this model Desktop can be updated, either by the user or by the system administrator, to offer extra capabilities.

The use of component architecture and object model is beneficial in that:

- any state-of-the-art software tools can be used for software module development;
- every module is independent of the others, in terms of the internal implementation.

Model Desktops:

- Operation division (analysis of the institution's activity)
- Patient registration
- Appointment management, hospitalisation plan
- Doctor on duty
- Inpatient physician
- Outpatient physician
- Admissions department nurse
- Ward nurse
- Medical statistics
- Diagnostic centre
- Food and nutrition service
- Pharmacy and warehouse
- Personnel department
- Library
- Health care services and patient billing

Besides, the following system and functional modules are part of the INTERIN-based application:

- Desktop – the common user interface
- Document flow management system
- Intensive care unit
- PACS (Picture Archiving and Communication System)
- System administrator
- Reference information
- Applied software packages (MSOffice and Oracle)

INTERIN ARCHITECTURE

The INTERIN-based integrated information system implements a three-tiered architecture (Client – Application Server – DBMS Server) and has a distributed structure:

- central database server (servers);
- application servers ensuring the multi-level operation of the system components;
- WEB-servers providing remote access to the information via the Internet;
- publishing servers for generating elaborate statistical reports;
- information archives.

Oracle Server and Oracle Application Server are used as DBMS and application servers, respectively. Oracle Reports Server is used as a publishing server.

Using Oracle servers gives an advantage of unlimited scalability and equips the system with advanced tools for monitoring, logging, administering, equipment failure recovery (transaction rollback, etc.), and access delimitation.

The DBMS runs on virtually all common platforms (Windows NT, Solaris, LINUX, Novell Netware, AIX, and others). The client runs on IBM-compatible personal computers with Windows 98/2000/XP.

HARDWARE REQUIREMENTS

DB Server

Minimum requirements
Pentium III 1000 MHz
128 MB RAM
HDD 8 GB (RAID recommended)

Application server

Minimum requirements
Pentium III 1000 MHz
128 MB RAM
HDD 5 GB

Client

Minimum requirements
Pentium 166 MHz
64 MB RAM
HDD 1 HB
1024x764 resolution monitor

INTERIN PROMIS

Interin PROMIS is a model information management system of a health care institution, developed with INTERIN technology.

By means of its software tools and techniques, Interin PROMIS can be scaled to and deployed in medical practices of any size and specialty, from a first aid post to a large health centre.

Deployment of Interin PROMIS includes: setting up the model system, tailoring the system to the specifics of the practice, customising user workplaces, staff training, further maintenance of the system.

Interin PROMIS holds a Ministry of Health Certificate that approves the use of the system in the health care institutions of the Russian Federation.

CONTACT US

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