Client Requirements Report

Daniel Ly

Contents

Summary

Gelos Enterprises has been commissioned by Sandra Williams, proprietor of a large medical practice, to design, develop, and test a database for a new Medical Practice Management system. This report outlines the business requirements gathered from a thorough investigation of the medical practice's day-to-day operations.

Project overview

Context

The medical practice, under the proprietorship of Sandra Williams, requires a robust database system to manage patient appointments, practitioner schedules, and pathology tests efficiently. Gelos Enterprises has been commissioned to design, develop, and test this database as part of a comprehensive Medical Practice Management system.

The medical practice offers a comprehensive range of healthcare services, including general medical services provided by doctors, as well as specialized services such as physiotherapy, podiatry, and optometry. The practice employs various healthcare professionals, including General Practitioners (GPs), nurses, physiotherapists, and podiatrists.

Currently, managing patient appointments, practitioner schedules, and pathology tests manually or through less integrated systems may lead to inefficiencies, potential data inaccuracies, and compliance risks. By developing a comprehensive database system, the practice aims to automate administrative tasks, improve data security and compliance, and ultimately provide better patient care by ensuring accurate and timely access to patient information.

Scope of Work

- Design and development of a database schema to support efficient data storage and retrieval.
- Conduct thorough testing to ensure the system meets all business and technical

requirements.

Project Deliverables

Table 1 – Deliverables

Deliverable	Definition
Database Design Document	A detailed document outlining the database schema and relationships.
Functional Database System	A fully functional database system that meets all specified requirements.
Testing Report	A report detailing the results of system testing and quality assurance.

Requirements

After a thorough investigation of the day-to-day operations of the Medical Practice, a business analyst has defined the business rules and business data for the medical practice. The database will not be extended to meet any other hypothetical requirements that are not described by these business rules.

Business Requirements

Patient Management, Appointment Management, Practitioner Management, and **Pathology Test Request Management—**are crucial components of a Medical Practice Management system because they address the core operational needs of a medical practice.

Patient management

Accurate and secure storage of patient information is essential for providing quality care and ensuring compliance with healthcare regulations. Efficient patient data management helps in making informed decisions about patient care and streamlines administrative tasks.

We should ensure secure and organized storage of patient demographics, medical history, and contact information. The system should allow for easy retrieval and updating of patient records while maintaining compliance with healthcare regulations such as HIPAA.

Appointment management

Effective appointment scheduling is vital for maximizing clinic capacity, reducing no-show rates, and improving patient flow. It ensures that patients receive timely care while optimizing practitioner time.

Thus, we should develop an efficient system for scheduling and managing patient appointments with various practitioners, considering their availability and scheduling constraints.

Practitioner management

Maintaining accurate records of practitioner availability and specialties helps in efficient appointment allocation and ensures that patients are seen by the appropriate healthcare professionals.

So, we should maintain accurate records of practitioner specialties, availability, and schedules to ensure efficient appointment allocation.

Pathology test request management

Efficient management of pathology tests is crucial for diagnosing and treating patients effectively. It helps in ensuring that tests are ordered appropriately, reducing unnecessary tests, and streamlining the process from request to result reporting.

Therefore, we should implement a system for requesting, tracking, and recording pathology tests ordered for patients, ensuring accurate and timely processing.

Detailed Requirements

Functional Requirements

Data	Functional Requirement

Patient	1. Store patient's current personal data including:
	    • Title, First name, Middle Initial, Last name
	    • House/unit/lot number, Street/road name, Suburb, State, Post Code
	    • Home Phone Number, Mobile Phone Number
	    • Medicare Number (if applicable)
	    • Date of Birth
	    • Gender
	2. Allow updating of patient's current personal details.
	3. Validate that all addresses are within Australia.
	4. Store only the patient's current details.
	5. Make Medicare Number optional.
	6. Allow the following operations on patient data:
	    • Insert details of a new patient
	    • Retrieve details of an existing patient
	    • Update details of an existing patient
	7. Prevent deletion of patient records.

Data	Functional Requirement
Appointment	1. Store details of past and future appointments made by the Receptionist for patients with practitioners. 2. Store specific appointment details: • Patient: Title, first name, surname, date of birth • Practitioner: Title, first name, surname, type • Appointment: Date and start time 3. Allow operations on appointment data: • Create new appointments • Retrieve patient's appointments • Retrieve practitioner's appointments • Retrieve practitioner's appointments for a specific date • Cancel future appointments • Update appointment date or time • Delete appointments 4. Appointment rules: • Only allow appointments with available practitioners • Allocate appointments in 15-minute increments • Allow patients to make appointments with any practitioner • Prevent double-booking of patients • Prevent double-booking of practitioners

Data	Functional Requirement	

Practitioner	1. Store practitioner's current personal details:
	   • Title, First name, Middle Initial, Last name
	   • Address details (house/unit/lot number, street/road name, suburb, state, post code)
	   • Contact information (home phone, mobile phone)
	   • Medicare Number (Unique)
	   • AHPRA Medical Registration Number (MRN) (Unique)
	   • Date of Birth, Gender
	   • Practitioner Type
	   • Days of the week available
	2. Allow updating of practitioner's current personal details.
	3. Store only the practitioner's current details.
	4. Enable the following operations on practitioner data:
	   • Insert details of a new practitioner
	   • Retrieve details of an existing practitioner
	   • Update details of an existing practitioner
	   • Mark practitioners as 'inactive' instead of deleting records
	5. Enforce practitioner rules:
	   • Require AHPRA Medical Registration Number (MRN) for all practitioners
	   • Allow only one practitioner type per practitioner
	   • Validate practitioner types against the provided list	

Data	Functional Requirement	
Pathology Test Request	1. Store details of pathology tests requested for patients by practitioners, including: • Type of pathology test • Date and time of test order • Ordering practitioner • Patient for whom the test was ordered 2. Store pathology test information: • Test code • Test name • Test description 3. Prevent duplicate test requests: • A practitioner cannot request the same pathology test for a patient on the same date and time 4. Allow the following operations on pathology test requests: • Create new pathology test requests • Delete existing pathology test requests • List all pathology tests requested for a particular patient • List all pathology tests requested by a particular practitioner • List all pathology test requests 5. Support various types of pathology tests, including but not limited to ABO, C Peptide, Deafness, Paraneoplastic, Echis Time tests	

Non-Functional Requirements

Data	Functional Requirement
Patient	1. Data Integrity: Ensure accuracy and consistency of patient data. 2. Security: Protect sensitive patient information, especially Medicare Numbers. 3. Scalability: The database should handle a growing number of patient records over time. 4. Performance: The system should quickly process patient data operations. 5. Compliance: Adhere to Australian healthcare data regulations. 6. Usability: The database interface should be user-friendly for staff managing patient records.
Appointment	1. Data Integrity: The system must maintain accurate and consistent appointment data. 2. Reliability: The system should consistently perform all specified operations on appointment data. 3. Usability: The appointment system should be easy for receptionists to use and understand. 4. Scalability: The system should handle a growing number of appointments and users over time. 5. Performance: The system should quickly process appointment creation, retrieval, and modification requests.

| Data	Functional Requirement
Practitioner	1. Data Integrity: Ensure accuracy and consistency of practitioner data. 2. Security: Protect sensitive practitioner information, especially Medicare and AHPRA numbers. 3. Scalability: The database should handle a growing number of practitioner records over time. 4. Performance: The system should quickly process practitioner data operations. 5. Compliance: Adhere to Australian healthcare data regulations and AHPRA requirements. 6. Usability: The database interface should be user-friendly for staff managing practitioner records. 7. Reliability: The system should consistently perform all specified operations on practitioner data. 8. Auditability: Maintain a record of changes to practitioner data for tracking and compliance purposes.
Pathology Test Request	1. Data Integrity: Ensure accuracy and consistency of pathology test request data 2. Scalability: Handle a growing number of pathology test requests and types over time 3. Performance: Process pathology test request operations quickly and efficiently 4. Usability: Provide an intuitive interface for managing pathology test requests 5. Reliability: Consistently perform all specified operations on pathology test request data 6. Security: Protect sensitive patient and practitioner information related to pathology test requests 7. Compliance: Adhere to relevant healthcare data regulations and standards for pathology testing

System Requirements

The Medical Practice Management system application will require the minimum system described in the section under Recommendations, operations, technologies.

Constraints

System Boundaries

Understanding these boundaries helps in designing a system that effectively manages internal processes while interacting appropriately with external entities, ensuring that it meets the operational needs of the medical practice while respecting professional and technical constraints.

System Context Diagram
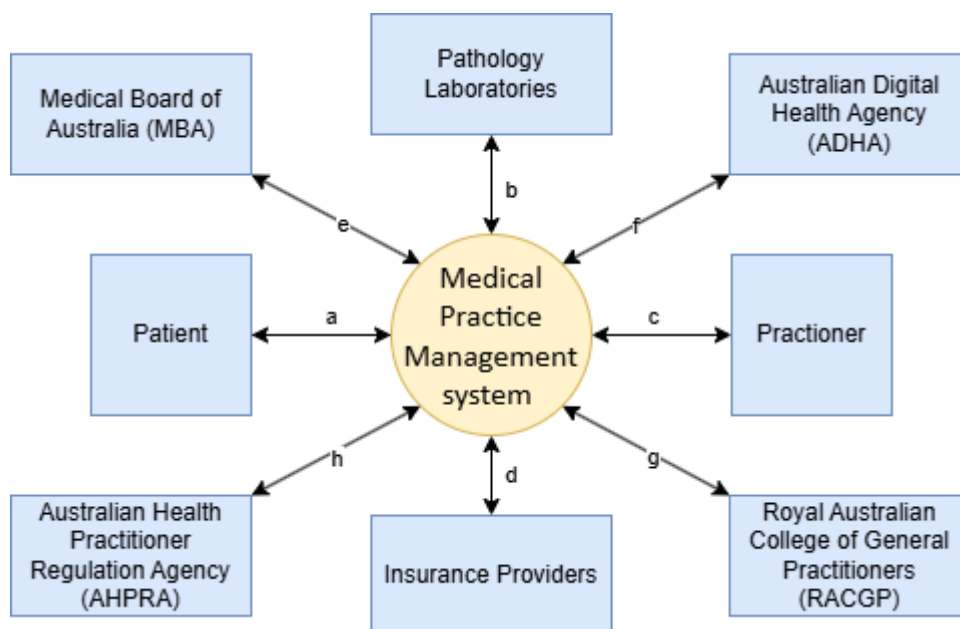
	Data Flow
a	Patient registration, medical history, appointment requests.
b	Electronic pathology test requests, test results.
c	Appointment schedules, patient treatment plans, pathology test orders.
d	Billing information, claims processing.
e	Ensures that medical practices adhere to professional standards, including confidentiality and privacy.

Data Flow	
f	Ensures secure and authorized access to digital health records, which may integrate with practice management systems.
g	Offers accreditation and standards for general practices, focusing on quality and safety.
h	Oversees the registration of medical practitioners, ensuring they meet professional standards.

Assumptions

Operational

Regulatory Compliance

- The system is designed to comply with relevant healthcare regulations, such as privacy laws and data security standards

Data Accuracy

- The system assumes that data entered by users (e.g. patient information, appointment schedules) is accurate and up to date.

User Adoption

- It is assumed that staff members will adapt to using the new system, with adequate training provided to ensure smooth integration into daily operations.

Technical

Infrastructure Support

- The system assumes that the practice has sufficient IT infrastructure (e.g., hardware, internet connectivity) to support its operation.

Integration with Other Systems

- It is assumed that the system can integrate seamlessly with other healthcare systems, such as electronic health records (EHRs) and laboratory information systems.

Security Measures

- The system assumes that robust security measures are in place to protect patient data, including encryption and access controls.

Recommendations

Strategy

Project Management

	Recommendation	Benefit
Involve Key Stakeholders	Engage all stakeholders in the decision-making process to ensure their needs are met and to foster a sense of ownership.	Encourages buy-in and reduces resistance to change.

	Recommendation	Benefit
Consider Cloud-Based vs On-premise Hosting	Evaluate whether cloud-based or on-premise hosting is more suitable based on the practice's resources and needs.	Cloud-based systems offer scalability and lower upfront costs.
Focus on User-Centered Design	Design the system with user needs in mind, ensuring it supports efficient workflows and enhances patient care.	Improves user satisfaction and reduces errors.
Ensure Data Security and Compliance	Implement robust security measures to protect patient data and ensure compliance with healthcare regulations.	Safeguards sensitive information and maintains regulatory compliance.

Operation

Resource Allocation

	Recommendation	Benefit
Phased Implementation	Implement the system in phases, starting with essential features and gradually adding more advanced ones as staff become comfortable with the system.	Reduces overwhelm and allows for iterative improvements.
Training and Support	Provide thorough training to staff and consider ongoing support to address any issues that arise during and after implementation.	Enhances user proficiency and system adoption.
Data Migration and Integration	Ensure seamless data migration from existing systems and integrate the new system with other healthcare technologies (e.g., EHRs, laboratory systems).	Prevents data loss and enhances interoperability.

	Recommendation	Benefit
Continuous Monitoring and Evaluation	Regularly monitor the system's performance, gather user feedback, and make adjustments as needed to optimize its effectiveness.	Identifies areas for improvement and ensures the system meets evolving practice needs.

Technologies

1. Cloud-Based Infrastructure

- **Technology**: Cloud platforms like AWS, Google Cloud, or Microsoft Azure.

- **Benefits**: Scalability, reduced infrastructure costs, and enhanced data security.

2. Database Management System (DBMS)

- **Technology**: Relational databases like MySQL or PostgreSQL for structured data, and NoSQL databases like MongoDB for handling unstructured or semi-structured data.

- **Benefits**: Efficient data storage and retrieval, support for complex queries.

3. Frontend Development

- **Technology**: Modern web frameworks such as React, Angular, or Vue.js for creating a responsive and intuitive user interface.

- **Benefits**: Provides a seamless user experience across different devices.

4. Backend Development

- **Technology**: Node.js with Express.js or Django for Python, to handle server-side logic and API integration.

- **Benefits**: Efficient handling of requests, robust API connectivity, and scalability.

5. Data Integration Technologies

- **Technology**: ETL (Extract, Transform, Load) tools like Talend or Informatica PowerCenter for integrating data from various sources.

- **Benefits**: Enables unified data management across different systems.

6. Security and Compliance

- **Technology**: Implement robust security measures such as encryption (e.g., SSL/TLS), access controls (e.g., role-based access), and auditing tools to ensure compliance with healthcare regulations.

- **Benefits**: Protects sensitive patient data and maintains regulatory compliance.

7. APIs for Interoperability

- **Technology**: Use APIs (Application Programming Interfaces) to integrate with external systems like pathology labs, insurance providers, and EHR systems.

- **Benefits**: Enhances interoperability and streamlines data exchange between different healthcare systems.

8. Mobile Functionality

- **Technology**: Develop mobile apps using frameworks like Flutter or React Native to provide on-the-go access for practitioners and patients.

- **Benefits**: Offers flexibility and convenience for users.

Recommended Technology Stack

- **Frontend**: React

- **Backend**: Node.js with Express.js

- **Database**: MySQL (for structured data) and MongoDB (for unstructured data)

- **Cloud Platform**: AWS

- **Security**: SSL/TLS encryption, role-based access control

- **APIs**: RESTful APIs for integrating with external systems

- **Data Integration**: Talend for ETL processes