University of Guadalajara

University Center of the Valles

School subject: Software Configuration Administration

Professor: Omar Ali Zatarain Durán

Author: Liusmila Nieto Cervantes

Contend

1. Software Configuration Identification

1.1 Definition of Baseline

A baseline provides a logical basis for comparison. A specific version of a single work product by itself, or a set of work products together can be established as a baseline. During the course of product development, a series of baselines is established, enabling assessment of the evolving product's maturity at different points in time.

The baseline is established for the development project "Information Management System for the Laboratory of Psychological Attention and Intervention (LPAI) in the University Centers ".

The development of the management system is done using the Extreme Programming (XP) methodology. The configuration elements that form the baseline are defined in accordance with the artifacts proposed by this methodology.

- **Software Requirements Specification**
  - Functional Requirements and Non-Functional Requirements)
    The software to be developed is described based on an understanding of the business context and analysis of the main characteristics.
- **System Design** (Prototypes and Architectural Aspects).
  - Prototypes are created for a better understanding of functional requirements.
  - The architectural aspects of the system are described according to the framework to be used.
- **Database**.
  - Entity-Relationship Diagram is performed to design and understand the architecture of the database.
- **Source Code**.
  Source code obtained as a result of the implementation process.

1.2. The configuration elements of the Baseline

1.2.1 Software Requirements Specification

System features

To contribute to the management and control of the information generated in the LPAI, a computer system will be developed for its information management. This system will allow standardized management of the information, contributing to its integrity, availability, and redundancy.

The modules defined for the system are:

Module	Description
Security	It will include functions for user management and user permission.
Management of Nomenclatures	It includes options to define standardized information in the system (nomenclatures).
Management of Laboratories LPAI	This module will allow the management of LPAI laboratories located in various universities, providing functions to list, add, modify and delete information from the laboratories.
Psychological Assessment and Follow-up	It will conduct psychological assessments and will allow for the recording of the follow-up on the provided psychological attention.
Reports	It provides information about the number of patients attended and evaluated based on their academic degree and the type of care received, allowing tracking of the laboratory's activity.

Functional Requirements

Module Security:

FR1: List users.

FR2: Add user.

FR3: View data from user.

FR4: Update user data.

FR5: Delete user.

FR6: Assign role to user.

FR7: Authenticate user.

FR8: Modify user password.

Module Management of Nomenclatures:

FR1: List Bachelor's Degree.

FR2: Add Bachelor's Degree.

FR3: View data from Bachelor's Degree.

FR4: Update Bachelor's Degree.

FR5: Delete Bachelor's Degree.

FR6: List Degree.

FR7: Add Degree.

FR8: View data from Degree.

FR9: Update Degree.

FR10: Delete Degree.

FR11: List Family Income.

FR12: Add Family Income.

FR13: View data from Family Income.

FR14: Update Family Income.

FR15: Delete Family Income.

FR16: List Institutions of Psychological Attention.

FR17: Add Institutions of Psychological Attention.

FR18: View data from Institutions of Psychological Attention.

FR19: Update Institutions of Psychological Attention.

FR20: Delete Institutions of Psychological Attention.

Module Management of Laboratories LPAI:

FR1: List Laboratories LPAI.

FR2: Add Laboratories LPAI.

FR3: View data from Laboratories LPAI.

FR4: Update Laboratories LPAI.

FR5: Delete Laboratories LPAI.

Module Psychological Assessment and Follow-up:

FR1: List Psychological Attention.

FR2: Add a Psychological Attention.

FR3: View data from Psychological Attention.

FR4: Update Psychological Attention data.

FR5: Register Psychological Instruments “Measures of Transversal Symptoms (MST)” applied to the patient.

FR6: Generate patient assessment based on the psychological instrument applied.

FR7: View data from Psychological Instruments MST.

FR8: Update Psychological Instruments MST.

FR9: Register Type of Attention indicated to the patient (Refer, Workshops, Consultations).

FR10: Register Patient Attention Status (Follow-up, Discharge, Discontinuation).

Module Reports:

FR1: Generate a report with the total number of patients attended per Bachelor of a University Center.

FR2: Generate reports with the total number of patients attended by Specialists at a University Center.

FR3: Generate a report with the total number of patients evaluated by Type of Attention of all University Centers.

FR4: Generate a report with the total number of patients by their Attention Status of all University Centers.

Non-Functional Requirements

Security:

- A two-factor authentication system must be implemented to access the system.
- All confidential data must be stored using encryption techniques.
- Users of each Laboratory should only see the information of the patients associated with it.

Graphic Design:

- The user interface must follow responsive design guidelines to adapt to different devices and screen sizes.
- A color palette based on light blues should be used.

Availability:

- An automated backup system must be implemented to perform daily backups.
- Planned maintenance must be carried out during low-demand hours.

Portability:

- The system must be compatible with web browsers such as Chrome, Firefox, Safari, and Internet Explorer.
- The system must be compatible with multiple operating systems, such as Windows, MacOS, and Linux.

1.2.2 System Design

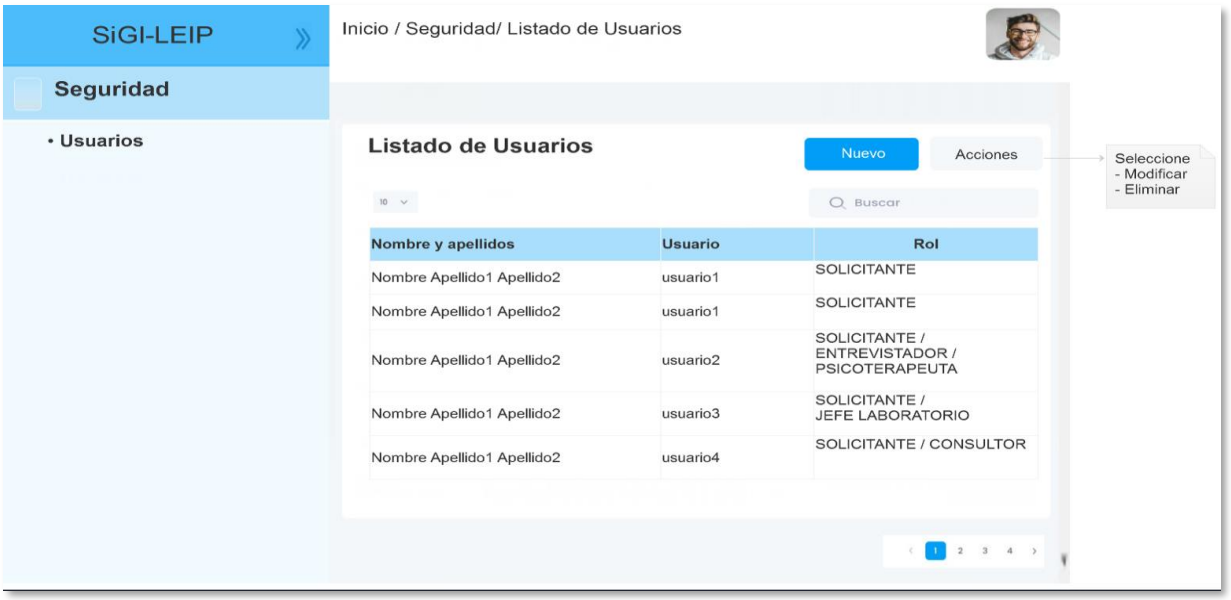
Prototypes

The prototypes of User Stories with High priority are presented, taking into account their complexity and importance to the clients.

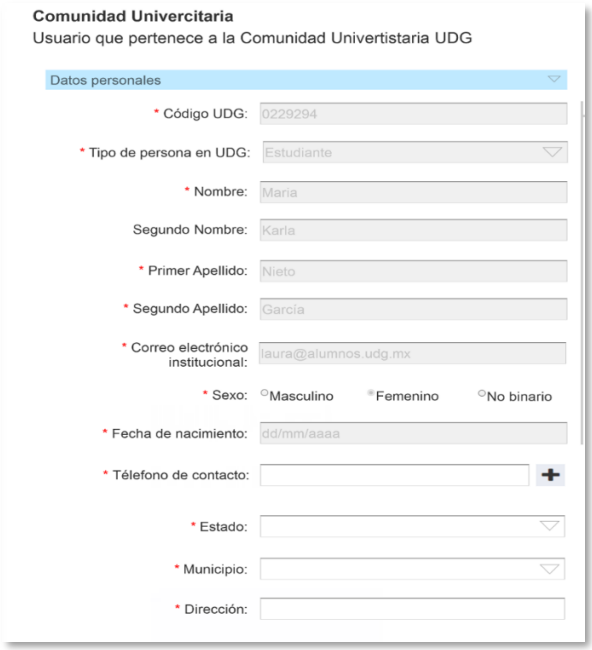
The prototype information is written in Spanish, as the system will be developed for University Centers in Mexico, where the native language is Spanish.

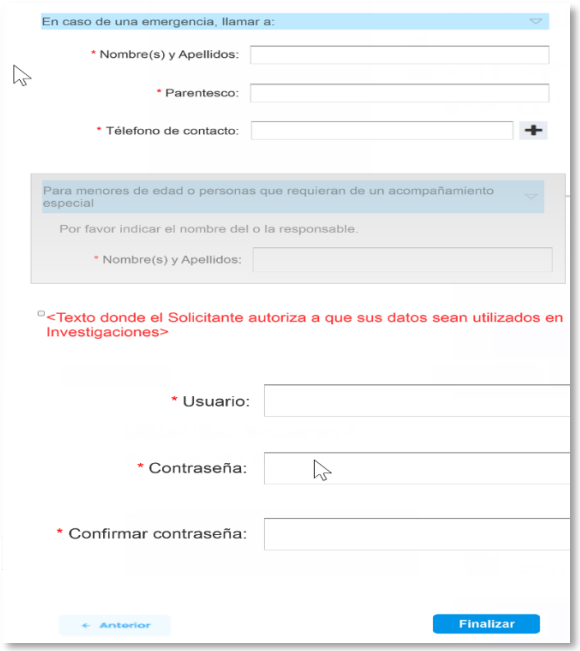
Module Security:

UH1: List users.



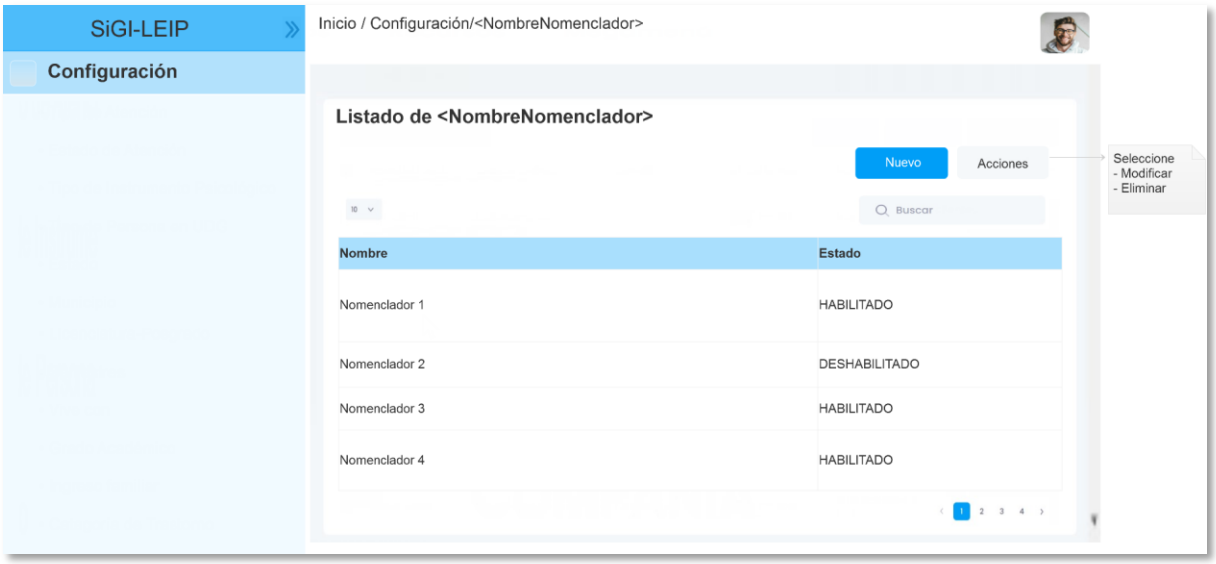
UH2: Add user.





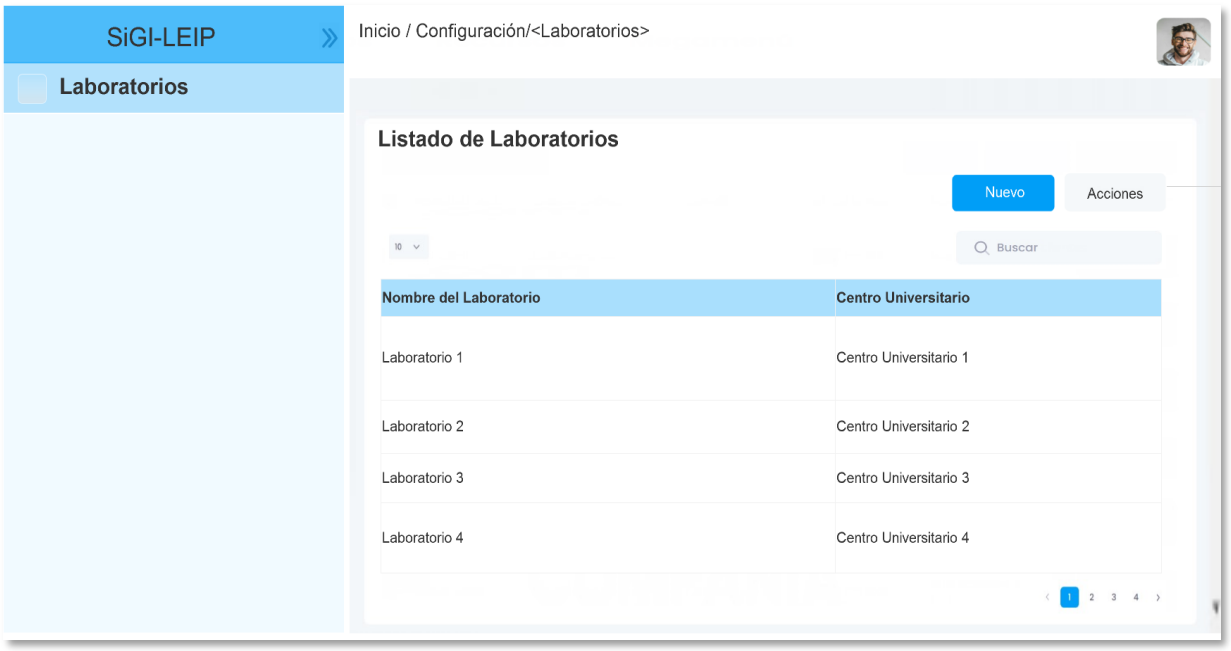
Module Management of Nomenclatures:

UH1: List Nomenclatures (Bachelor's Degree, Degree, Family Income, Institutions of Psychological Attention).



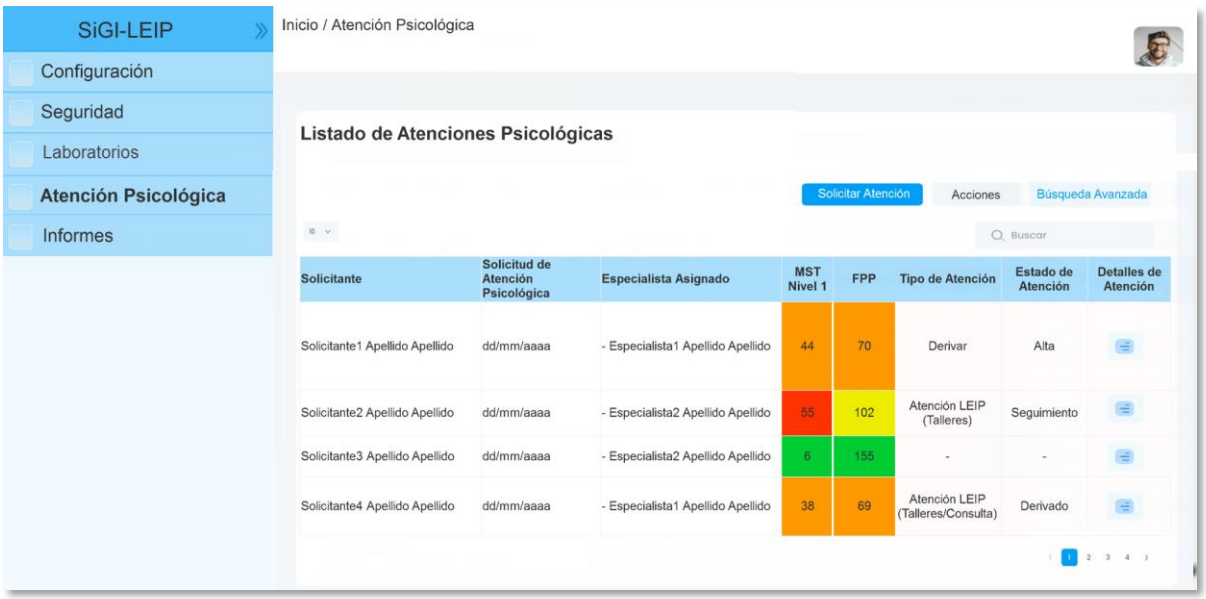
Module Management of Laboratories LPAI:

FR1: List Laboratories LPAI.

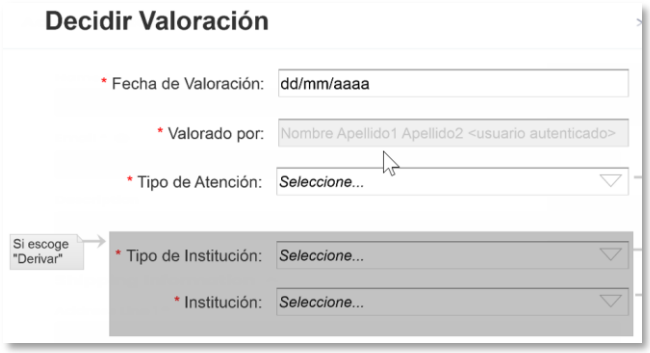


Module Psychological Assessment and Follow-up:

UH1: List Psychological Attention.



UH2: Register Type of Attention indicated to the patient (Refer, Workshops, Consultations).



UH3: Register Patient Attention Status (Follow-up, Discharge, Discontinuation).

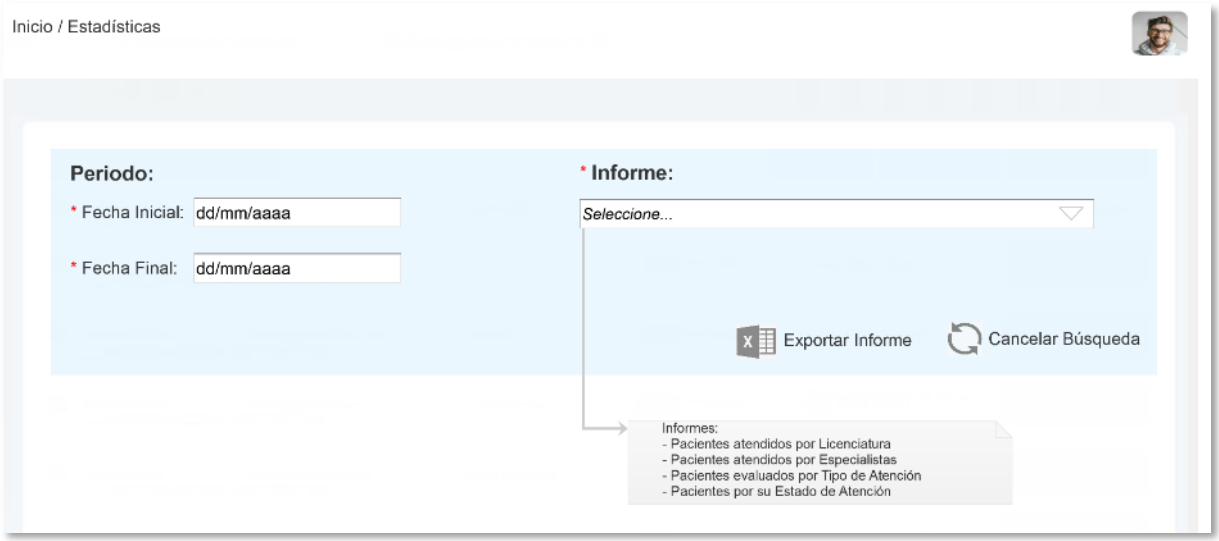
Module Reports:

UH1: Generate a report with the total number of patients attended per Bachelor of a University Center.

UH2: Generate reports with the total number of patients attended by Specialists at a University Center.

UH3: Generate a report with the total number of patients evaluated by Type of Attention of all University Centers.

UH4: Generate a report with the total number of patients by their Attention Status of all University Centers.



Centro Universitario "Nombre del Centro"	
Licenciatura	**Total**
Licenciatura 1	##
Licenciatura 2	##
Licenciatura 3	##
TOTAL	##

Centro Universitario "Nombre del Centro"	
Especialistas	**Total**
Nombre Apellidos Especialista 1	##
Nombre Apellidos Especialista 2	##
Nombre Apellidos Especialista 3	##
TOTAL	##

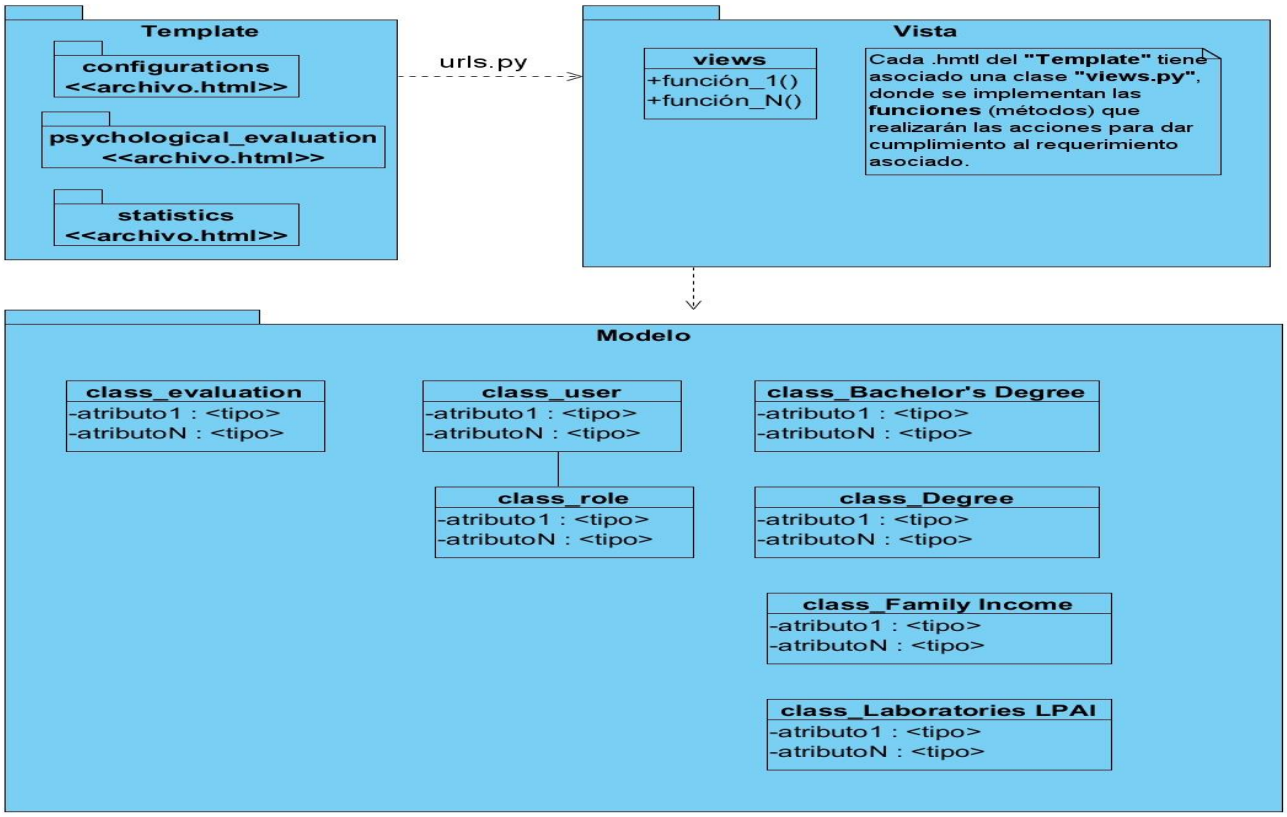
Tipo de Atenciones	Taller	Consultar	Derivar	Total
Centro Universitario 1	##	##	##	##
Centro Universitario 2	##	##	##	##
Centro Universitario 3	##	##	##	##
TOTAL	##	##	##	##

Estado de Atención	Seguimiento	Alta	Baja	Total
Centro Universitario 1	##	##	##	##
Centro Universitario 2	##	##	##	##
Centro Universitario 3	##	##	##	##
TOTAL	##	##	##	##

The architectural aspects

MTV is based on MVC. The model remains the model, the view is called Template, and the controller is called View.

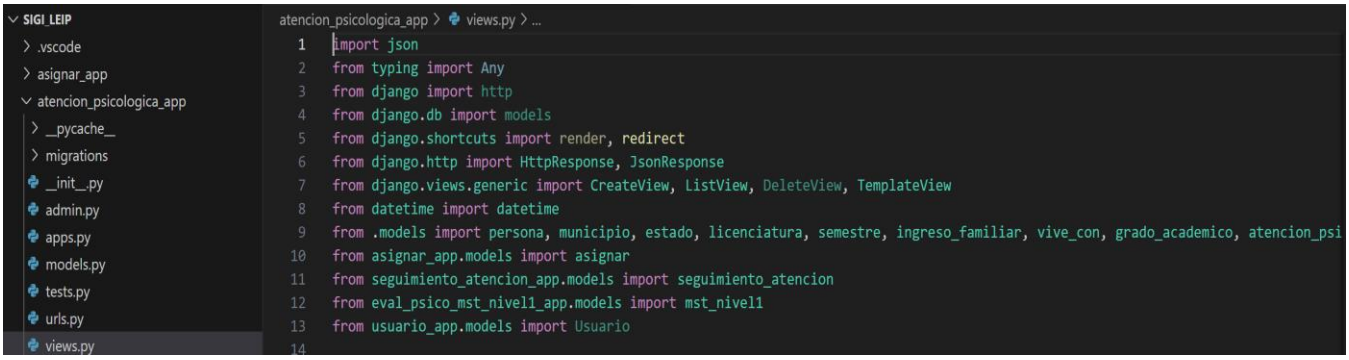
- Model: Controls the behavior of the data, defines the stored data, and has methods for data management.
- View: Its purpose is to determine which data will be displayed. The view has nothing to do with the presentation style of the data; it only handles the data, while the presentation is the task of the template.
- Template: Receives the data from the view and then organizes it for presentation to the web browser.



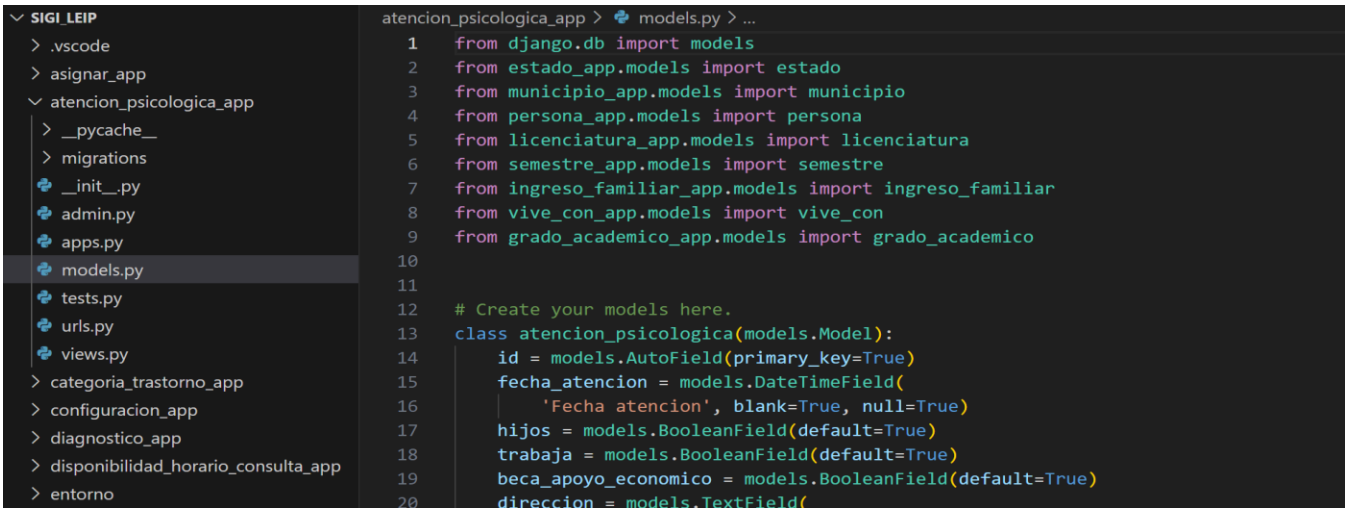
1.2.3 Database

1.2.4 Source Code

View Example



Model Example



2. Software Configuration Control

This section describes the process for managing changes in the configuration and deviations from the defined baseline. Procedures are established to control and track the implementation of these changes.

2.1 Decision Making Policy

The decision-making policy in configuration control of a project is fundamental to establish a framework for decision-making related to change requests. This policy defines who has the authority to approve or reject changes, how proposed changes are evaluated, and what criteria are used for decision making.

2.1.1 Authority and Responsibilities

- Define who has the authority to approve or reject changes in the system configuration.
- Assign clear responsibilities to each team member regarding the submission and evaluation of changes.

Committee Change Control	
Rols	**Responsibilities**
Manager	
Project Manager	- Coordinate committee meetings and ensure that established objectives are met. - Responsible for presenting and coordinating the evaluation of changes.
Technical Leader	- Provides technical advice on the feasibility and impact of proposed changes on system functionalities, architecture, and quality assurance.
Human Resources Manager	- Assess the impact of changes on personnel and organizational structure. - Provide recommendations on how to manage any impact on the project's human team (e.g., new staff hiring or management of staff overtime hours).

Finance Manager	- Assess the impact of changes on monetary cost and determine their financial feasibility.

2.2 Decision Making Process

Below is detailed how the decision-making process for change requests is carried out. The responsibilities of each member of the change control board in decision-making are included.

	Activities	Rol
1	- Submit Request	- Client - Stakeholder - Project Team
2	- Review the request and decide whether to record it as a change request - Register the request, if you decided it is a change request.	- Project Manager
3	- Initially assess the change request to determine its feasibility and relevance, ensuring understanding of its scope and potential impact.	- Project Manager
4	- Present the change request to the committee for to start your evaluation.	- Project Manager
5	Strategic Evaluation: - Develop the SWOT Matrix corresponding to the change request. - Evaluate the strategic impact of the change in terms of business objectives, budget, necessary personnel, and deadlines for fulfilling the change request.	- Project Manager - Human Resources Manager - Finance Manager
6	Technical Evaluation: - Assess the technical feasibility of the change and its impact on the existing architecture and design. - Determine if new tools or technologies are needed to implement the proposed change.	- Technical Leader

7	Reviewing and Discussion of Change Requests in the Committee: - Review and discuss the change request in detail, considering the technical and strategic analyses previously conducted.	- Committee Change Control
8	Decision Making: - Make a decision regarding the change request, considering the recommendations and opinions gathered.	- Committee Change Control
9	Documentation and Communication of Decisions: - Document the decision made during the committee meeting. - Communicate the decision to all relevant stakeholders.	- Project Manager
10	Follow-up and Implementation Supervision: - Supervise the implementation of the change (if approved), ensuring it is carried out as planned and objectives are achieved.	- Project Manager

2.2.1 Decision making criteria

The decision-making process in a project is based on key criteria that guide the evaluation of proposed changes. These aspects are fundamental to ensure that the decisions made are aligned with the project's objectives.

1. **Impact on the business**:
    - High: If the proposed change has a significant impact on the business's objectives and goals, such as improving process efficiency, increasing revenue, or meeting customer needs. For example: The change involves adding a new feature that will significantly enhance the customer experience and increase customer retention.
    - Medium: If the change has a moderate impact on the business, such as improving internal processes or increasing team productivity. For example: The addition of a functionality that allows better process management and resource allocation to improve productivity, but does not introduce changes in the execution of business processes.

- Low: If the change has a limited impact on the business and only affects minor aspects of the processes. For example: Changing graphic design elements (iconography, colors, informative texts) in the user interface that do not have a significant impact on the final business outcomes.

2. **Urgency of change:**
    - High: If the change involves complex modifications to the architecture or design of the system, requires the development of new complex functionalities, or affects critical areas of the system. For example, the change involves integrating a new complex technology that requires significant changes to the system's architecture.
    - Medium: If the change is important but not critical, and can wait for a reasonable period before being implemented.
    - Low: If the change is desirable but not urgent, and can be addressed in the future without causing immediate problems.

3. **Technical Complexity:**
    - High: If the change involves complex modifications to the architecture or design of the system, requires the development of new complex functionalities, or affects critical areas of the system. For example, the change involves integrating a new complex technology that requires significant changes to the system's architecture.
    - Medium: If the change involves some technical complexity but can be addressed with resources and technical skills available within the team.
    - Low: If the change is relatively simple and does not require significant modifications to the existing infrastructure or design.

4. **Cost Associated:**
    - High: If the change entails a high direct and indirect cost, which may include significant expenses for human resources, materials, and time. For example: Acquiring new software licenses and hiring additional staff for its implementation are required.
        - Additional Cost: Greater than or equal to 50% of the initial cost.
        - Additional time: Greater than or equal to 50% of the initial time.

- Medium: If the change has a moderate cost and can be financed within the allocated project budget. For example: It involves updating existing hardware and software to ensure compatibility with new technology, which will incur a moderate but manageable cost within the assigned budget.
    - Additional Cost: Greater than or equal to 25% and less than or equal to 49% of the initial cost.
    - Additional Time: Greater than or equal to 25% and less than or equal to 49% of the initial Time.
- Low: If the change has a low cost and can be implemented without requiring significant financial investment. For example, updating minor text elements in the user interface, which can be easily done with existing resources and tools, without incurring additional expenses.
    - Additional Cost: Less than 25% of the initial cost.
    - Additional Time: Less than 25% of the initial time.

2.2.2 Evaluation of Change Request

For the evaluation of the change, a scale based on an ordinal structure is used, where numerical values are sequentially assigned (preferably odd numbers) to reflect the relative order of the levels of each criterion. The evaluation considers different levels of impact on the business, urgency of change, technical complexity, and associated cost.

Criteria	**Levels**		
	High	**Medium**	**Low**
Impact on the business	4-5	2-3	0-1
	The more positive impact it has on the business, the higher the score it receives.		
Urgency of change	4-5	2-3	0-1

	The more urgency for implementation it has, the higher the score it receives.		
Technical Complexity	0-1	2-3	4-5
	The more technical complexity the implementation of the change has, the lower the score it receives.		
Cost Associated	0-1	2-3	4-5
	The more costs the implementation of the change has, the lower the score it receives.		

If the sum of the scores is:

- Greater than or equal to 15: The change can be **approved**.
- Between 8 and 14: **Additional assessment** is required before making a decision.
- Less than or equal to 7: The change must be **rejected**.

Note: Lower scores are assigned to changes with higher technical impact and associated costs, better reflecting their high risk and the need for a more detailed review or even rejection of the change if the sum of the scores is sufficiently low.

Defined subprocess for when the change evaluation score falls within the range of 8 to 14 (**Additional assessment**).

	Activities	Rol
1	Prepare a detailed report with the results of the initial evaluation of the proposed change, including the criteria of impact on the business, urgency of the change, technical complexity, and associated cost.	- Project Manager
2	Analyze the report with the details of the initial evaluation. - The criteria of "Impact on the business" and "Cost	- Manager - Project

<table>
<tr><td></td><td>Associated" are analyzed.</td><td>Manager</td></tr>
<tr><td>3</td><td>Make the final decision on the approval or rejection of the change, based on the information presented.
<table><tr><th>Decision</th><th>Impact on the business</th><th>Cost Associated</th></tr><tr><td rowspan="3">Approve</td><td>Hight</td><td>Medium or Low</td></tr><tr><td>Medium</td><td>Low</td></tr><tr><td>Low</td><td>Low</td></tr><tr><td rowspan="3">Reject</td><td>Hight</td><td>Hight</td></tr><tr><td>Medium</td><td>Hight</td></tr><tr><td>Low</td><td>Hight o Medium</td></tr></table></td><td>- Manager</td></tr>
<tr><td>4</td><td>Communicate the final decision to all relevant stakeholders, including the project team and the change control committee.</td><td>- Project Manager</td></tr>
</table>

2.3 Process for the Implementation of the Change Request

	Activities	**Rol**
1	Analysis and Planning of Change Implementation.	
	- Analyze the change request in detail to understand its requirements and the impact on the system.	- Analysts of Requirements. - Architect
	- Establish a detailed plan for change implementation, including the necessary human, material, and technological resources, as well as the corresponding schedule of activities.	- Project Manager
2	Implementation of Corresponding Modifications.	
	- Implement the specific tasks planned to carry out the	- Developers

	modifications corresponding to the change request.	
3	Validation Testing.	
	- Perform tests to verify the integrity and functionality of the system with the newly implemented modifications.	- Testers
	- Conduct integration tests to ensure that the new functionalities integrate seamlessly with the existing system.	
4	Communication of Implemented Change.	
	- Inform affected users about the implemented change through meetings or other communication channels.	- Project Manager
5	Training and Preparedness for the Implemented Change. - Note: This activity is carried out if the system is already being used by users.	
	- Plan training sessions for users who will utilize the new system functionalities.	- Training Team
	- Develop training materials to assist users in understanding the change.	
6	Closure of Change Request.	
	- Inform all stakeholders that the change request is officially closed.	- Project Manager
	- Conduct a final evaluation of the implemented change to gather feedback from end users and other stakeholders (e.g., Satisfaction surveys).	

2.3.1 Evaluation variables to measure the behavior of the implemented change.

1. **Adherence to Schedule.**
    - It evaluates whether the implementation of the change is carried out within the planned time frame. It is measured by comparing the actual start and end dates of each activity with the planned dates.

- Actions to be taken based on the variable measurement.
    - Within Schedule: No additional actions are required. Project tracking continues as usual.
    - Schedule Delay: Identify the causes of the delay and take corrective actions, such as allocating more resources, reorganizing tasks, or reviewing the planning to recover lost time.
    - Schedule Advance: Make adjustments to the planning to take advantage of the advance or redistribute resources as necessary.

2. **Cost Efficiency.**
    - It evaluates how the implementation of the change affects the project budget. It is measured by comparing the actual costs with the budgeted costs for implementing the change.
    - Actions to be taken based on the variable measurement.
        - Within Budget: No additional actions are required. Monitoring of costs continues to keep them within the budget.
        - Cost Below Budget: Evaluate if there are areas where the remaining budget can be reinvested to enhance the project or adjust the planning to utilize available resources more efficiently.
        - Cost Above Budget: Identify the reasons for the overage and take corrective actions. Efforts should be made to reduce costs or renegotiate contracts as necessary.

3. **Impact on System Quality.**
    - It evaluates how the implementation of the change affects the system's performance in terms of functionality and stability. It is measured through technical tests that assess the system before and after the change implementation. The correctness and completeness of functionalities and the error rate before and after the change request are analyzed.
    - Actions to be taken based on the variable measurement.
        - Quality values maintained: Continue monitoring the quality of the system.

- Quality values decrease: Identify areas where deficiencies and provide additional training to the team or make improvements to the infrastructure.
- Quality values increase: Implement de best practices identified in other aspects of the project and celebrate achievements with the team and stakeholders.

4. **Impact on Risk Management.**
    - It evaluates how the implementation of the change affects the system's risks management. It is measured comparing the risk management before and after the change.
    - Actions to be taken based on the variable measurement.
        - If the same risks persist: Continue monitoring and updating the project's risk management.
        - If risks increase: Identify areas where risks have increased and take corrective actions (review the risk management process in detail).
        - If risks decrease: Identify the best practices that contributed to this decrease and apply them in other areas of the project.

3. Change Requests

3.1 Change request #1

The client wants to make profit from the system you are developing. He requested that the system should have a module that retrieves the statistics from a series of branches across the country.

3.1.1 Strategic Evaluation

The SWOT matrix is used to identify and assess the Strengths, Weaknesses, Opportunities, and Threats associated with the change request. The matrix provides a comprehensive view of the internal and external factors that may influence the success of the change request implementation.

STRENGTHS (+)	WEAKNESSES (-)
• Team experience in report module development. • The system allows for the addition of new modules, as the Django Framework architecture makes it flexible and scalable. • Statistics in the psychological care sector have a growing demand and are necessary for research purposes.	• Increased project cost and duration due to the change. • Introduction of errors in already implemented modules due to the addition of new functionalities that involve changes in them.
OPPORTUNITIES (+)	THREATS (-)
• Contribute to decision-making for laboratory management, improving the effectiveness of psychological services provided to the university community	• Regulatory changes in psychological care and intervention that could affect the information associated with the generation of statistics.

3.1.2 Technical Evaluation

The change request affects the following configuration items:

1. The Requirements Specification Document: new functionalities will be added (Obtaining statistics associated with types of attention and patient follow-up).
    - A module was added: “Management of Laboratories LPAI”. This module contains 5 functional requirements (list, add, modify and delete information from the laboratories).
    - The "Reports" module was modified. The scope of the functional requirement "FR3" was modified (the quantity must be obtained for all University Centers) and a new functional requirement "FR4" was added (the total number of patients by their Attention Status of all University Centers).
2. The System Design Document: new classes must be created for subsequent implementation.
3. Source code: New classes with their methods must be implemented.
4. Database: New tables and their relationships. Implement new procedures to obtain the new reports.

This change impacts the baseline, causing an impact on the duration and final cost of the project.

- The duration of the project will be extended by 1 month (20 Work days).
    - Initial duration of the project: 4 months (80 Work days).
    - Additional time: 1 month (Represents **25%** of the initial duration).
    - Current project duration: 4 months + 1 month = **5 months (100 Work days).**

The following table details the calculation of the time necessary to develop Change Request #1.

Functionalities	**Requirements Specification Document**	**System Design Document**	**Database**	**Source code**	**Acceptance Testing Document**
	Time (Days)				
Module Management of Laboratories LPAI (Add 5 functional requirement)	1	2	1	4	2

Module Reports (Modified FR3)		1	1	2	
Module Reports (Add FR4)		1	1	4	
Change request #1	1	4	3	10	2
	20 Days (1 month)				

- The cost of the project will increase, it is necessary to pay 1 more month of work to the team.
  - Initial project cost: 235680 MXN.
  - Additional cost: 58920 MXN (Represents **25%** of the initial cost).
  - Current project cost: 235680 MXN + 58920 MXN = **294600 MXN**.

The following tables detail the additional cost calculation associated with Change Request #1.

Roles	**Configuration items**	**Daily Salary (Mexican coin)**	**Change request #1 (Days - Salary)**
Analyst	Requirements Specification Document	2000 MXN	1 Day 2000 MXN
Architect	System Design Document	2700 MXN	4 Days 10800 MXN
Developer	Database, Source code	2500 MXN	13 Days 32500 MXN
Tester	Acceptance Testing Document	1900 MXN	2 Days 3800 MXN

Total Salary	49100 MXN
20 % Other expenses (Electricity, Rent, Office Supplies and other expenses)	9820 MXN
Total Additional Cost	**58920 MXN**

3.1.3 Evaluation of Change Request

Criteria	Levels	Evaluation
Impact on the business	High (5) The requested change request could assist the client in making strategic decisions regarding the performance of all laboratories, thereby enhancing the efficiency of psychological care and having a greater impact on the university community.	Sum: 16 **Approved**
Urgency of change	High (5) The requested change must be implemented as soon as possible since the system needs to be adapted to accommodate multiple configured laboratories. Additionally, these statistics are crucial in the decision-making process for the management team.	
Technical Complexity	Medium (3) The change will be addressed with the current human resources of the team, and there is no need to purchase or learn new technologies to implement it, only	

	more development time is required. The change request involves adding a new module for laboratory management, which causes moderate changes in some system modules and modifications to the database. Additionally, two new statistics associated with the change request need to be implemented. The changes do not make modifications to the defined architecture or significant changes to existing modules.	
Cost Associated	Medium (3)	
	Represents 25% of the initial cost. • Initial project cost: 235680 MXN • Additional cost: 58920 MXN Represents 25% of the initial duration. • Initial project duration: 5 months • Additional time: 1 month	

3.1.4 Conclusions of the evaluation.

The request change was approved because it will help the client make strategic decisions about the performance of all laboratories, thus improving the efficiency of psychological care. In addition, the urgency of implementing the requested statistics is high, as they are crucial for the decision-making process. Despite the average technical complexity and the moderate increase in the cost and time of the project, the team has the necessary resources to address the change.

3.2 Change request #2

The government launched a new system to collect information on the statistics of mental disorders. For this purpose, the system should generate reports by psychologists with the number of patients, types of disorders, and treatment time. The reports should be formatted according to the new system, and an authentication method using a Kerberos-like system should be implemented to avoid information leakage. The reports should be released weekly and monthly.

3.2.1 Strategic Evaluation

The SWOT matrix is used to identify and assess the Strengths, Weaknesses, Opportunities, and Threats associated with the change request. The matrix provides a comprehensive view of the internal and external factors that may influence the success of the change request implementation.

STRENGTHS (+)	WEAKNESSES (-)
• Team experience in report module development. • The system allows for the addition of new modules, as the Django Framework architecture makes it flexible and scalable. • Potential to enhance the system's reputation with the government and other institutions by complying with their new regulations.	• The development team lacks knowledge of the Kerberos authentication method. • Although the implementation of a Kerberos-like authentication method is mentioned, ensuring the complete security of sensitive data is a challenge.
OPPORTUNITIES (+)	THREATS (-)
• Obtaining new reports opens new avenues for mental health research, including the development of new treatments and therapies. • Contributing to the development of more effective mental health policies	• Since the reports will be generated for the government, there is a risk of being targeted by hackers seeking access to sensitive information. • Laws and regulations related to privacy and data protection may

through accurate and updated data.	change, which could require significant adjustments to the system.

3.2.2 Technical Evaluation

The change request affects the following configuration items:

1. Requirements Specification Document:
    - New functionalities will be added (Obtaining statistics associated with mental disorders (number of patients, types of disorders, and treatment time)).
    - The module associated with System Security will be modified, specifically the authentication method, which should be implemented similar to the Kerberos systems.
2. Source Code: new classes with their methods must be implemented.
3. Database: new stored procedures must be implemented to obtain the new reports.

This change impacts the baseline, causing an impact on the duration and final cost of the project.

- The duration of the project will be extended by 2 weeks (10 Work days).
    - Initial duration after accepted Change Request #1: 5 months (100 working days).
    - Additional time: 10 days (Represents **10%** of the initial duration).
    - Current project duration: 5 months + 0.5 months = **5.5 months (110 Work days).**

The following table details the calculation of the time needed to develop Change Request #2.

- The implementation of the statistics on mental disorders and the adjustment of the authentication method will be done in parallel.
- The implementation of the statistics on mental disorders will be carried out by the project development team.
- For the analysis, design, implementation and testing of authentication settings similar to Kerberos, the service of an external company will be contracted.

Functionalities	Requirements Specification Document	System Design Document	Source code	Acceptance Testing Document	Days for functionality
	Time (Days)				
Module Reports (Obtain statistics on mental disorders)	2	1	5	2	10
Module Security (Adjust the implementation of System authentication to be similar to the Kerberos method)	The external company will plan its service adjusted to 10 days.				10
Change request #1	**10 Days (2 weeks)**				

- The cost of the project will increase, it is necessary to pay 10 more days of work to the team and contract the services of an external company.
  - Initial project cost after accepted change request #1: 294600 MXN.
  - Additional cost: 59600 MXN (Represents **20%** of the initial cost).
    - 27 600 MXN: Cost of developing statistics on mental disorders.
    - 32000 MXN: Cost of hiring the external company to make adjustments in the authentication method.
  - Current project cost: 294600 MXN + 59600MXN = **354200 MXN**.

The following tables detail the additional cost calculation associated with Change Request #2.

Roles	Configuration items	Daily Salary (Mexican coin)	Change request #1 (Days - Salary)

Analyst	Requirements Specification Document	2000 MXN	2 Day 4000 MXN
Architect	System Design Document	2700 MXN	1 Days 2700 MXN
Developer	Source code	2500 MXN	5 Days 12500 MXN
Tester	Acceptance Testing Document	1900 MXN	2 Days 3800 MXN
Total Salary			23000 MXN
20 % Other expenses (Electricity, Rent, Office Supplies and other expenses)			4600 MXN
Total Additional Cost			**27600 MXN**

3.2.3 Evaluation of Change Request

Criteria	Levels	Evaluation
Impact on the business	High (5) The change request enhances the system's reputation by complying with new government regulations and provides crucial data for mental health research.	Sum: 12 **Additional assessment**
Urgency of change	Medium (2) Although it is important to comply with new government regulations, its	

	implementation is not immediately urgent.	
Technical Complexity	High (1)	
	Implementing a Kerberos-like authentication method is technically challenging. Kerberos is a complex protocol that requires a deep understanding of security.	
Cost Associated	Low (4)	
	Represents 20% of the initial cost. • Initial project cost after accepted change request #1: 294600 MXN • Additional cost: 59600 MXN Represents 10% of the initial duration. • Initial duration after acceptance of change request #1: 5 months • Additional time: 0.5 months	

The initial assessment of the change request, starting from the scale defined in the process, led to an additional assessment of the change. This evaluation is detailed below.

Decision	Impact on the business	Cost Associated
Approve	Hight	Low

3.2.4 Conclusions of the evaluation.

The change request was approved due to its significant impact on the business by enhancing the system's reputation through compliance with new government regulations and providing crucial data for mental health research. Although the urgency of

implementation is medium, the importance of the new functionalities justified the extension of the project's time and cost. Additionally, the team has the financial resources necessary to hire an external company to implement a Kerberos-like authentication method.

3.3 Change request #3

The client requests that the screens used throughout the system be modified for people with visual impairments. It includes the change of fonts, colors, and descriptions with sound besides text descriptions.

3.3.1 Strategic Evaluation

The SWOT matrix is used to identify and assess the Strengths, Weaknesses, Opportunities, and Threats associated with the change request. The matrix provides a comprehensive view of the internal and external factors that may influence the success of the change request implementation.

STRENGTHS (+)	WEAKNESSES (-)
• Improving accessibility could potentially open the system to a wider audience in the future.	• Increase in project costs and time due to modifications to all interfaces, as the team lacks experience in implementing accessible interfaces. • Possible introduction of errors in the current system interfaces due to the changes.
OPPORTUNITIES (+)	THREATS (-)
• Could set a positive precedent for future accessibility updates in other projects.	• Hight development cost for a perceived limited benefit, given that the system is mainly used by doctors (a low percentage with visual impairments) and not by patients (who may have a slightly higher percentage).

	• Possible need for additional training for current users due to the interface changes.

3.3.2 Technical Evaluation

The change request affects the following configuration items:

1. Requirements Specification Document: All system interfaces must be modified, which involves defining new functional prototypes and design styles to meet the accessibility to visual debils.
2. Source Code: the CSS and HTML and JavaScript styles must be reimplemented.

This change impacts the baseline, causing an impact on the duration and final cost of the project.

- The duration of the project will be extended by 2 months (40 Work days).
  - Initial duration after accepted Change Request #2: 5.5 months (110 working days).
  - Additional time: 2 month (Represents **36%** of the initial duration).
  - Current project duration: 5.5 months + 2 months = **7.5 months (150 Work days).**

The following table details the calculation of the time needed to develop Change Request #3.

-As the project team has no knowledge of the specifications that must be met by the interfaces for the visual debils, it is necessary to hire an expert graphic designer in this area.

- The graphic designer has specified that it needs 1 month to be able to carry out the revision of the current system and to be able to design the style of the new interfaces.

Time of the development team to develop modifications to the interfaces:

Functionalities	Requirements Specification Document	System Design Document	Source code	Acceptance Testing Document
	Time (Days)			
All Interfaces of the system.	4	2	10	4
Change request #3	**20 Days (1 month)**			

- The cost of the project will increase, it is necessary to pay 40 more days of work to the team and contract the services of an external company.
  - Initial project cost after accepted change request #2: 354200 MXN.
  - Additional cost: 71200 MXN (Represents **20%** of the initial cost).
    - 55200 MXN: Cost to develop interface modifications by the development team.
    - 16000 MXN: Cost to hire the external graphic designer.
  - Current project cost: 354200 MXN + 71200 = **425400 MXN**.

The following tables detail the additional cost calculation associated with Change Request #3.

Roles	Configuration items	Daily Salary (Mexican coin)	Change request #1 (Days - Salary)
Analyst	Requirements Specification Document	2000 MXN	4 Day 8000 MXN
Architect	System Design Document	2700 MXN	2 Days 5400 MXN
Developer	Source code	2500 MXN	10 Days 25000 MXN

Tester	Acceptance Testing Document	1900 MXN	4 Days 7600 MXN
Total Salary			46000 MXN
20 % Other expenses (Electricity, Rent, Office Supplies and other expenses)			9200 MXN
Total Additional Cost			**55200 MXN**

3.3.3 Evaluation of Change Request

Criteria	Levels	Evaluation
Impact on the business	Low (1) Limited impact on the business, as the system will be used mainly by doctors, not by patients with visual disabilities. Improved accessibility of screens does not contribute significantly to the main functionality of the system or the operational efficiency of doctors.	Sum: 5 **Rejected**
Urgency of change	Low (1) Although accessibility is important, this change is not urgent because it does not directly affect the use of the system by doctors in their daily practice. The critical functions of the system do not depend on this update, which allows to postpone its implementation without immediate consequences.	
Technical Complexity	High (1)	

	All system interfaces need to be modified. Requires adjustments to fonts, colors and descriptions with sound. The extent of the work required makes it technically complex.	
Cost Associated	Medium (2)	
	Represents 20% of the initial cost. • Initial project cost after accepted change request #2: 354200 MXN • Additional cost: 71200 MXN Represents 36% of the initial duration. • Initial duration after acceptance of change request #2: 5.5 months • Additional time: 2 months	

3.3.4 Conclusions of the evaluation.

The change request was rejected due to its limited impact on the business, as the system will be used primarily by doctors and not by users with visual impairments. Additionally, improving the accessibility of the screens does not significantly contribute to the main functionality of the system or the operational efficiency of the doctors. Implementing the change requires high technical complexity and considerable costs in time and money, which do not justify the perceived benefit.

3.4 Change request #4

The client requests that the system incorporate new features for psychiatric patients. This implies new requirements, such as monitoring patients' medication histories, admitting them to the hospital, and performing medical interventions during psychiatric crises.

3.4.1 Strategic Evaluation

The SWOT matrix is used to identify and assess the Strengths, Weaknesses, Opportunities, and Threats associated with the change request. The matrix provides a comprehensive view of the internal and external factors that may influence the success of the change request implementation.

STRENGTHS (+)	WEAKNESSES (-)
• Experience of the team in the development of modules related to mental health. • The system already has a flexible structure that allows the addition of new modules and functionalities.	• Increasing the scope of the project may increase the risk of errors in existing modules.
OPPORTUNITIES (+)	THREATS (-)
• It can significantly improve the quality of psychiatric care and patient satisfaction. • Possibility of expanding the system to new areas of mental health (psychiatric care).	• Additional regulations and legal requirements in the treatment and handling of psychiatric patient data.

3.4.2 Technical Evaluation

The change request affects the following configuration items:

1. The Requirements Specification Document: new functionalities will be added (Obtaining statistics associated with types of attention and patient follow-up).
    - Implement new modules that allow hospital management corresponding to the period of admission of patients (management of clinical history, examinations performed, drugs supplied). In addition, new statistics associated with the treatment of patients admitted for psychiatric crises need to be incorporated.
2. The System Design Document: new classes must be created for subsequent implementation.

3. Source code: New classes with their methods must be implemented.
4. Database: New tables and their relationships corresponding to the new modules to be implemented.

This change impacts the baseline, causing an impact on the duration and final cost of the project.

- The duration of the project will be extended by 2 months (40 Work days).
  - Initial duration after accepted Change Request #2: 5.5 months (110 working days).

    It took the initial duration after accepting change request #2 because #3 was rejected, so it does not affect project times.
  - Additional time: 2 month (Represents **36%** of the initial duration).
  - Current project duration: 5.5 months + 2 months = **7.5 months (150 Work days).**

  The following table details the calculation of the time needed to develop Change Request #4.

Functionalities	**Requirements Specification Document**	**System Design Document**	**Source code**	**Acceptance Testing Document**
	Time (Days)			
Clinical and Drug Configuration.	10		2	5
Admissions Management.			5	
Management of patients' medical records.			5	
Statistics on the care of patients with psychiatric crises.			8	

Total for phase	10	5	20	5
Change request #4	**40 Days (2 month)**			

- The cost of the project will increase, it is necessary to pay 40 more days of work to the team.
  - Initial project cost after accepted change request #2: 354200 MXN.
    It was taken as initial cost, the cost after accepted change request #2 because #3 was rejected, so it does not affect the costs of the project.
  - Additional cost: 111600 MXN (Represents **31%** of the initial cost).
  - Current project cost: 354200 MXN + 111600 = **465800 MXN**.

The following tables detail the additional cost calculation associated with Change Request #4.

Roles	**Configuration items**	**Daily Salary (Mexican coin)**	**Change request #1 (Days - Salary)**
Analyst	Requirements Specification Document	2000 MXN	10 Day 30000 MXN
Architect	System Design Document	2700 MXN	5 Days 13500 MXN
Developer	Source code	2500 MXN	20 Days 75000 MXN
Tester	Acceptance Testing Document	1900 MXN	5 Days 19000 MXN
Total Salary			93000 MXN
20 % Other expenses (Electricity, Rent, Office Supplies and other			18600 MXN

expenses)	
Total Additional Cost	**111600 MXN**

3.4.3 Evaluation of Change Request

Criteria	Levels	Evaluation
Impact on the business	Hight (5) The addition of the new functionalities associated with hospital admission of patients with psychiatric crises would have a significant impact, as it allows the system to address a critical segment of psychiatric medical care. This would not only increase the value of the system for current clients, but could also attract new clients seeking comprehensive solutions for the management of psychiatric patients.	Sum: 16 **Approved**
Urgency of change	Hight (5) The urgency of change is high due to the importance of improving the management of psychiatric patients. Implementing these features can have a direct impact on patient care quality and safety, which is a high priority for any health system.	
Technical Complexity	Medium (3) Although the implementation of new functionalities implies an increase in technical complexity, the team already has experience in the development of	

	modules related to hospital management.	
Cost Associated	Medium (3)	
	Represents 31% of the initial cost. • Initial project cost after accepted change request #2: 354200 MXN • Additional cost: 111600 MXN Represents 36% of the initial duration. • Initial duration after acceptance of change request #2: 5.5 months • Additional time: 2 months	

3.4.4 Conclusions of the evaluation.

The change request was approved due to its significant business impact, as the new features enhance the management of psychiatric patients and can attract new clients seeking comprehensive solutions for handling psychiatric patients. The urgency of implementation is high, as these improvements directly impact the quality and safety of care for patients with mental health issues. Additionally, although the technical complexity is moderate, the team has prior experience in developing hospital management modules, which facilitates implementation.

4. Status accounting

Status accounting is an important process in project management that involves the recording, tracking, and documentation of the current state of relevant project aspects.

4.1 Policies for monitoring and evaluation status accounting

The policies for monitoring and evaluation status accounting are fundamental to ensure that a project is aligned with its objectives and to identify areas for improvement.

Variables to consider in the current project status accounting process:

1. **Project Progress.**
   - Variable: Task Progress.

     Provides an overview of how much work has been completed compared to the total planned work. It allows evaluating whether the objectives are being met within the scheduled timeframe.

     How to measure the variable?

     Assess the project's progress compared to the planned schedule.
     - Calculate the percentage of elapsed time (in days) from the start of the project to the current moment, in relation to the total duration. Percentage of elapsed time (PET) = (Elapsed time since the start of the project (ETSP) / Total duration of the project (TDP)) * 100.
     - Calculate the percentage of completed tasks (PCT) = (number of tasks completed (NTC) / total number of planned tasks (TNPT)) * 100.
     - Compare the elapsed time (PET) with the percentage of tasks completed (PTC) to determine if the project is on schedule or delayed.

     Task Progress Evaluation.
     - On Schedule: If the percentage of completed task is equal to or greater than (>=) the percentage of elapsed time.
     - Delayed: If the percentage of completed task is less (<) than the percentage of elapsed time. Measures should be taken to recover lost time.

- Ahead of Schedule: If the percentage of completed task is greater (>) than the percentage of time elapsed. There may be opportunities to improve efficiency or add more features.

2. **Budget.**

   Variable: Expenditure Monitoring

   This involves keeping track of project expenses to ensure they stay within the allocated budget.

   How to measure the variable?

   - Compare the expenses with the budgeted costs for the project phases analyzed in the evaluation.

   Budget Evaluation.

   - Within Budget: If actual costs remain within the allocated budget for the analyzed phase of the project.
   - Over Budget: If actual costs exceed the allocated budget for the phase. Measures should be taken to control costs and prevent overruns.
   - Below Budget: If actual costs are lower than the allocated budget for the phase.

3. **Risks.**

   Variable: Risk Impact

   Monitor and evaluate the risks identified during the project to ensure they are being managed correctly and anticipate potential future issues.

   How to measure the variable?

   - Count the number of mitigated risks (NMR) from the beginning of the project until the current moment.
   - Count the number of new risks (NNR) that have emerged during the project.

   Risk Impact Evaluation.

- Low Incidence: If the number of mitigated risks is significantly greater than the number of new risks that have emerged.
- Moderate Incidence: If the number of mitigated risks is approximately equal to the number of new risks that have emerged.
- High Incidence: If the number of new risks that have emerged is significantly greater than the number of mitigated risks.

4.2 Status accounting after implementation of Change Request #1

<table>
<tr><td>ID: CR#1</td><td>Date of Status accounting:
When the change request was completed.</td><td>15/03/2024</td></tr>
<tr><td>Start date of the project:

19/01/2024</td><td>Date of approval:

02/02/2024</td><td>Date of implementation (star):

16/02/2024</td></tr>
<tr><td>Task Progress</td><td>Expenditure Monitoring</td><td>Risk Impact</td></tr>
<tr><td>o PET= (ETSP / TDP) * 100.
PET= (40days/100days) * 100
PET= 40%
o PCT = (NTC / TNPT) * 100
PCT = (250/500) *100
PCT = 50%</td><td>o - Budget:
40days * 58920 MXN = 117840 MXN
o Expenditure:
117840 MXN</td><td>o - Total risks identified during the project: 17
o NMR: 15 risks
o NNR: 2 risks</td></tr>
<tr><td>Evaluation</td><td>Evaluation</td><td>Evaluation</td></tr>
<tr><td>50% > 40%

Ahead of Schedule</td><td>Expenditure = Budget

Within Budget</td><td>NMR > NNR

Low Incidence</td></tr>
<tr><td colspan="3">Actions</td></tr>
<tr><td colspan="3">o As the Project is ahead of schedule, the advance time will be taken and the code already implemented will be refactored for better system performance.</td></tr>
</table>

○ With regard to budget compliance and risk impact, no action is needed.
Conclusions
The project is ahead of schedule, within budget and with a low risk incidence, which indicates efficient management of time and resources, as well as effective risk management.

4.3 Status accounting after implementation of Change Request #2 y 4

The implementation of change requests #3 and #4 will be executed after implementing the initial functionalities and change request #1. The project development started on 19/01/2024 (150 days - total duration including the time of all approved changes) and is currently on 17/05/2024 (85 days of current execution), so the implementation of change requests #3 and #4 has not yet been completed.

The status accounting for change requests #3 and #4 will be conducted on 02/08/2024, by which time these two requests should have been fully implemented and the project will be nearing completion.

5. Auditing

The audit process in configuration management is an important step, as it ensures the integrity, quality and compliance of products and processes within a project.

Audit focuses on reviewing and validating all aspects of the software configuration management system (SCM) to ensure that all changes and configurations comply with defined policies and that the final product is consistent with initial specifications and approved change requests.

5.1 Audit Process

The audit process is composed of several activities that ensure an evaluation of the configuration management system:

1. Audit Planning: Define the scope, objectives, and criteria of the audit, as well as select the audit team and establish a detailed schedule.
2. Documentation Review: Evaluate all configuration documents, including change requests (CRs) and status accounting reports.
3. Change Validation: Verify that all approved changes have been correctly implemented and that test results reflect the expected software performance.
4. Findings Report: Document all findings, identifying conformities, non-conformities, errors, and recommendations for improving configuration processes.
5. Follow-up and Resolution of Findings: Ensure that all deviations and errors identified during the audit are addressed and resolved.

5.2 Audit performed after implementation of change request #1

Date of Audit: 18/03/2025 *(When implementation of change request #1 is completed)*	
Audit Planning	• Objective: Verification of the implementation of change request #1, ensuring compliance with internal quality standards.

	• Audit Team: Two quality specialists and two technical experts (the Principal Analyst and the Project Architect).
	• Schedule:
	  ○ Opening meeting of the audit: 10/03/2024.
	  ○ Compilation and revision of documents: 18/03/2024 to 21/03/2024.
	  ○ Interviews with the development team: 22/03/2024
	  ○ Closing meeting and presentation of the final report: 23/03/2024

Documentation Review	• Project configuration management document. • Requirements, design classes, database and code corresponding to change request #1. • The status accounting report for the implementation of change request #1.
Change Validation	Verified that change request #1 was implemented correctly. ○ The test results of the change request (test cases and test results reports) were reviewed.

Findings Report	The report documenting all observations and findings during the audit was prepared.
	• The following "Conformities" are identified:
	  ○ Correct implementation of change request #1
	  ○ The correct update of configuration documents.
	• "Non-conformities" are not identified.

Follow-up and Resolution of Findings	It is not necessary to follow up and resolve findings because "Non-conformities" were not identified during the audit.
Result	Satisfactory