



Tunisian Republic

Ministry of Higher Education

and Scientific Research

Tunis El Manar University



Faculty of Economics and Management of Tunis

## FINAL YEAR PROJECT

Presented for the purpose of having

National diploma in business information systems engineering

By

Oussama Mejri

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# Development of a Framework for the diagnosis, evaluation and continuous improvement of healthcare information systems.

---

Professional supervisor: **Mrs Maryem Seltana** Assistant manager

Academic supervisor: **Mr Jelassi Nidhal** Professor

Fullfilled in EY/Ernst and Young







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## END OF STUDIES PROJECT REPORT

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Oussama Mejri

# Dedication

*I dedicate this work to Almighty Allah who always blesses me with determination, good people, and guidance. To my parents, who always guided me with their wise advice, supported me with their love and care, and taught me to always do my best, believe in myself, and in the good side of each person i meet. To my dear friends who encouraged me to take this chance and for making this journey funnier and full of great moments. And i also dedicate this humble project to everyone who gave me a hand whenever i needed it.*

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# Acronyms and Abbreviations

- **BPMN** = Business Process Model and Notation
- **EHR** = Electronic health records
- **HIS** = Health information system
- **JWT** = JSON WEB TOKEN
- **SOCI** = Stages of Continuous Improvement
- **UI** = User interface
- **USAID** = United States Agency for International Development
- **WHO** = World health organisation

# General Introduction

The health sector is undergoing a profound transformation fueled by the rapid advancement of digitalization.

Technology has revolutionized various aspects of healthcare, from patient care and diagnosis to administrative tasks and data management. In this digital era, the integration of technology has become crucial for the efficiency and effectiveness of the health sector.

One key element in this digital transformation is the implementation of health information systems. These systems are pivotal in managing and organizing vast amounts of health-related data, ensuring its accessibility, accuracy, and security. Health information systems contribute significantly to improving patient care outcomes and enhancing overall healthcare management by streamlining processes, facilitating communication, and enabling data-driven decision-making.

However, for these systems to keep pace with the ongoing digital revolution, consultants and experts in the field need to possess a solid knowledge base and guidelines to assess and diagnose the existing health information systems to identify areas for improvement and ensure that these systems align with the evolving needs of healthcare organizations.

During the internship, our primary objective will be to develop a comprehensive framework for diagnosing and assessing health information systems. This framework will serve as a guide for consultants, providing them with a structured approach to evaluate and improve the functionality and effectiveness of these systems. It will encompass various components that will ensure to provide best practices and necessary resources.

Once the framework is established, we will proceed with implementing it in a web application. This application will serve as a practical tool for consultants, allowing them to follow the framework systematically while diagnosing health information systems. It will offer a user-friendly interface, guiding consultants through each step of the diagnosis process and providing relevant insights and recommendations. The web application will be designed to facilitate collaboration and knowledge sharing among consultants, enabling them to document their findings, share best practices, and contribute to a collective knowledge base.

This report describes exhaustively the different stages of our work. It is organized around six chapters as follow:

- The first chapter is dedicated to present the hosting company "EY" along with the department and the solution we worked on, finally, we end up with an explanation to the choice of the methodology.
- The second chapter we will define key concepts and terms related to the project. This chapter will serve as a foundation for the subsequent chapters, providing the necessary background knowledge for the development of our framework.
- The third chapter will be showcasing the design part of our project where we are going to dive into our framework.
- The fourth chapter, we will outline the functional and non-functional specifications, the backlog product, the global use case diagram, the decomposed sprints and releases, and finally the adopted architectures and the technologies, programming languages.
- The fifth chapter we will showcase the first sprint of the backlog
- The sixth chapter we will showcase the second sprint of the backlog.

Finally, we end our report with a general conclusion recapitulates our progress and proposing other possible improvements to the produced service that could be achieved in the future.

# GENERAL PROJECT PRESENTATION

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## Plan

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## Introduction

Throughout This chapter, we will have a general introduction of the hosting company "EY", along with the project that we'll work on during the internship, its current situation and limits. After that, we'll end up presenting briefly the proposed solution by the company to work on and the adopted methodology to achieve it.

### 1.1 Presentation of the hosting organization

The purpose of this section is knowing more about the company "EY", its background and its project.

#### 1.1.1 EY



**Figure 1.1:** ey logo

EY, also known as Ernst Young, is one of the world's leading professional services firms, with a reputation for excellence in its provision of assurance, tax, consulting, and advisory services to a vast array of clients, from private individuals to large corporations and government entities. As a member of the "Big Four" accounting firms, EY has a truly global presence, with operations in over 150 countries and a workforce of approximately 300,000 professionals. EY's mission is to build a better working world one that is more trustful, more sustainable, and more inclusive. To achieve this, EY leverages its core services in unique and innovative ways to help clients navigate the ever-changing business landscape, capitalize on opportunities, and drive sustainable growth. Innovation sits at the heart of EY's ethos. Recognizing the immense potential of technology to reshape business and society, EY is at the forefront of embracing and developing disruptive technologies. This includes exploring the potentials of Artificial Intelligence (AI), blockchain, data analytics, and automation, among others, to deliver value-added services to clients[1].

### 1.1.2 EY Tunisie

Established locally since 1987, AMC EY Tunisia is one of the leading consulting firms in Tunisia. Its connection with the local public sector encompassing ministries, banks, local development agencies, and chambers of commerce positions it as a dedicated advisor to the public sector in Tunisia. This is particularly evident in its collaborations with the Ministry of Industry and Technology and its affiliated entities, the Ministry of Investment and International Cooperation, as well as the Ministry of Transportation. With more than 30 years of experience in the local market, EY Tunisia boasts a robust team of over 560 permanent staff members based in the Tunis office. These professionals execute more than 500 missions annually and serve over 200 major local clients, demonstrating the breadth and depth of EY Tunisia's expertise in providing effective guidance to its clients.

### 1.1.3 Activity

At the heart of EY Tunisia's operations lie four main service lines, each contributing to the firm's mission of delivering top-tier, comprehensive professional services. These service lines reflect the diversity and depth of EY's expertise, addressing various sectors and aspects of business management and growth.

- **Audit:** EY Tunisia's audit services are characterized by their meticulous approach and commitment to transparency. The audit team conducts comprehensive financial audits that adhere to both local and international standards, offering clients reassurance about their financial health and regulatory compliance.
- **Consulting:** The consulting services offered by EY Tunisia span several domains including financial services, strategy and operations, and technology. The team offers strategic advice and actionable insights to clients, enabling them to optimize their business operations, leverage emerging technologies, and navigate the complexities of the financial sector.
- **Tax and Law (Tax):** EY Tunisia's tax and law division provides expert advice and services related to taxation and legal issues. Their services range from tax planning and compliance to providing legal counsel on a variety of business matters, helping clients navigate the intricate landscape of tax laws and regulations.

- **Strategy and Transactions:** This service line at EY Tunisia helps clients throughout their strategic business decisions related to mergers, acquisitions, divestitures, and capital funding strategies. By providing comprehensive transaction advice, industry knowledge, and strategic insights, they assist clients in making informed decisions that drive their business forward.

#### 1.1.4 Technology transformation department

The Technology Transformation department, which is part of the Technology Consulting branch, specialises in digital transformation in both the public and private sectors. The ultimate aim of this department is to improve performance, manage risk and stimulate innovation in a number of sectors

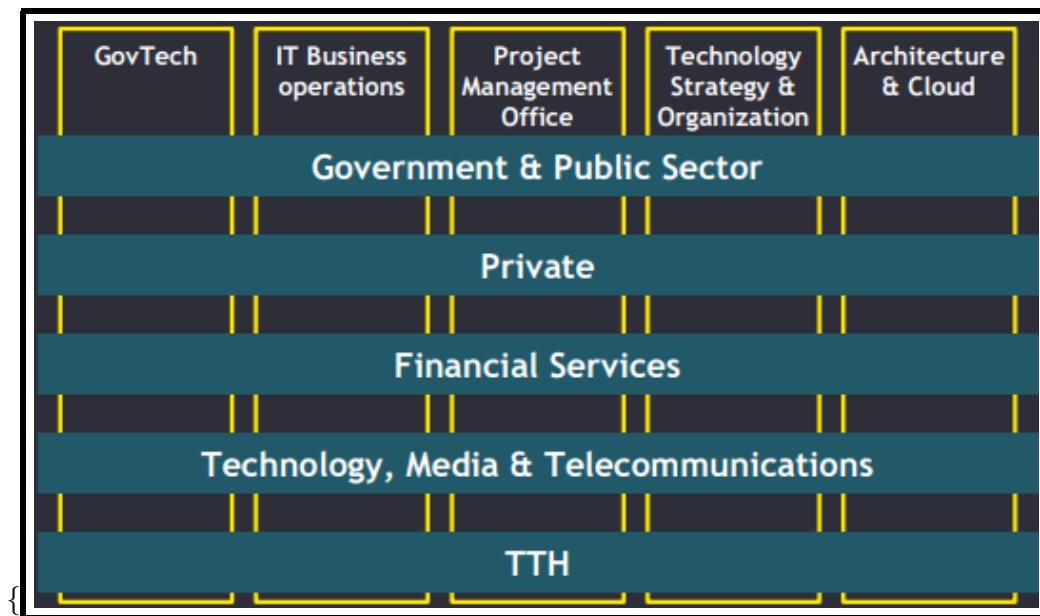


Figure 1.2: Technology transformation services

## 1.2 State of the art

Here we'll present the current situation, its limits and highlight the mission we will focus on during this internship experience.

### 1.2.1 Overview of Health Information Systems:

Health Information Systems are integral to the management and utilization of health-related information within healthcare organizations. These systems encompass a range of technologies, processes, and resources designed to collect, store, analyze, and disseminate health data for various purposes. The primary objective of HIS is to improve healthcare delivery, enhance patient outcomes, and support informed decision-making at all levels of the healthcare ecosystem. Furthermore, Health Information Systems facilitate the exchange of health data through interoperability standards and health information exchange networks. These networks enable the secure sharing of patient information among healthcare providers, laboratories, pharmacies, and other stakeholders, ensuring seamless care coordination and continuity of treatment. Data analytics and reporting capabilities are essential components of Health Information Systems. These capabilities allow for the analysis of large volumes of health data, generating valuable insights to support population health management, disease surveillance, research, and public health interventions. By leveraging data analytics, healthcare organizations can identify trends, track outcomes, and make evidence-based decisions to improve healthcare quality and optimize resource allocation.

### **1.2.2 Current Challenges and Opportunities:**

One of the prevailing challenges in Health Information Systems is the need for a clear and comprehensive guide for implementing and evaluating these systems. As health information systems play a crucial role in healthcare delivery, decision-making, and data management, the lack of standardized guidelines can hinder their successful implementation and optimization. With a clear guide, organizations can easily define the necessary components, processes, and metrics to ensure the effectiveness and efficiency of their health information system initiatives.

However, despite this challenge, the importance of health information system in the healthcare landscape cannot be overstated. They enable the seamless collection, storage, and exchange of health information, leading to enhanced care coordination, improved patient outcomes, and more efficient healthcare delivery. Health information systems provide valuable insights into population health trends, facilitate evidence-based decision-making, and support public health initiatives. With the growing emphasis on data-driven healthcare, the effective implementation and utilization of health information systems have become critical for healthcare organizations to thrive in the digital age.

Fortunately, organizations such as the World Health Organization (WHO) have recognized the significance of health information systems and have developed toolkits and resources to assist in their implementation. These toolkits, provided by reputable organizations and health agencies, offer practical guidance, best practices, and standardized approaches to help organizations navigate the complexities of implementing and evaluating health information system. They provide frameworks for data governance, interoperability standards, Privacy, and security protocols, and other essential aspects of health information systems implementation. These toolkits address the challenges and create valuable opportunities for organizations to leverage established guidelines and resources to develop robust and effective Health Information Systems.

By leveraging these toolkits and adopting standardized approaches, healthcare organizations can overcome the challenges associated with health information systems implementation and maximize the potential of these systems to improve healthcare outcomes, enhance data management, and drive innovation in healthcare information technology.

### **1.2.3 Analysis of the existing situation**

The successful execution and improvement of health information system requires the expertise and guidance of consultants equipped with a precise methodology with a clear and comprehensive guidelines. Despite toolkits developed by renowned global organizations such as "United States Agency for International Development", "world health organisation" and "Measure Evaluation", these resources focus on specific aspects of the health information system rather than providing a holistic evaluation framework. While these toolkits offer valuable insights into evaluating specific components, consultants often need help to diagnose and assess the entire health information system with a standardized methodology. As a result, there is a need for a clear and comprehensive guide enabling consultants to effectively assess and improve the overall performance of these crucial systems.

## **1.3 Our mission**

Our mission is to develop a comprehensive framework for diagnosing and evaluating Health Information Systems . This framework aims to guide consultants and offering them valuable support and guidance. In addition to drawing upon the tool kits provided by renowned organizations such as the World Health Organization and leveraging EY's tool kits, this framework will provide a structured approach to assess and improve the effectiveness of health information system. Finally we will implement the project into a web application.

### 1.3.1 Adopted methodology

To make the project goes on in the best and organised way we started by creating a personalized methodology presented down below to ensure the efficiency of the workflow and keep on track of the objectives

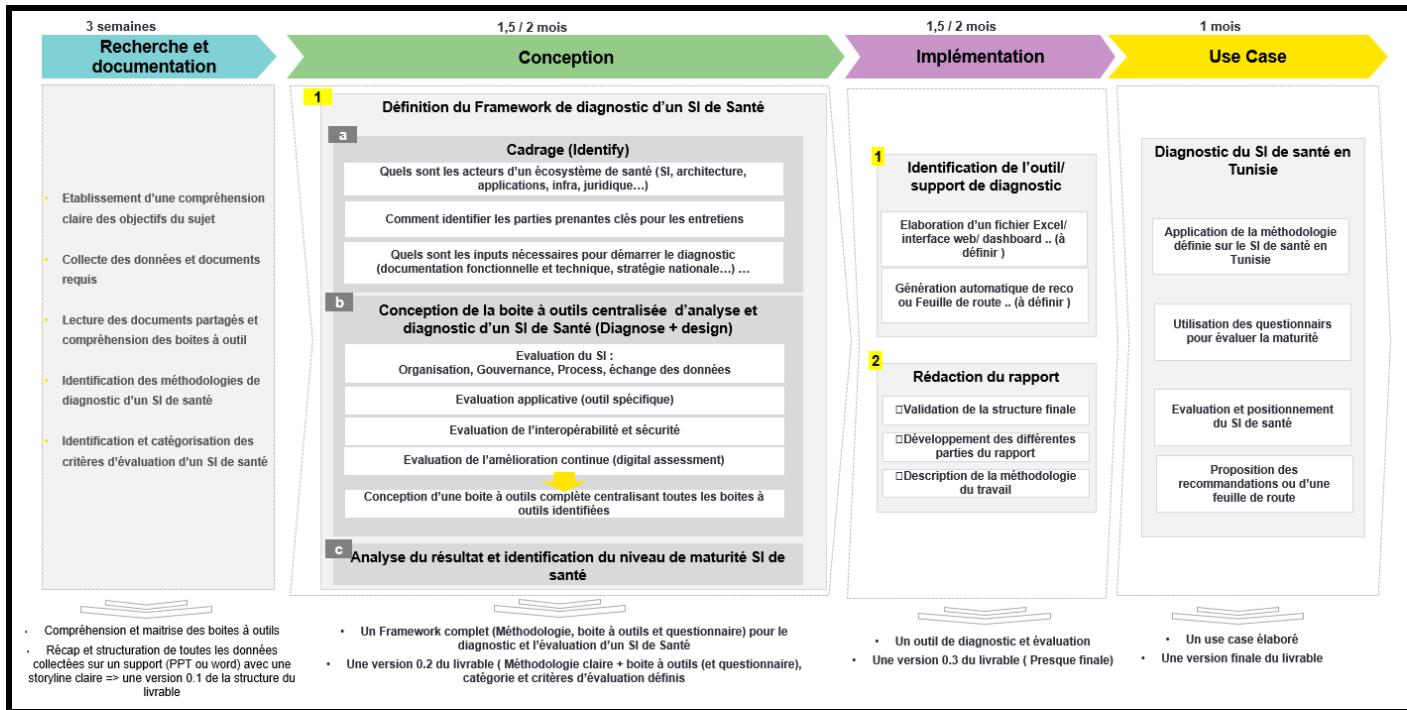


Figure 1.3: EY Methodology

### 1.3.2 Gantt diagram

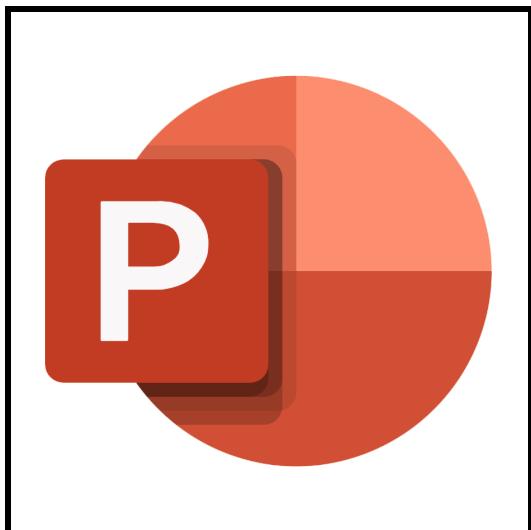
We also prepared a gantt diagram to show exactly how we're going through the project progress as shown in the figure 1.4 below

Overall project						
Phase	Progress Détails / Gantt	M1	M2	M3	M4	M5
Ph# 1: Onboarding	<ul style="list-style-type: none"> <li>Integration into the Tech-Transformation team</li> <li>Understanding of the subject and the work methodology / monitoring of the project</li> </ul>					
Ph# 2 : Cadrage	<ul style="list-style-type: none"> <li>Research and documentation on Health information system diagnostic toolkits,</li> <li>Stakeholders Identification,</li> <li>Setting project objectives and identification of desired results</li> </ul>					
Ph# 3 : Conception	<ul style="list-style-type: none"> <li>Developing the Framework</li> <li>Identify standards and best practices</li> <li>Identify an analysis Framework</li> <li>Build a process with a BPMN graphical representation</li> </ul>					
Ph# 4 : Développement	<ul style="list-style-type: none"> <li>Implement the Framework in a web application</li> </ul>					

**Figure 1.4:** Gantt diagram

## 1.4 Work environment

To complete the project, we are needing of some tools to create and design what we have mentioned as well as for the implementation and for that here are the environment we have worked on to achieve the required work.



PowerPoint is presentation software developed by Microsoft. Part of the Microsoft Office suite, it is widely used in professional, educational and other environments to create visual presentations. Le logiciel offre une grande variété de modèles prédefinis pour faciliter la création de diapositives attrayantes et professionnelles.

**Figure 1.5:** power point logo

BPMN (Business Process Model and Notation) is a graphical language used to model business processes. It provides a standardized notation for graphically representing the steps, flows and decisions involved in a process [2].



**Figure 1.6:** Business Process Model and Notation Logo



**Figure 1.7:** Visual paradigm logo

Latex is a high-quality typesetting system. It contains features designed to produce technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents [4]. And as an online editor for Latex we used Overleaf [5].

Visual Paradigm is a UML CASE Tool supporting UML 2, SysML and Business Process Modeling Notation from the Object Management Group. In addition to modeling support, it provides report generation and code engineering capabilities including code generation [3].



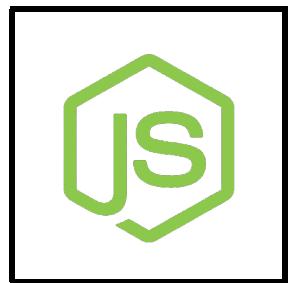
**Figure 1.8:** Latex Logo



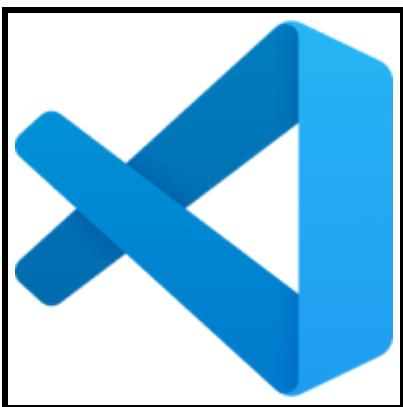
**Figure 1.9:** Mongodb Logo

MongoDB is a popular open-source NoSQL database management system that provides a flexible and scalable approach to storing and retrieving data. It is designed to handle large amounts of unstructured or semi-structured data and offers high performance, horizontal scalability, and ease of use [6].

Express.js is a popular web application framework for Node.js that provides a minimalistic and flexible approach to building web applications and APIs. It is known for its simplicity, ease of use, and robustness. With Express, you can create server-side applications quickly and efficiently[7].



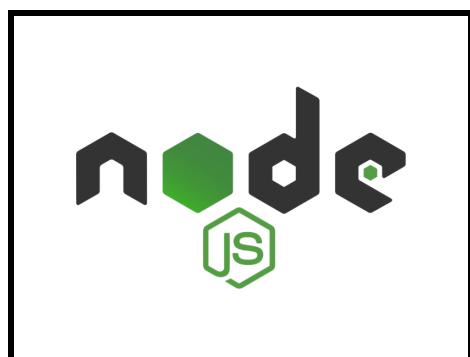
**Figure 1.10:** Express js logo



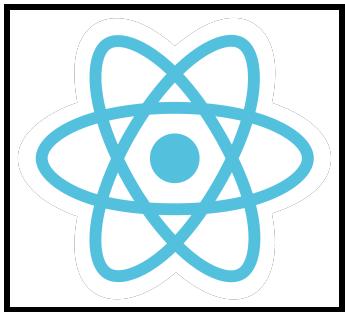
Visual Studio Code is a free and open source source-code editor developed by Microsoft. It includes support for debugging, embedded Git control and GitHub. In the Stack Overflow 2019 Developer Survey, Visual Studio Code was ranked the most popular developer environment toolVisualStudio.

**Figure 1.11:** Visual Studio Code logo

Node.js is an open-source JavaScript runtime environment that allows developers to run JavaScript on the server-side. It uses the V8 JavaScript engine from Chrome, which enables executing JavaScript code outside of a web browser. Node.js provides an event-driven, non-blocking I/O model that makes it highly efficient and scalable for building server-side applications[8].



**Figure 1.12:** node js Logo



**Figure 1.13:** Reactjs Logo

ReactJS, or simply React, is a popular JavaScript library for building user interfaces (UIs). It was developed by Facebook and is widely used for creating interactive and dynamic web applications. React follows a component-based approach, allowing developers to build reusable UI components and efficiently manage complex UI states [9].

## Conclusion

Throughout this chapter, we introduced generally "EY" giving an overview of its background and the project I am working on. After that, we analyzed the current solution with the purpose of identifying its limits and then presenting the solution we worked on through the internship. Finally, we introduced the adopted methodology and gantt diagram to keep track of the project progress and the work environment that will help us.

## RESEARCH AND DOCUMENTATION

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### Plan

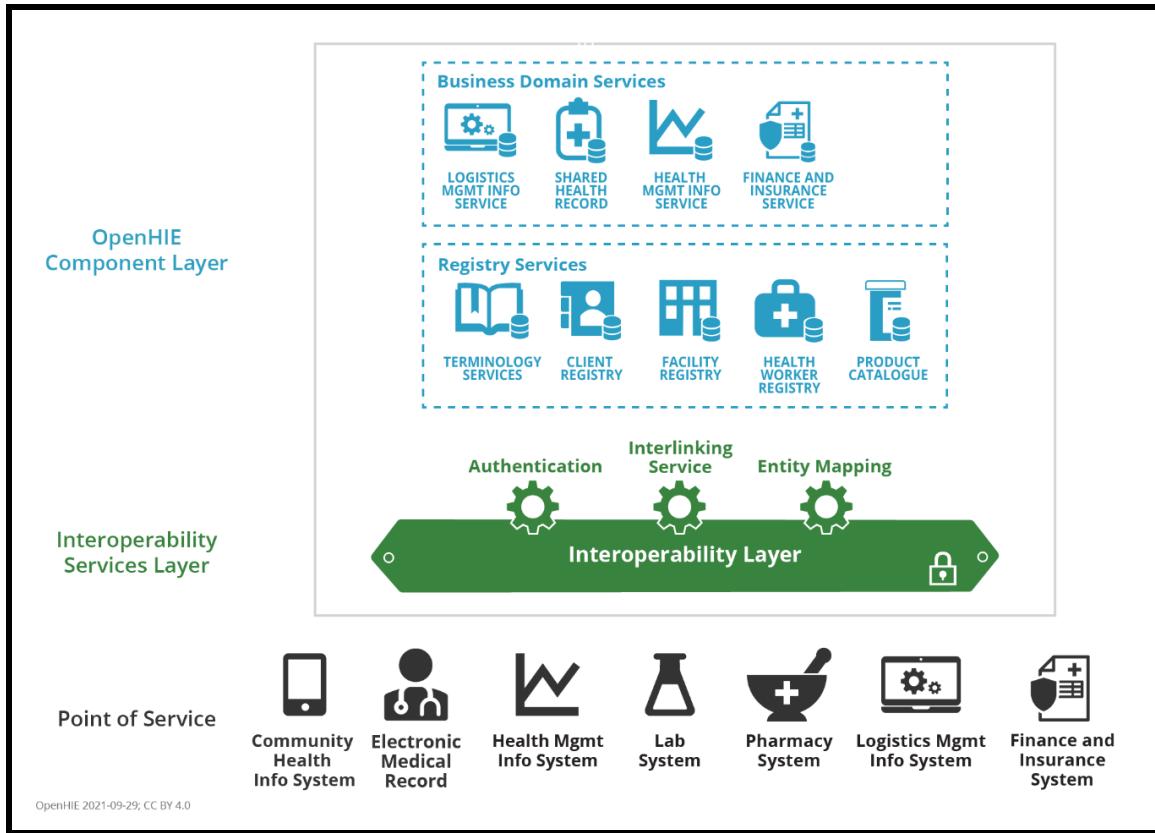
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3	Analytical Approach . . . . .	23

## Introduction

In this chapter, we will identify some of the basic knowledge so that can help us further more in the design phase, such us a health information system, Framework and analysis approach.

### 2.1 Health Information System

A health information system is a comprehensive framework or infrastructure designed to collect, store, manage, analyze, and disseminate health-related data and information. It involves integrating various components, including technology, processes, policies, and human resources, to support the effective management and use of health information for decision-making, planning, monitoring, and improving health outcomes. Health information systems encompass a wide range of activities, including collecting and recording patient data, such as medical histories, diagnostic test results, treatments received, and other relevant health information. This information is stored in electronic health records (EHRs) or other digital formats to ensure accessibility, accuracy, and security. These systems also involve data analysis and reporting tools that allow healthcare providers, policy makers, researchers, and administrators to generate meaningful insights and make informed decisions based on the aggregated health data. Additionally, it facilitate the exchange of health information between different healthcare facilities or organizations, enabling continuity of care and coordination among healthcare providers. Here is an example of a health information system architecture made by OpenHIE [10] in figure 2.1



**Figure 2.1:** Health information system architecture

## 2.2 Framework

A framework is a structure, outline, or conceptual tool that helps organize information, guide decision-making, or provide an understanding for a particular subject or problem. It offers a way to approach complex topics and make sense of them by providing structure, organization, and a set of guiding principles. In project management, a framework might include predefined phases, milestones, and deliverables that serve as a roadmap for the project. It provides a structure for organizing tasks, allocating resources, and monitoring progress. By understanding the essence of a framework through in-depth research, we created a unique framework tailored to address the complexities and challenges specific to health information system and it's composed of three main components which are : Role artefact, methodology, toolkit and the overall process chronology that will be as guide to this framework as shown in the figure 2.2. In the following subsections, we will define the composition and components of this framework.

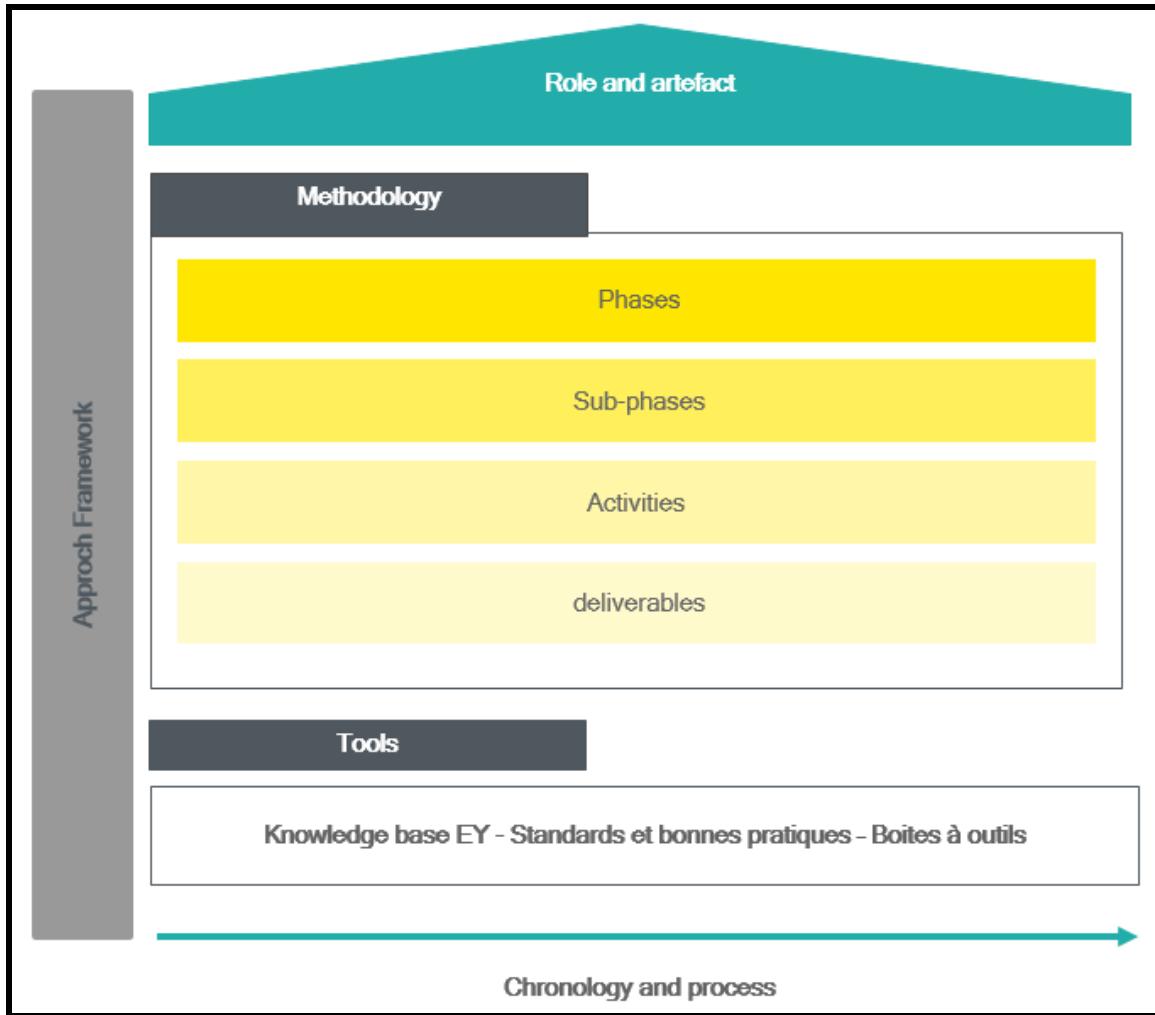


Figure 2.2: Framework structure

### 2.2.1 Role and Artefact

- **Role:** A role refers to a specific position or responsibility that an individual or a group of individuals assumes within a project team. Roles define the functions, tasks, and responsibilities that each team member is assigned to fulfill. Examples of project roles include project manager, team leader, project coordinator, subject matter expert, or stakeholder. Each role has specific responsibilities, decision-making authority, and accountability within the project. Roles help establish clear lines of communication, promote collaboration, and ensure that the necessary expertise and resources are available to successfully execute the project.
- **Artefact:** an artifact refers to any tangible or intangible document, deliverable, or output created during the course of a project. Artifacts serve as evidence or records of the project's progress, decisions, and outcomes.

### 2.2.2 Methodology

The methodology is the systematic and disciplined approach to studying, analyzing, or understanding a subject or field of knowledge. It involves the principles, theories, and frameworks that guide the overall approach and direction of a particular discipline or area of study.

In this sense, methodology goes beyond the specific techniques or procedures and focuses on a field's more comprehensive philosophical and theoretical underpinnings. It encompasses the underlying assumptions, concepts, and paradigms that shape how knowledge is generated, organized, and interpreted within a discipline.

Methodology helps define the scope of their inquiry, identify relevant concepts and variables, and determine the appropriate methods and tools to study a particular phenomenon or research question. It provides a framework for conducting rigorous and valid research by promoting transparency, clarity, and logical reasoning. Furthermore, methodology also addresses data collection, analysis, and interpretation issues within a specific discipline.

### 2.2.3 Toolkits

A toolkit is a set of tools or resources designed to assist and facilitate a particular task, process, or domain. It typically consists of a collection of software programs, utilities, libraries, documentation, and sometimes hardware components that are bundled together to provide a comprehensive solution or aid in achieving a specific objective. They are intended to simplify complex tasks, enhance productivity, and provide users with pre-built functionalities, frameworks, or interfaces that can be utilized to build or customize applications, perform specific analyses, or tackle specific challenges. Toolkits can range from general-purpose toolkits that provide a broad set of capabilities applicable across different domains to specialized toolkits tailored for specific purposes or industries. These resources are often created and maintained by organizations, communities, or companies, and they are frequently updated and improved to keep up with technological advancements and evolving requirements and concerning the health information system we can enlist toolkits such as :

- **Health information system Stages of Continuous Improvement Toolkit (SOCI)**

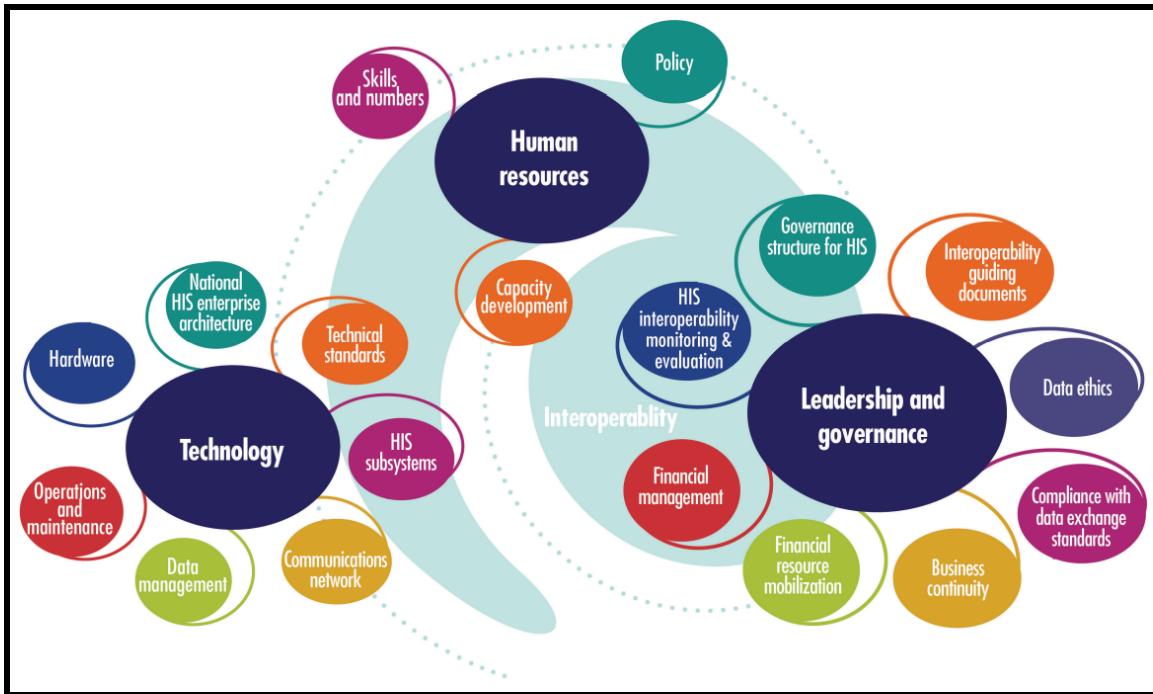
[11]:The Health Information System Stages of Continuous Improvement Toolkit was collaboratively designed to help countries or organizations holistically assess, plan, and prioritize interventions and investments to strengthen an HIS. This tool aligns with World Health Organization efforts to strengthen country HIS and capacities to monitor universal health coverage and health

Sustainable Development Goals. The assessment measures current and desired HIS status across five core domains of an HIS as the figure 2.3 shown below :

HIS Core Domains	HIS Components
HIS Leadership and Governance	<ul style="list-style-type: none"> <li>• HIS strategic plan or HIS strategy</li> <li>• Policy, legal, and regulatory framework and compliance</li> <li>• HIS leadership and governance organizational structures and functions</li> </ul>
HIS Management and Workforce	<ul style="list-style-type: none"> <li>• HIS workforce capacity and development</li> <li>• Financial management</li> </ul>
HIS ICT Infrastructure	<ul style="list-style-type: none"> <li>• Operations and maintenance</li> <li>• Communication network</li> <li>• Business continuity</li> </ul>
HIS Standards and Interoperability	<ul style="list-style-type: none"> <li>• Standards and guidelines</li> <li>• HIS core services</li> <li>• Interoperability (data exchange)</li> </ul>
HIS Data Quality and Use	<ul style="list-style-type: none"> <li>• Data quality assurance and data management</li> <li>• Data availability and data use processes and products</li> </ul>

**Figure 2.3:** HIS Stages of Continuous Improvement Toolkit

- **Health Information Systems Interoperability Maturity Toolkit:** A measure evaluation project,[12] funded by the USAID in collaboration with the Digital Health and Interoperability Technical Working Group of the Health Data Collaborative ,the HIS Interoperability Maturity Toolkit addresses challenges in low- and middle-income countries, where information systems are largely fragmented. The term “interoperability” describes the ability of two or more information systems or components to exchange information based on standards, and to use the information that is exchanged.This HIS interoperability maturity model addresses three broad domains that are critical to HIS interoperability as the figure 2.4 shown below :



**Figure 2.4:** HIS Stages of Continuous Improvement Toolkit

- **The Routine Health Information System Rapid Assessment Tool:** The Routine Health Information System Rapid Assessment Tool builds on the approach to strengthening a country's monitoring and evaluation system described in Monitoring, Evaluation and Review of National Health Strategies. [13] The tool was developed by 'measure Evaluation', which is funded by the USAID, in collaboration with WHO's Information, Evidence and Research Department, with substantial input from other WHO departments and programs, health ministries, regional experts, and global and in-country partners. This model addresses four broad domains as the figure 2.1 shown below :

**Table 2.1:** Routine Health Information System Rapid Assessment Tool domains and sub domains

Domains	Sub-domains
<b>Management and Gouvernance</b>	<b>Policies and Planning</b>
	<b>Management</b>
	<b>Humain Resources</b>
<b>Data and Decision Support Needs</b>	<b>Data Needs</b>
	<b>Data Standards</b>
<b>Data Collection and Processing</b>	<b>Data collection</b>
	<b>Data Reporting</b>
	<b>Data Quality</b>
	<b>Information and Communication Technology</b>
<b>Data Analysis, Dissemination and Use</b>	<b>Data Analysis</b>
	<b>Information Dissemination</b>
	<b>Data Demand and Use</b>

#### **2.2.4 Chronology process**

The chronology process is the systematic arrangement or order of events, experiences, or data in a chronological or time-based sequence. It involves organizing information or occurrences in the order in which they happened, typically from past to present, to create a timeline or a coherent narrative. It allows for a clear understanding of the events' sequence and helps identify patterns, trends, or causality. Establishing a chronological framework is crucial for accurately analyzing and interpreting data or events. By following the chronology process, we can create a structured framework that aids in understanding the development, evolution, or progression of a particular subject or phenomenon over time.

### 2.3 Analytical Approach

An analytical approach, or an analytical model, is a conceptual or theoretical structure used to organize, design and analyze information in a specific field. It provides a set of concepts, principles, categories and relationships that enable a given phenomenon to be understood, explained and interpreted.

An analytical approach serves as a guide for examining data, formulating research questions, defining variables, identifying cause-and-effect relationships, proposing hypotheses and drawing conclusions.

The choice of analytical framework depends on the context and objectives of the study.

## Conclusion

Throughout this chapter, we presented the basic knowledge of the components that we are going to penetrate in the next chapter as well as some of the tools we researched to help us the design chapter.

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# DESIGN

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## Plan

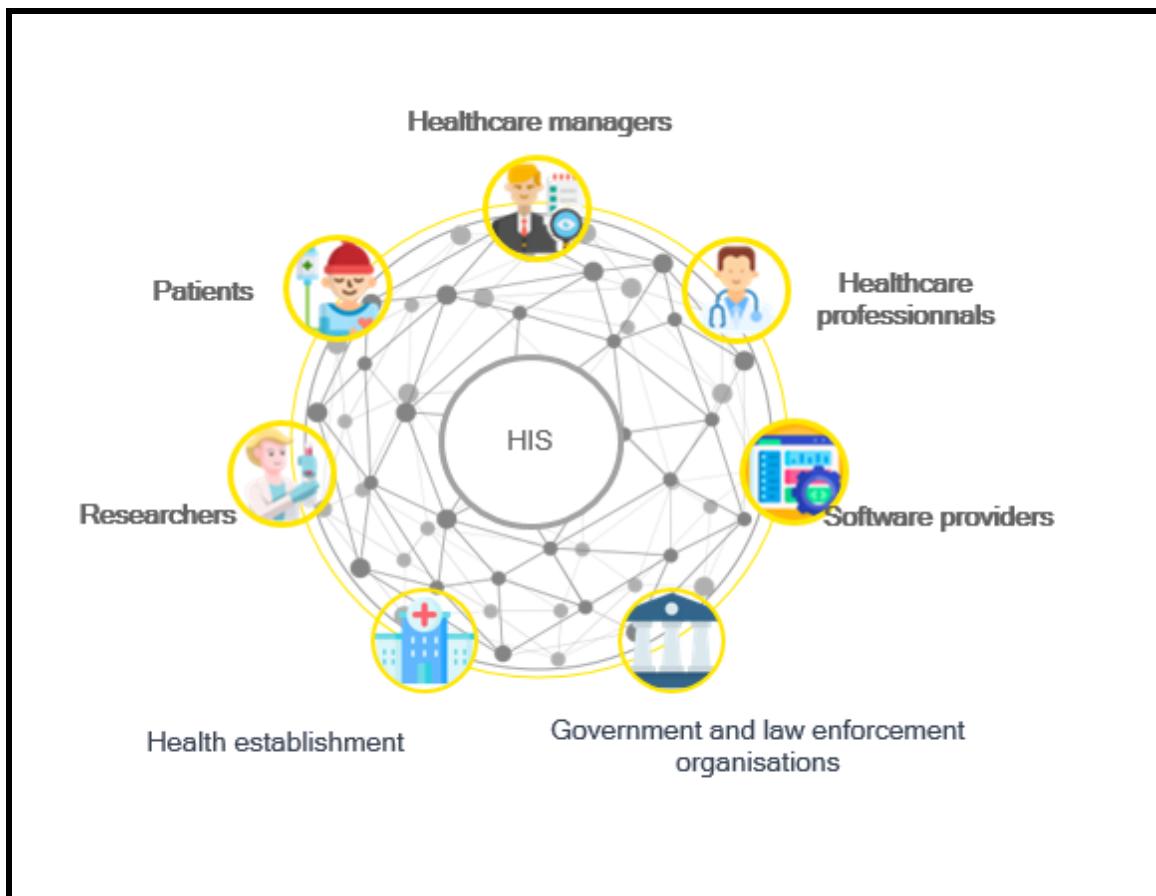
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### 3.1 Introduction

in this chapter we are going to dive deep into the framework where we are going to define it's component as mentioned in the last chapter.

### 3.2 Role and artefact

The first component in this framework is the role and artefact where we are going to talk about health information system environment. In this environment first thing is the stakeholders that are related to the health information system which we can show here in the figure



**Figure 3.1:** Health information environment

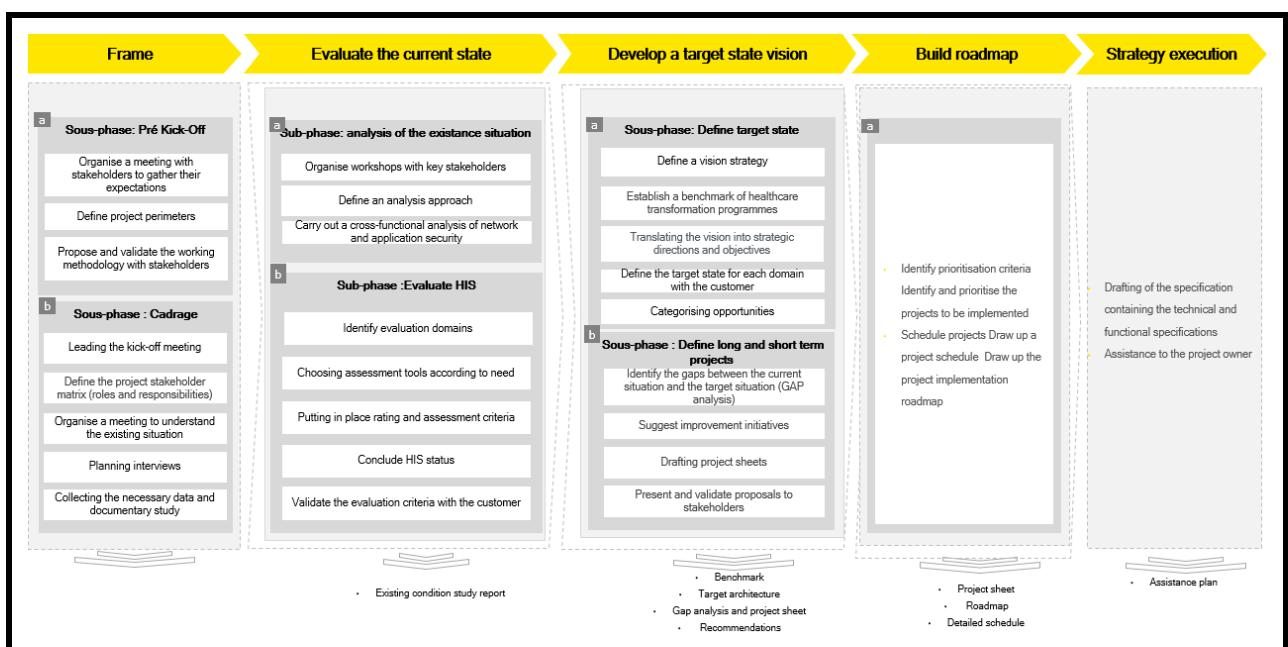
After identifying the stakeholder we distinguished them into two categories as the table is showing :

**Table 3.1:** Stakeholders classification

stakeholder	classification
Legal and regulatory organisations	Strategic level
Gouvermental organisations	Strategic level
Healthcare professionnals	Operational level
Patients	Operational level
Software providers	Operational level
Researchers	Operational level

### 3.3 Methodology

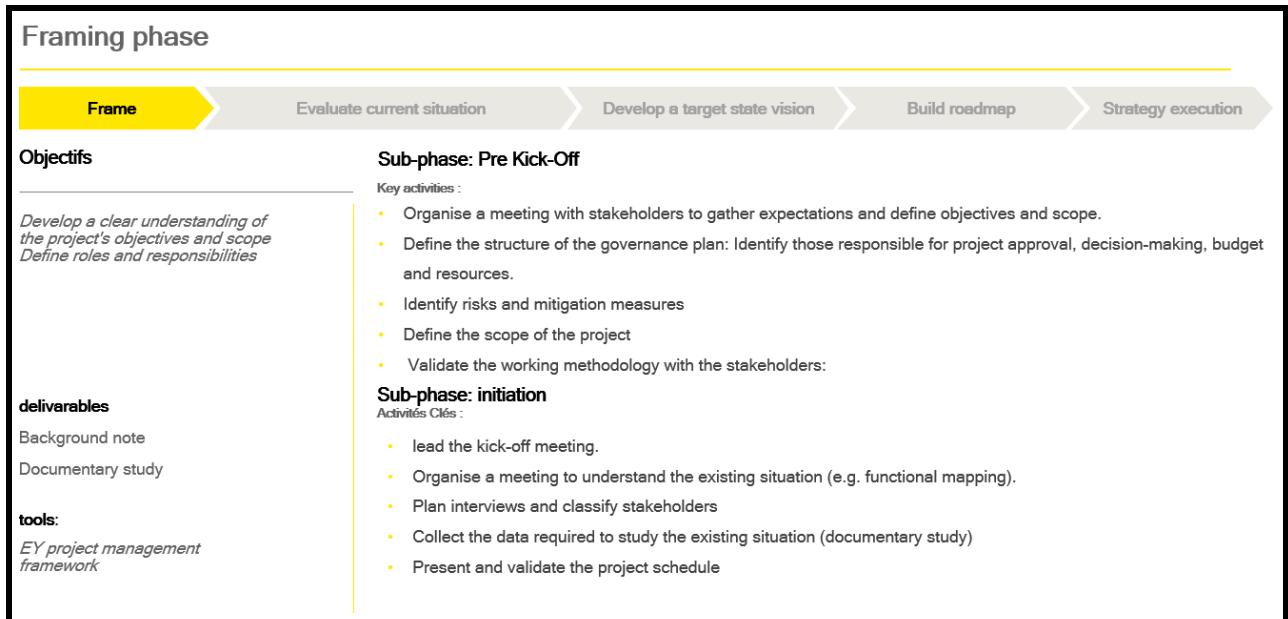
the second component in the framework is the methodology and it's the most important component in our framework where there will define the phases , sub-phases and the activity for the consultant to follow as shown below in the figure 3.2.



**Figure 3.2:** Methodology

### 3.3.1 Phase "Framing"

The phase called "Framing" is the first phase in our methodology and it contains two sub-phases as shown below in figure 3.3 , it's a crucial step in defining and clarifying the project's objectives, expectations and constraints. It provides a clear, shared vision for all project stakeholders, including project team members, clients, users and decision-makers.



**Figure 3.3:** Framing phase

- **Sub-phase Pre-kick off:** Its aim is to brings together all stakeholders to share essential information and establish a common understanding of the project.
- **Sub-phase initiation :**At this initiation, the objective are to bring together project team members, key stakeholders, and managers to create a shared understanding of the project, align expectations, and lay the foundations for collaborative working.

### 3.3.2 Phase "Evaluate current state"

The aim of this phase is to provide a solid understanding of the current situation, enabling in-depth analysis and informed decision-making when designing future solutions or improvements. By studying the existing situation and evaluating it, problem areas can be identified.

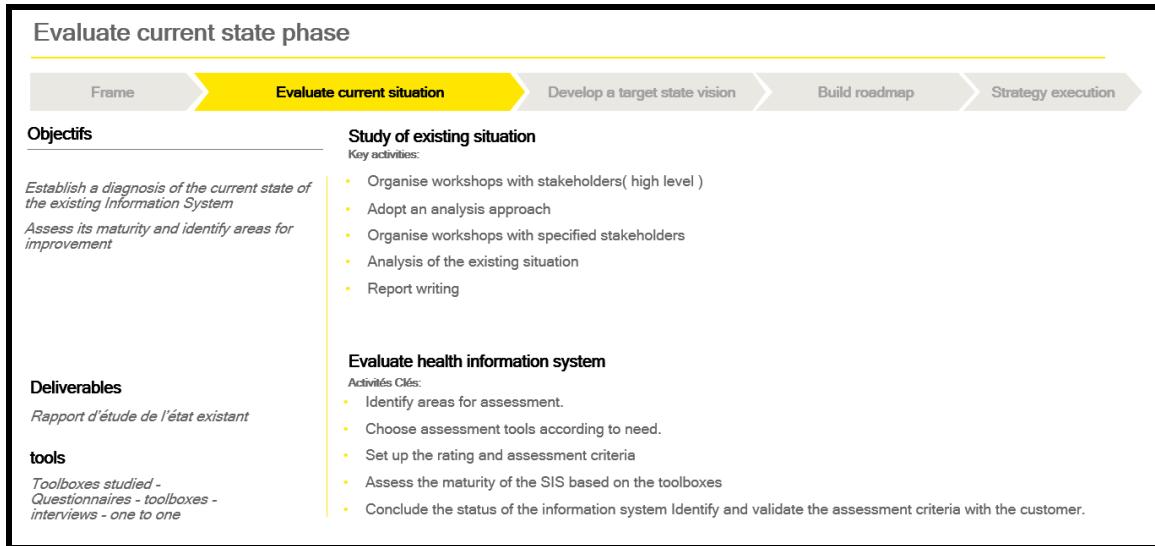


Figure 3.4: Evaluate current state phase

- **Sub-phase "Analysis of the existing situation":** The aim of this phase is to provide a solid understanding of the existing situation, enabling in-depth analysis on the current situation of the HIS, which will help us later on with an analytical approach to asses the health information system
  - **"activity" Identify an analysis approach":** To analyse the current state you must have a specific approach for the analysis or at least know what are the layer you are analysing. As for our project we chose to pick this approach for our analysis as shown in the figure 3.5

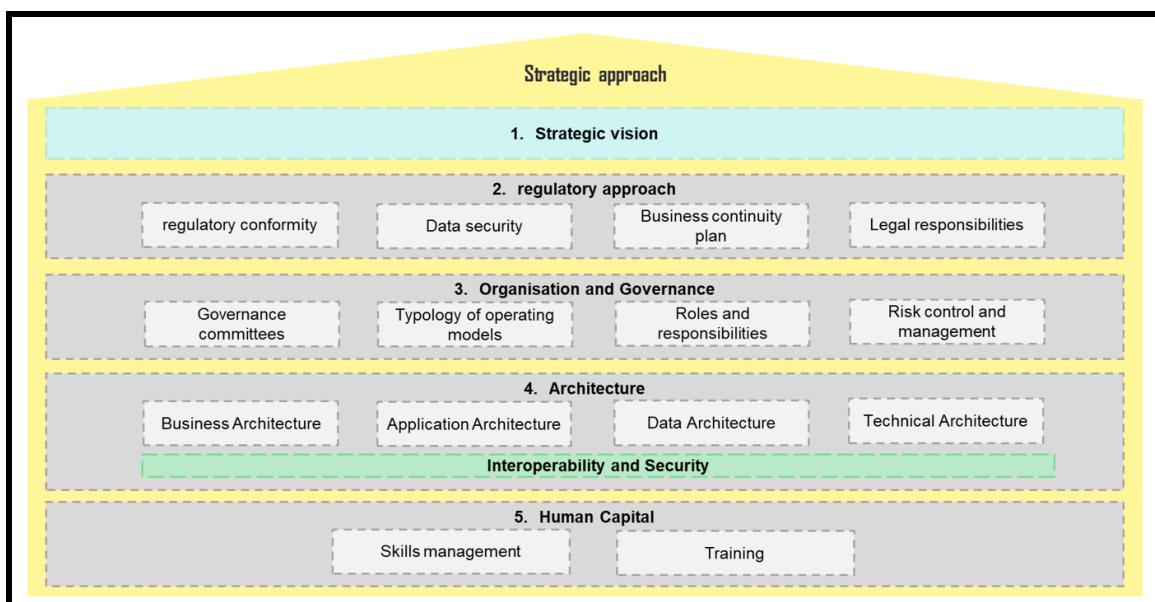
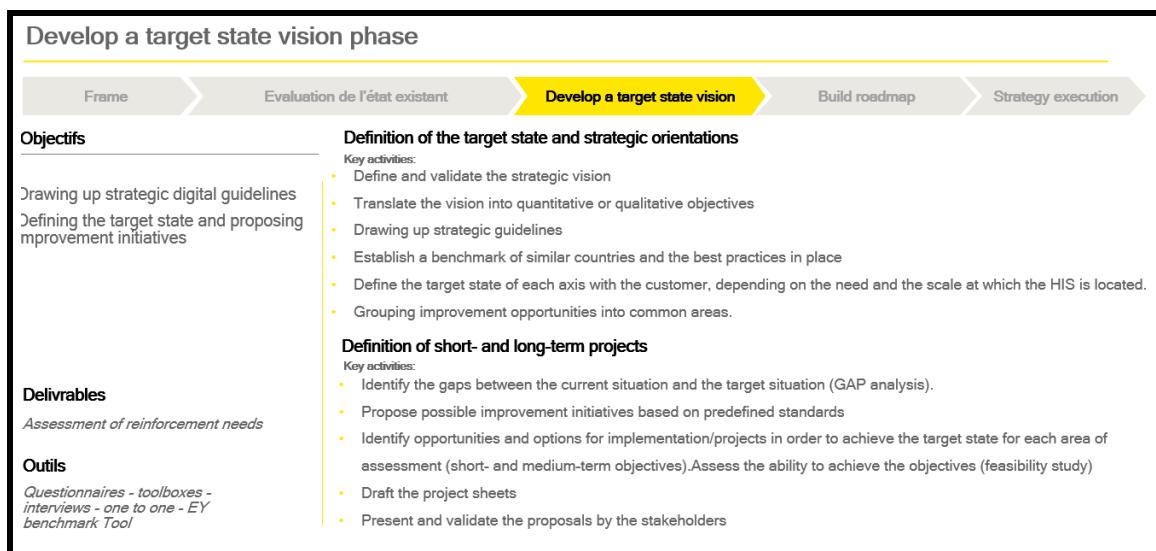


Figure 3.5: Analysis approach

- **Sub-phase "Evaluate health information system":** The purpose of this sub-phase is to measure data quality, assess effectiveness and efficiency, measure impact and added value, identify needs for improvement, and ensure compliance with standards and best practices. This evaluation helps optimize the use of health data to improve care, service planning and decision-making in the healthcare field.

### 3.3.3 Phase "Develop a target state vision"

The objective of this phase is to define the project's gap analysis, the strategic vision of the system and to define the current and long-term projects, proposing possible improvement initiatives according to the predefined standards.



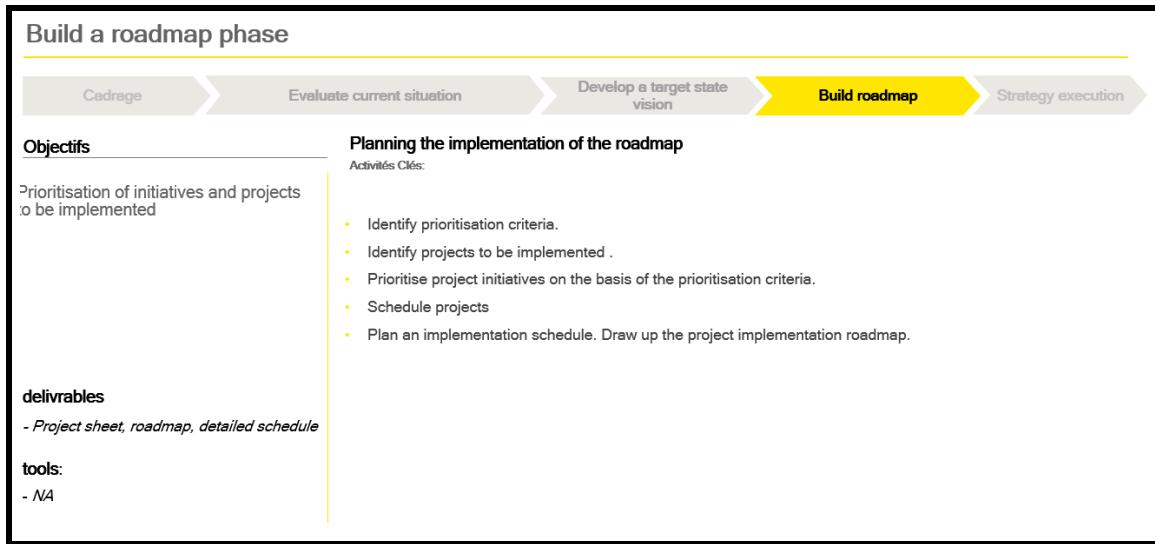
**Figure 3.6:** Develop a target state vision Phase

- **"Sub-phase"Gap analysis and strategic orientation':** This sub-phase is critical in establishing a clear direction for the project, ensuring alignment with the strategic goals, and providing a solid foundation for subsequent planning and implementation activities. We can confidently move forward by addressing the identified gaps and deficiencies, taking the necessary steps to optimize the health information system and drive positive outcomes per our strategic vision.
- **"Sub-phase"Defining short and long term projects":** Long-term projects involve significant changes and improvements to the system's infrastructure, technology, processes, or governance, while short-term projects address immediate needs and aim for quick results. Both types of projects contribute to achieving the system's strategic objectives, with long-term projects having a lasting impact and short-term projects providing immediate solutions to identified

gaps.

### 3.3.4 Phase " Build a roadmap"

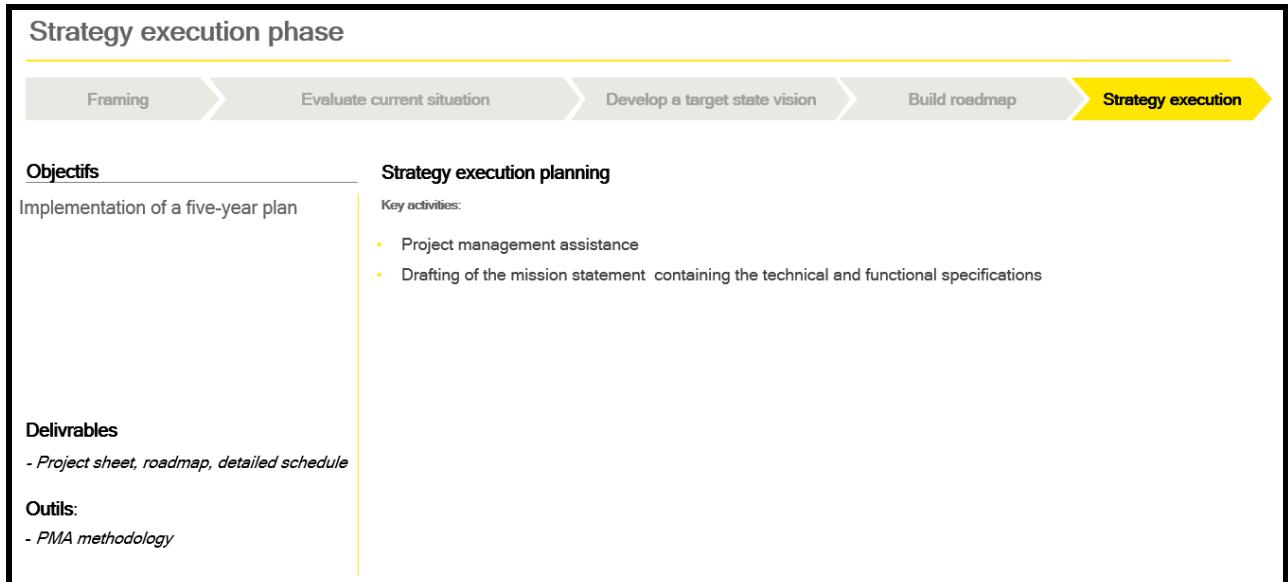
The roadmap phase consists of a detailed plan for implementing the strategy, defining objectives, actions, resources, timetables, and monitoring mechanisms. This ensures that the process is structured, efficient and coherent to achieve the strategic goals within the set deadlines.



**Figure 3.7:** Roadmap Phase

### 3.3.5 Phase 'Strategy execution'

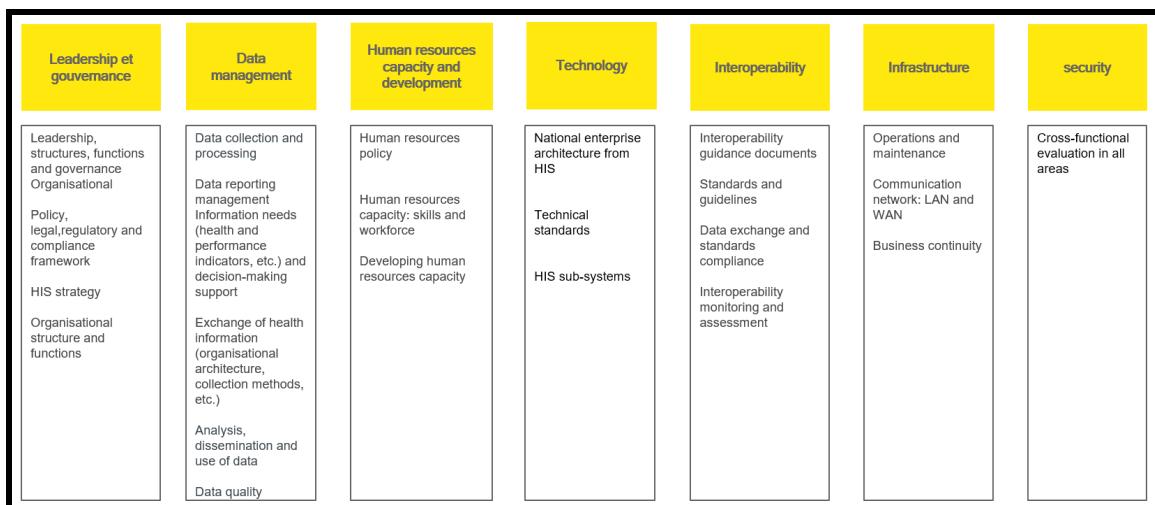
Strategy execution is the phase in which the actions and initiatives are defined in the roadmap and implemented to realize the strategic vision. This phase aims to transform strategic plans into concrete steps and to make progress toward achieving the objectives set. It is divided into two main activities : Project management assistance and Drafting of project specifications containing technical and functional specifications



**Figure 3.8:** Strategy execution Phase

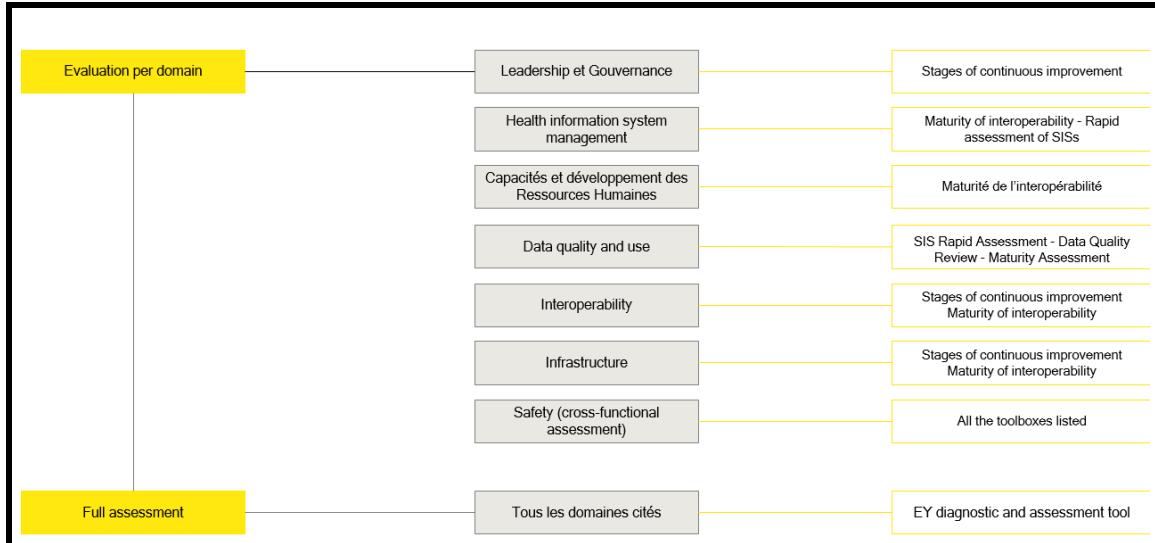
### 3.4 Tool kits

The tool kit consists of equipping consultants with the necessary resources to effectively carry out their work. It encompasses a comprehensive collection of documents and tools that are specifically designed to support and enhance their abilities in the health information system missions so we have collected domains of the tools we mentioned and gathered the subdomains accordingly as shown in the figure 3.9



**Figure 3.9:** Collected domains subdomains

And to give the consultant a wider vision on how to asses the health information system using the tools by providing them a toolbox based on the need of area assessed as shown in the figure 3.10

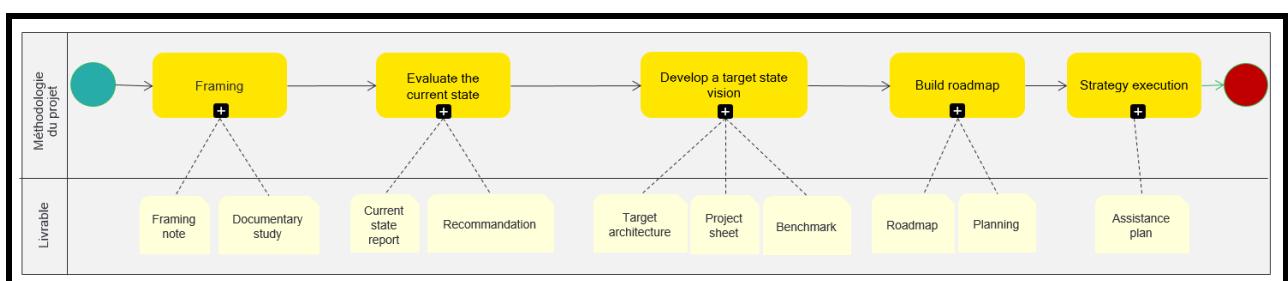


**Figure 3.10:** toolbox presentation

### 3.5 Chronology process

In this section we're going to demonstrate the process of the methodology in each phase using business Process Model and Notation.

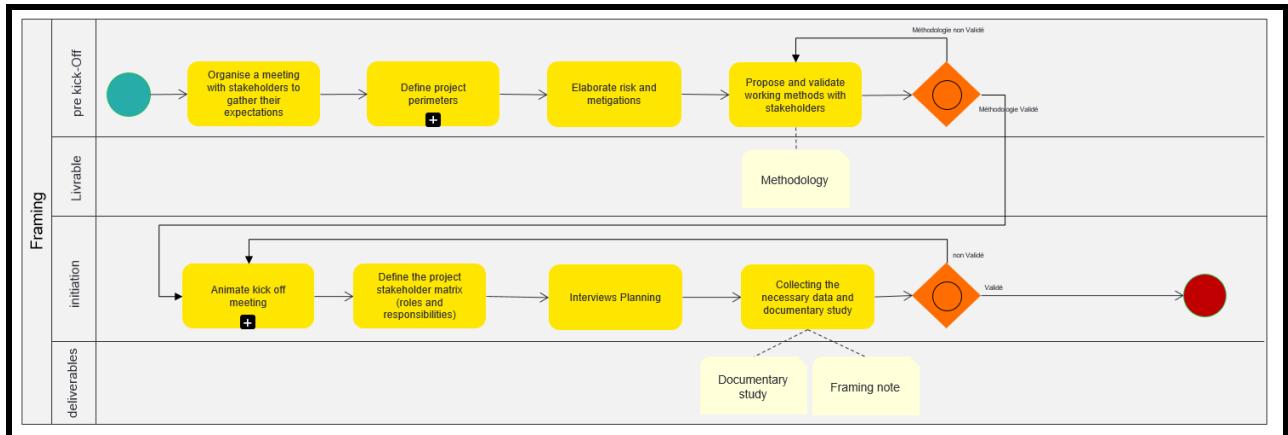
#### 3.5.1 Methodology process



**Figure 3.11:** BPMN methodology

The process of this methodology starts with 5 main phases as mentioned before and each phase has a an artefact that is either helps us to the next phase or give us a summary to what we have achieved.

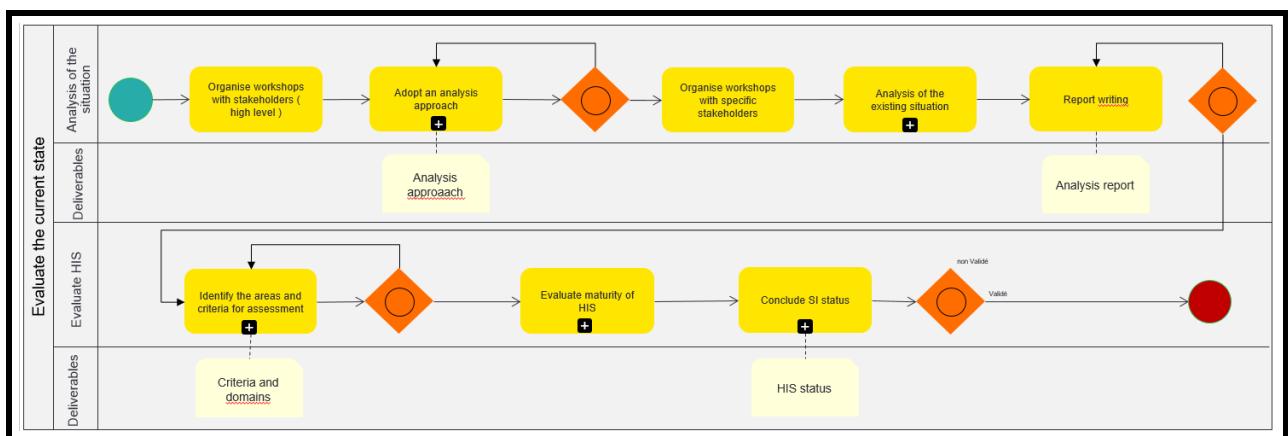
### 3.5.2 Framing process



**Figure 3.12:** Framing process

In this phase as shown in the figure 3.12 we have two sub-phases as mentioned before, and it's process is as follows : We start off by the pre kick off where we organise a meeting to understand the scope of the mission, prepare the project perimeters, risks and create a work methodology that will later on be validated by the stakeholder. Moving on initiating the project where we launch a kick off meeting, define the metrics, planning the meeting and collect data for the next phase.

### 3.5.3 Evaluate current state process



**Figure 3.13:** Evaluate current state process

The second phase which is the important phase where we are going to analyse and evaluate the health information system and this one starts with analysing the current state of the health information system where we gather data about the situation of our target, it's functionalities, it's

interoperability and choosing the analytical approach, then we are going to evaluate the health information system in it's every aspect using the tool kits mentioned before

### 3.5.4 Develop target state of vision process

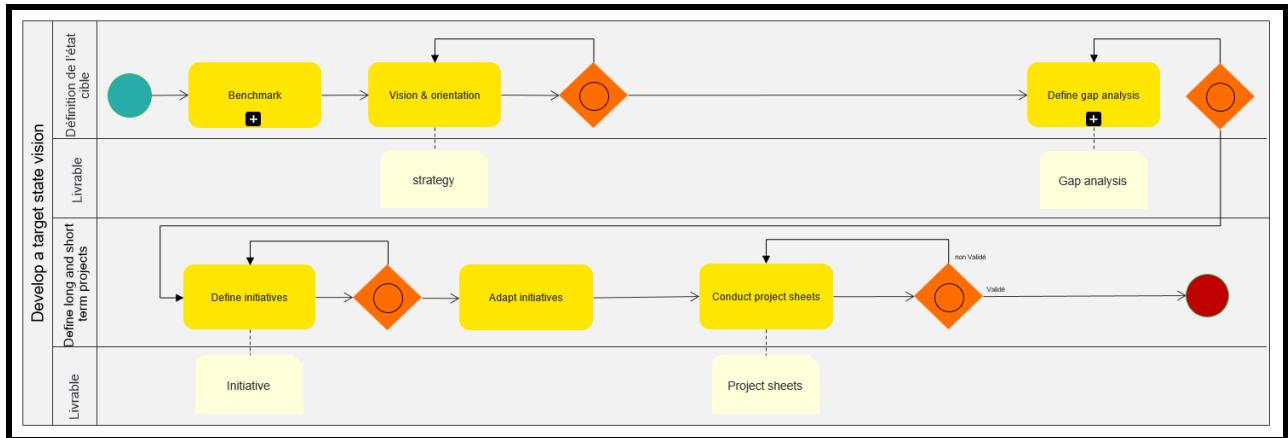


Figure 3.14: Roadmap process

By analysing and evaluating the current state we move on to develop a target state vision where we benchmark the countries with the best health information system that are near ours, define a strategy vision and then we define the gap analysis and start initiating a long and short term projects as initiatives.

### 3.5.5 Build roadmap process

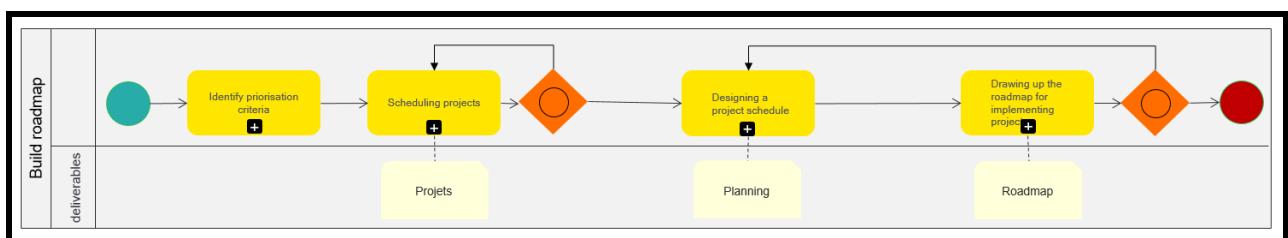
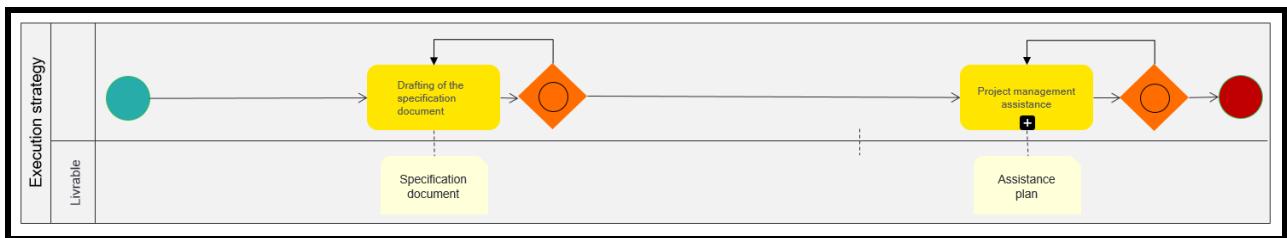


Figure 3.15: Roadmap process

Here in the Roadmap phase after we got the hang of the current state and evaluated the systems, we need to set a roadmap by defining a vision a strategic approach, define the gap analysis to create initiatives to improve the health information system.

### 3.5.6 Strategy execution process



**Figure 3.16:** Strategy execution process

After defining long and short term project, plan and build the roadmap, comes the final stage of the methodology which is the execution. It's where we are going to be writing the requirements specifications of each project and eventually manage their assistance.

## 3.6 Conclusion

In this chapter, we presented each component of our framework and specified some activities as well as defined how the chronology process of the methodology works by presenting a Business Process Model and Notation .

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# IMPLEMENTATION

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## Plan

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## 4.1 Introduction

In this chapter, we will showcase the implementation the framework in the previous chapter. Therefore, we will present the functional and non functional requirements, use case diagram, class diagram and the sprint plan.

## 4.2 Our mission

Our mission is to implement the studied framework into a web application so that can work as a guide for the consultants for a heath information system mission.

## 4.3 Adopted Methodology

In this section, we will explain the reason behind our choice for the followed methodology showing its benefits for the company and its philosophy.

### 4.3.1 Project development strategy

We believe that the agile methodologies are the best fit for our project's improvement process. Consequently, for this internship, we decided to go with Scrum methodology which is one of the Agile methodologies.

### 4.3.2 Scrum Methodology

Agile Scrum is a highly effective approach for project management and work execution. Its adaptability allows for embracing change and evolving requirements, ensuring that the project stays aligned with customer needs. Through collaboration and transparent communication, Agile Scrum promotes shared understanding, collective problem-solving, and swift issue resolution.

## 4.4 Requirement Analysis

The first step in the Scrum method life cycle is planning, where requirements are listed by the product owner in the product backlog. Also, in this phase, sprints are fixed all along with the releases.

#### 4.4.1 Actors identification

It is crucial to identify the users of our application, and in our case, we have two main users:

- **EY consultant** :a basic user who will be consulting the platform.
- **The admin**:is the one who will be in charge of the platform management.

#### 4.4.2 Functional requirements

Functional requirements depict the desired operations that should be provided by the produced application.

Our solution shall enable its users to:

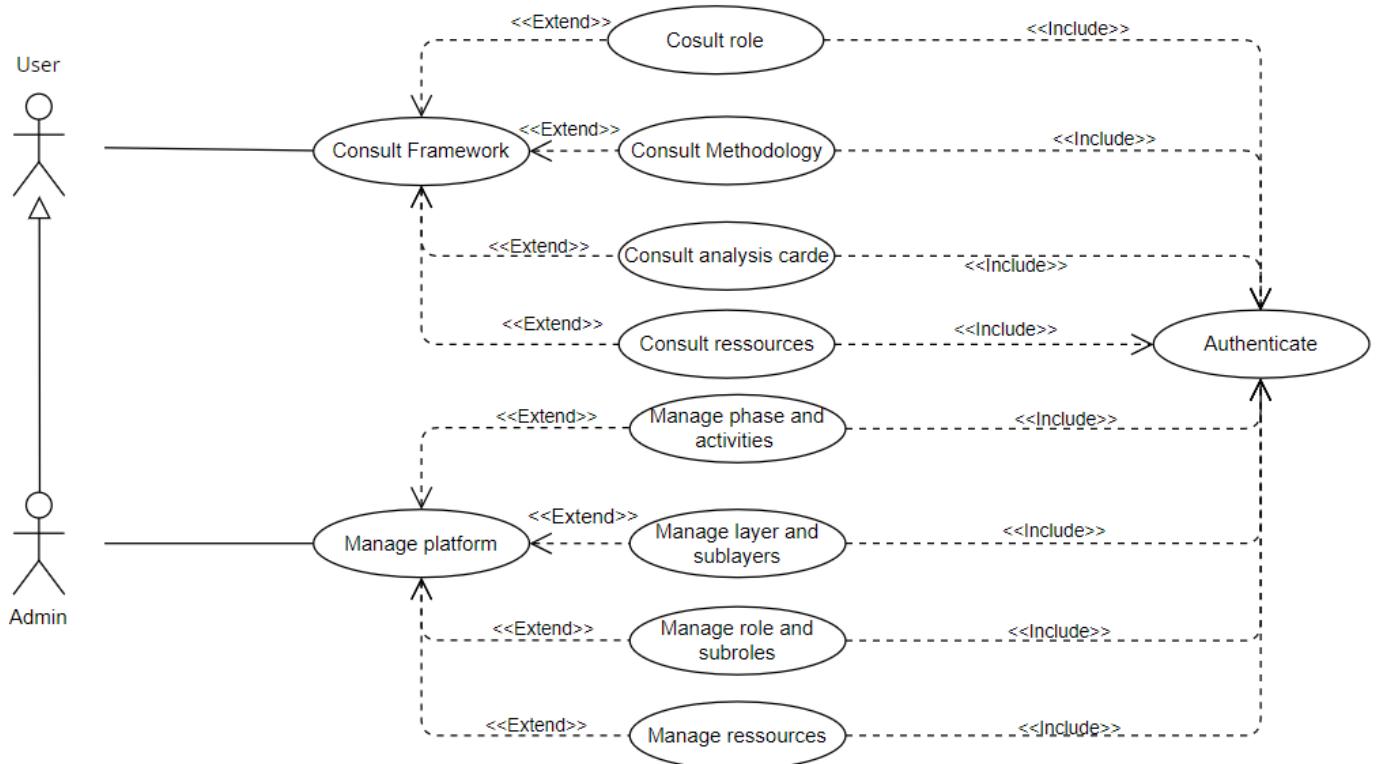
- **Authenticate**: in order to have access to the platform, the user, whether the responsible or the admin, must authenticate by having an account.
- **Register** : in order to have an account one must register to the platform by inserting his details in the register form.
- **Consult platform**: the user will be acceding the platform and consult it's components .
- **Manage phases, layers, roles** : the admin will be able to create a phase as well as deleting it.
- **Manage activities, sublayers, subroles** : the admin will be managing the platform by creating an activity,sublayer and subrole based on the phase,layer or role that he creates, also he can delete them and their according components will be deleted.
- **Manage ressources**: the admin will manage ressources by importing files and deleting them.

#### 4.4.3 Non-Functional requirements

- **performance**: The resulting product must have a quick response to the users' requests and provides fast pages refreshing;
- **maintainability**: To facilitate the extension of our project the written code must respect the conventional standards;

## 4.5 Use case diagram

The use case diagram is a graphical description of the user's interaction with the application each use case describes one of the system's operations. This diagram is the commonly adopted way to define the functional requirements of the project. The figure down bellow 4.1 is the general use case diagram for our application.



**Figure 4.1:** General use case diagram

## 4.6 Product backlog

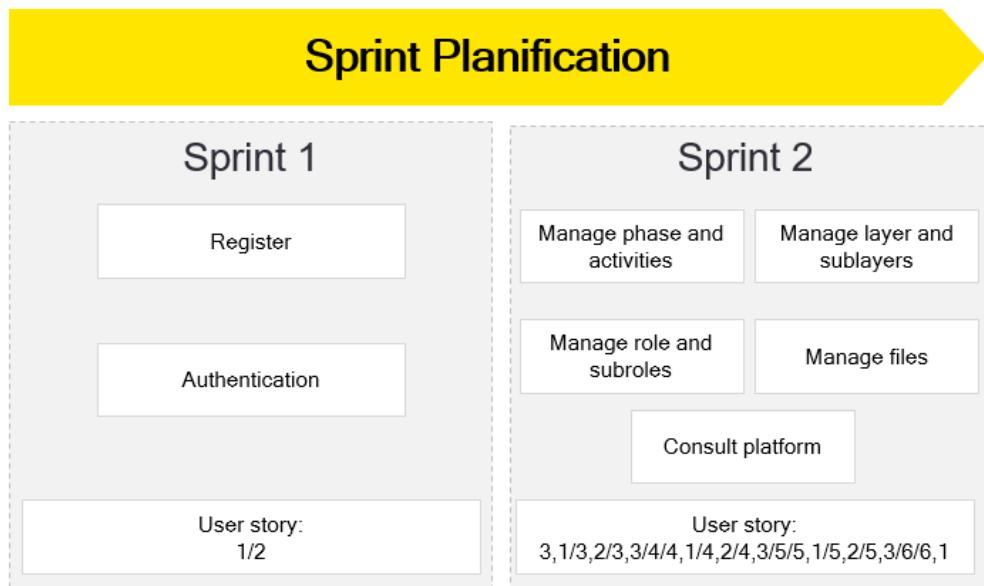
The product backlog includes the needed tasks that must be delivered through the project realization. It orders the tasks by priority. It is an essential step in the project's life-cycle containing also the estimated period of realization, and the description of each user story listed within. This backlog is realized by the Product owner which helps him to analyze the progress of the team work. Our Product backlog is represented by the table

**Table 4.1:** Product backlog

Sprint Name	ID	User story	sprint	priority
Register	1	as a user I want to have an account	1	1
Authenticate	2	as a user i want to authenticate to access the platform	1	1
Manage phase,activities	3	as an admin i want to create a phase	2	2
	3.1	as an admin i want to delete phase	2	2
	3.2	as an admin i want to create activity	2	2
	3.3	as an admin i want to update activity	2	2
Manage layer, sublayers	4	as an admin i want to create a layer	2	2
	4.1	as an admin i want to delete layer	2	2
	4.2	as an admin i want to create sublayer	2	2
	4.3	as an admin i want to update sublayer	2	2
Manage role, subroles	5	as an admin i want to create a role	2	2
	5.1	as an admin i want to delete role	2	2
	5.2	as an admin i want to create subrole	2	2
	5.3	as an admin i want to update subrole	2	2
Manage ressources	6	as an admin i want to import a file	2	3
	6.1	as a user i want to download a file	2	3

## 4.7 Sprints plan

After identifying the user stories, we have decided to divide the user stories into three sprints. In each one, we will work on specific functionalities ordered by priority level. The following image clarify to us the content of each sprint .

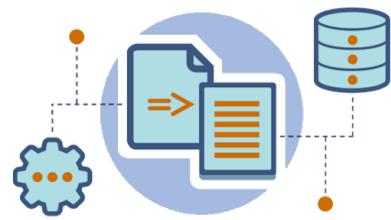
**Figure 4.2:** Sprint planning

## 4.8 Architecture

The good choice of architecture is crucial for the success of any project therefore we must analyze the possibly used architectures and interpret the adequate one based on our project's needs and perspectives. Currently, our main architecture we're interested in is MVC (Model view controller)

### 4.8.1 Model-View-Controller architecture

The Model-View-Controller (MVC) is an architectural pattern that separates an application into three main logical components: the model, the view, and the controller. Each of these components are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development framework to create scalable and extensible projects.



**Figure 4.3:** MVC architecture

## 4.9 Class diagram

After defining our services and dividing them based on their types. the next step depicted in the forwarded class diagram that presents the static structure of our system .

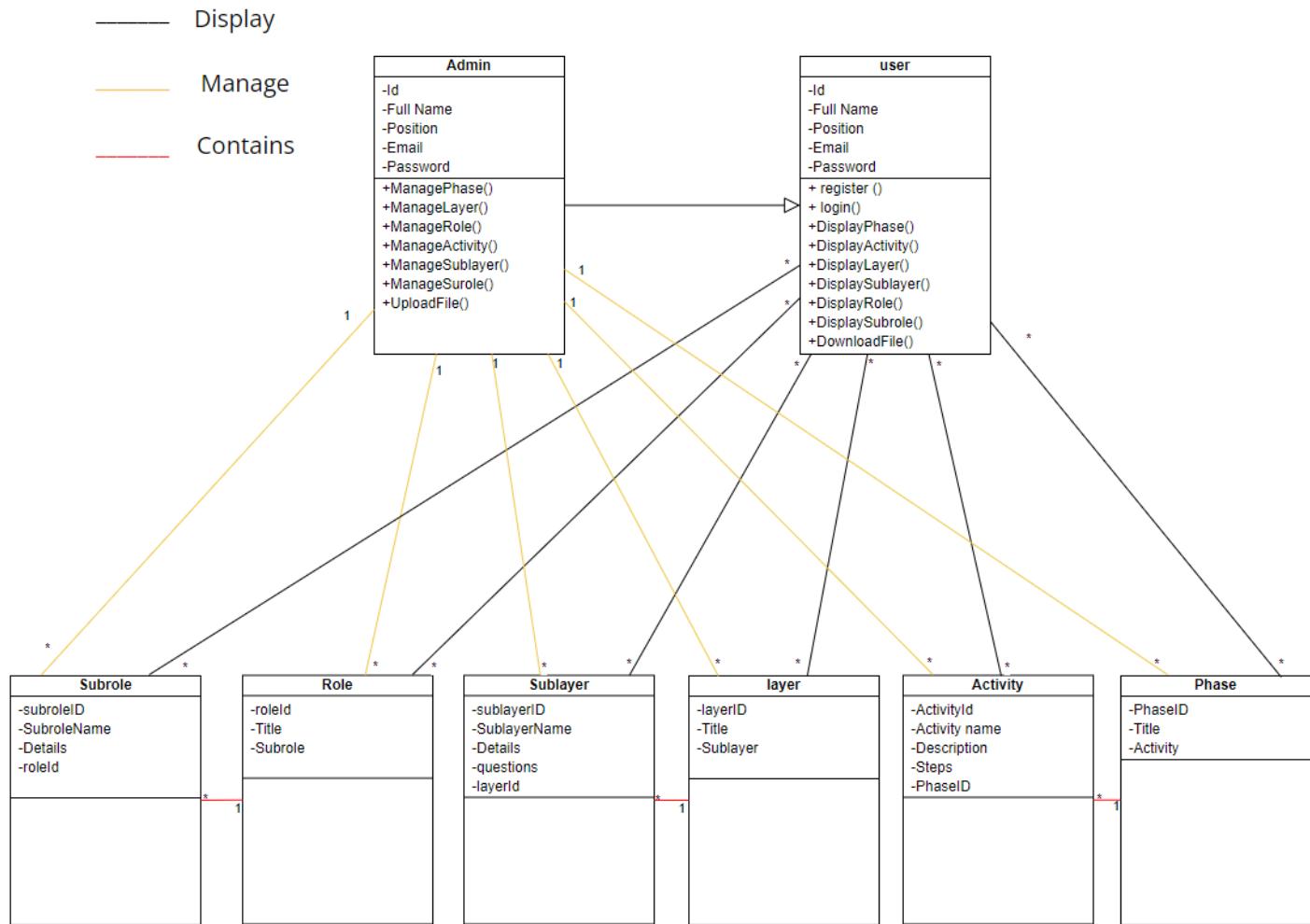


Figure 4.4: General Class diagram

## 4.10 Conclusion

In this chapter, we presented the requirements of our project, specified our product backlog and sprint plan.

# SPRINT 1

---

## Plan

1	Introduction . . . . .	45
2	Product backlog . . . . .	45
3	Detailed specification . . . . .	45
4	Conception . . . . .	48
5	Interfaces . . . . .	50
6	Conclusion . . . . .	54

## 5.1 Introduction

In this chapter, we will focus on the first sprint. Therefore, we will present use case and sequence diagrams of the user story. Finally, we will present few interfaces of our final result of this release.

## 5.2 Product backlog

The first sprint of our first release focuses on the "authenticate" user story and some of the consulting user stories. They are all shown in the table 5.1 which represents the backlog of this sprint.

**Table 5.1:** backlog of the first sprint

Number	sprint Name
1	Register.
2	Authenticate.

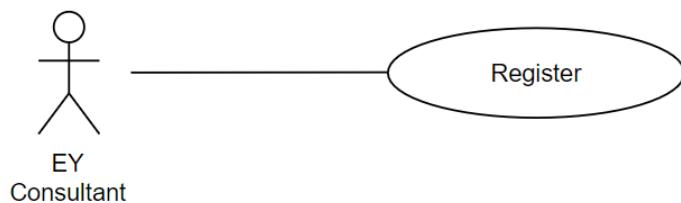
## 5.3 Detailed specification

In this section, we will specify each use case of the mentioned user stories in the table 5.2 .

**Table 5.2:** Detailed backlog of the first sprint

Sprint Name	User story	Task Id	Task Description
Register	as a user i want to register so i can access the platform	1	Create user model
			Develop user controller
			Create Register interface
Authenticate	as a user i want to log in so i can access the platform	2	Create login method
			create login interface

### 5.3.1 Refining The " Register " use cases



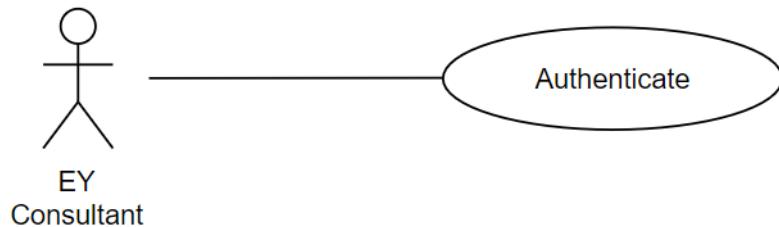
**Figure 5.1:** "student management " use case diagram

The next table gives us an amplified description of "Register" use case diagram.

**Table 5.3:** Description of the "Register" scenario

Case identification summary	
Title	Register
Actor	User
Summary	The user can create an account to access the platform.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- the user fills out the form of the registration;</li> <li>- Redirected to home page</li> </ul>	
Exceptions	
E1: If the user enters a wrong email or character in any field: -An alarming message appears asking for correction E2: If the user forgets to fill out any field: an error message will tell him to fill out the missing information.	

### 5.3.2 Refining The "authenticate" use case



**Figure 5.2:** "authenticate" use case diagram

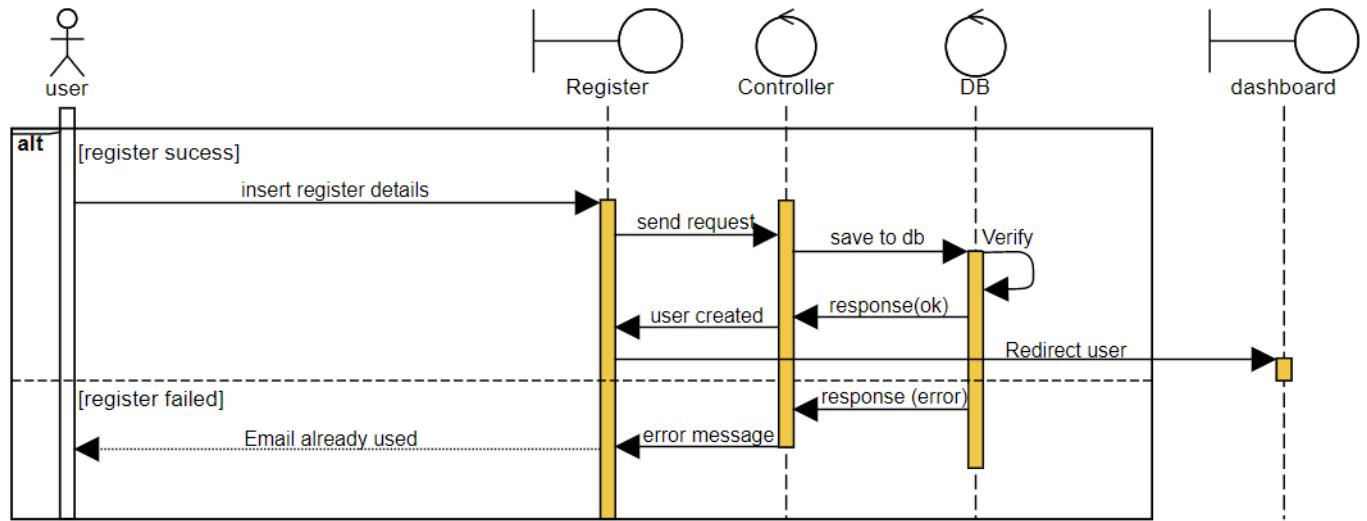
The next table gives us an amplified description of the authentication scenario

**Table 5.4:** Description of the authentication user story

Case identification summary	
Title	Authenticate
Actor	User
Summary	The User authenticates by inserting his email and password in order to login and access the dashboard.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- the user inputs the email and password;</li> <li>- the user click on "enter" or login button ;</li> <li>- Redirected to the Home interface .</li> </ul>	
Exceptions	
E1: If the user dose not fill the fields: -An error messages pops up to requires him to fill all the fields E2: If the user fills an email or password wrong : -An error messages tells him to fill the right email or password is incorrect .	

## 5.4 Conception

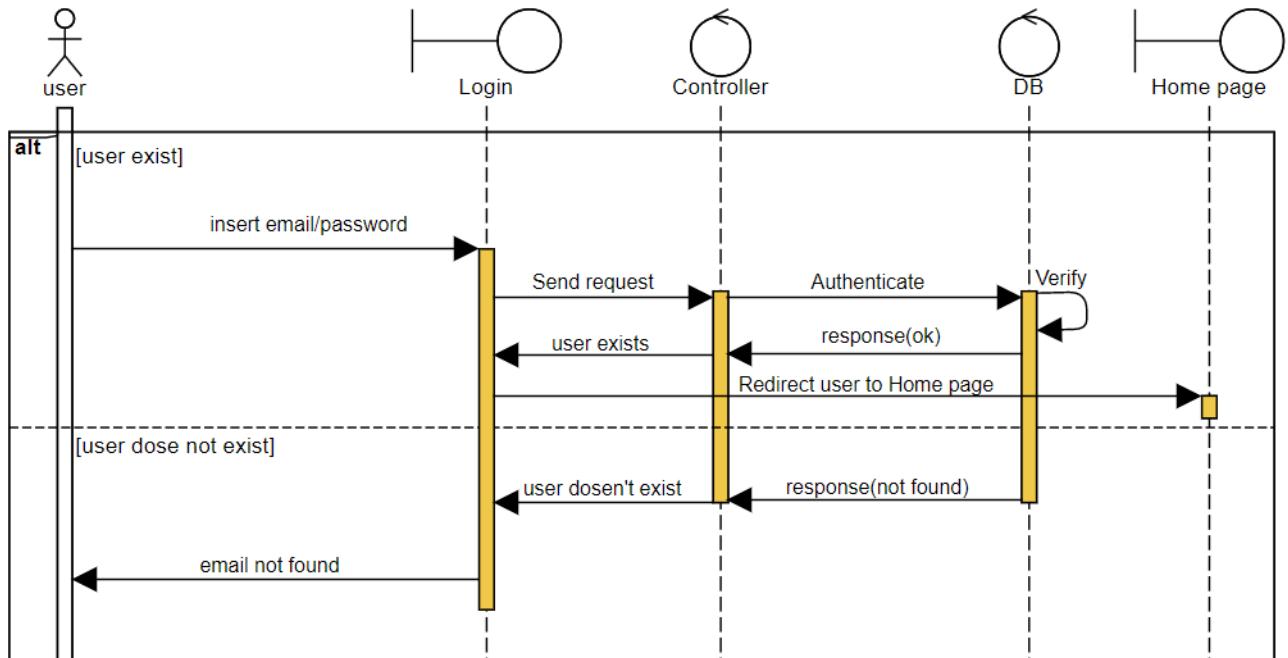
### 5.4.1 Sequence diagram "Register" use case



**Figure 5.3:** "Register" sequence diagram

User registration involves the registration form in the React user interface sending a request to the server. The server validates the input data, hashes the password, and stores the user information in the MongoDB database. After successful registration, the server generates a JSON Web Token (JWT), sends it back to the front end and redirects to the home page.

### 5.4.2 Sequence diagram "authentication" use case



**Figure 5.4:** "authenticate" sequence diagram

The login process begins when the user enters their login credentials into the login form in the React user interface. After submitting the form, the front end sends a login request to the server. Upon receiving the request, the server validates the provided input data for correctness. If the data is valid, the server retrieves the user's hashed password from the MongoDB database based on the provided username/email. It then compares the hashed password with the password provided by the user. If the passwords match, the server authenticates the user and allows access to protected resources or routes. If the passwords do not match or the user does not exist, the server responds with an error, indicating an unsuccessful login attempt.

## 5.5 Interfaces

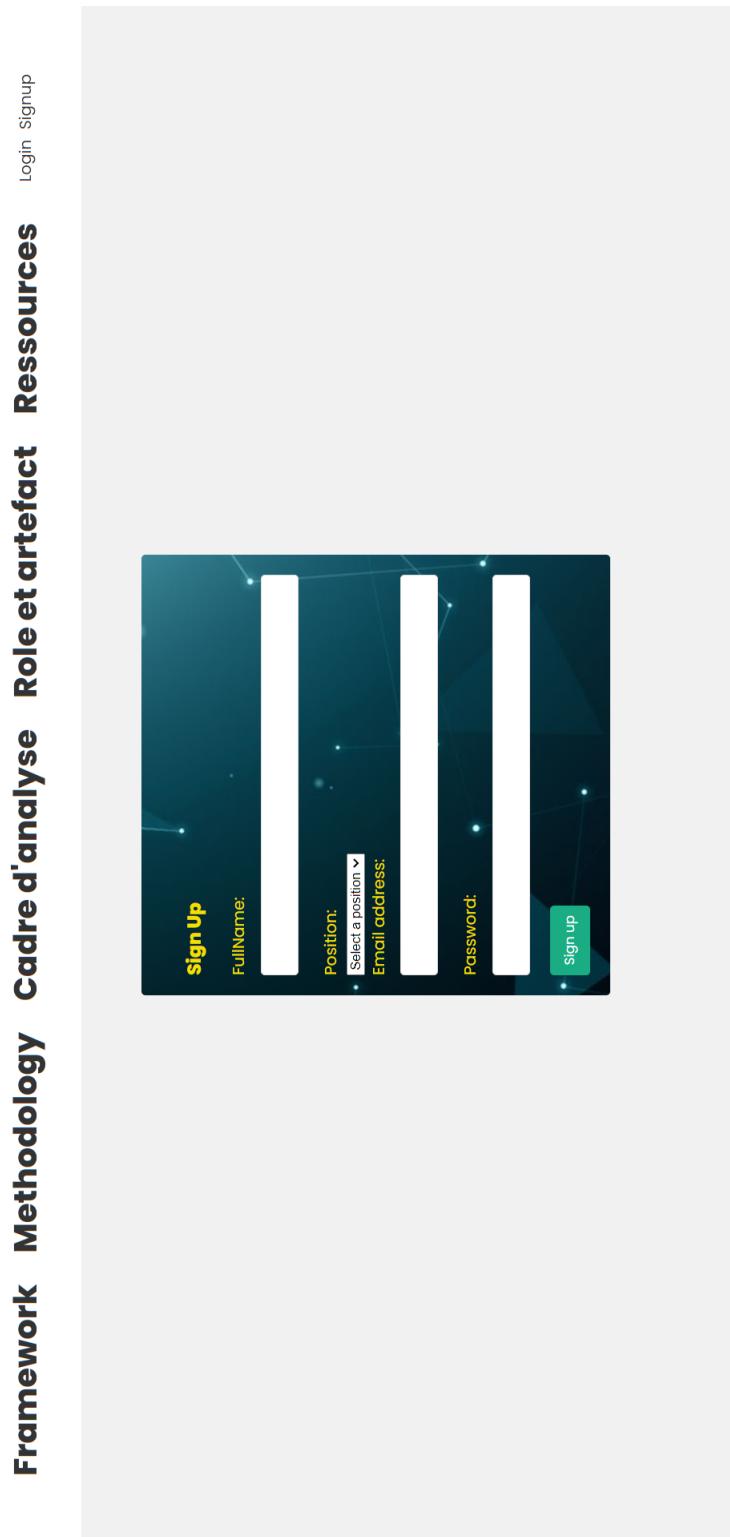


Figure 5.5: "sign up" interface

Framework   Methodology   Cadre d'analyse   Role et artefact   Ressources   Login   Signup

---

**sign up**

FullName: oussama

Position: Manager >

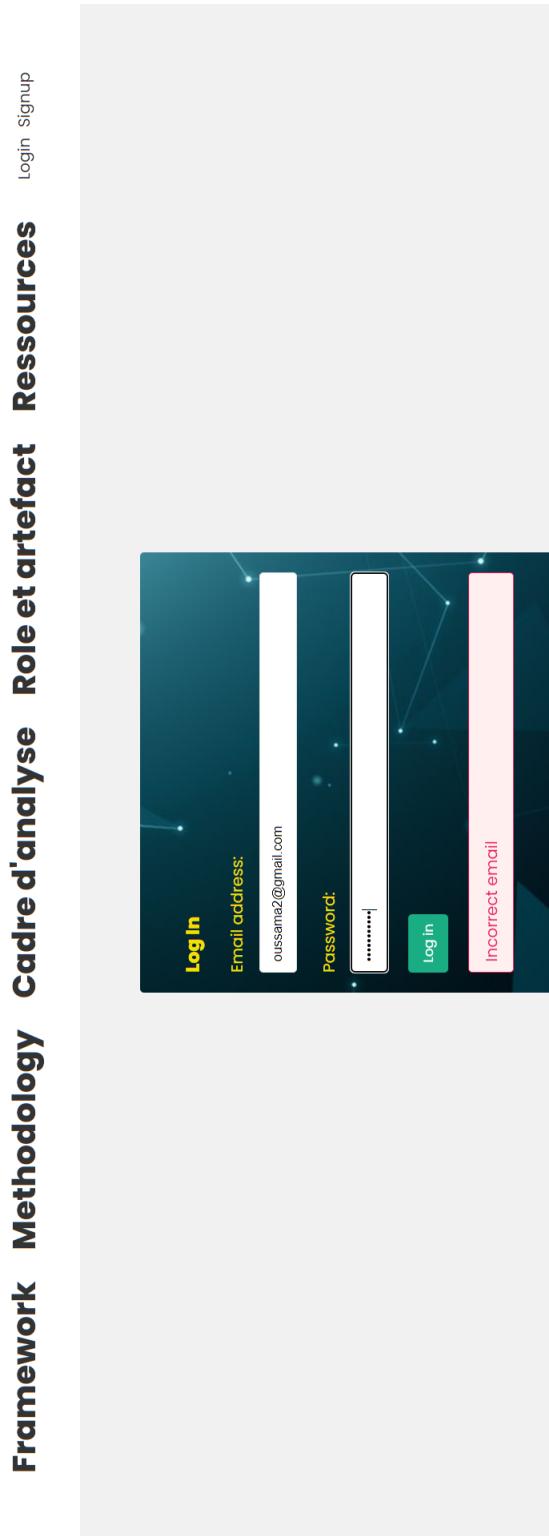
Email address: oussama2@gmail.com

Password: ..... Password not strong enough

**Sign up**



**Figure 5.6:** "Sign up input control"



**Figure 5.7:** "Authenticate" interface

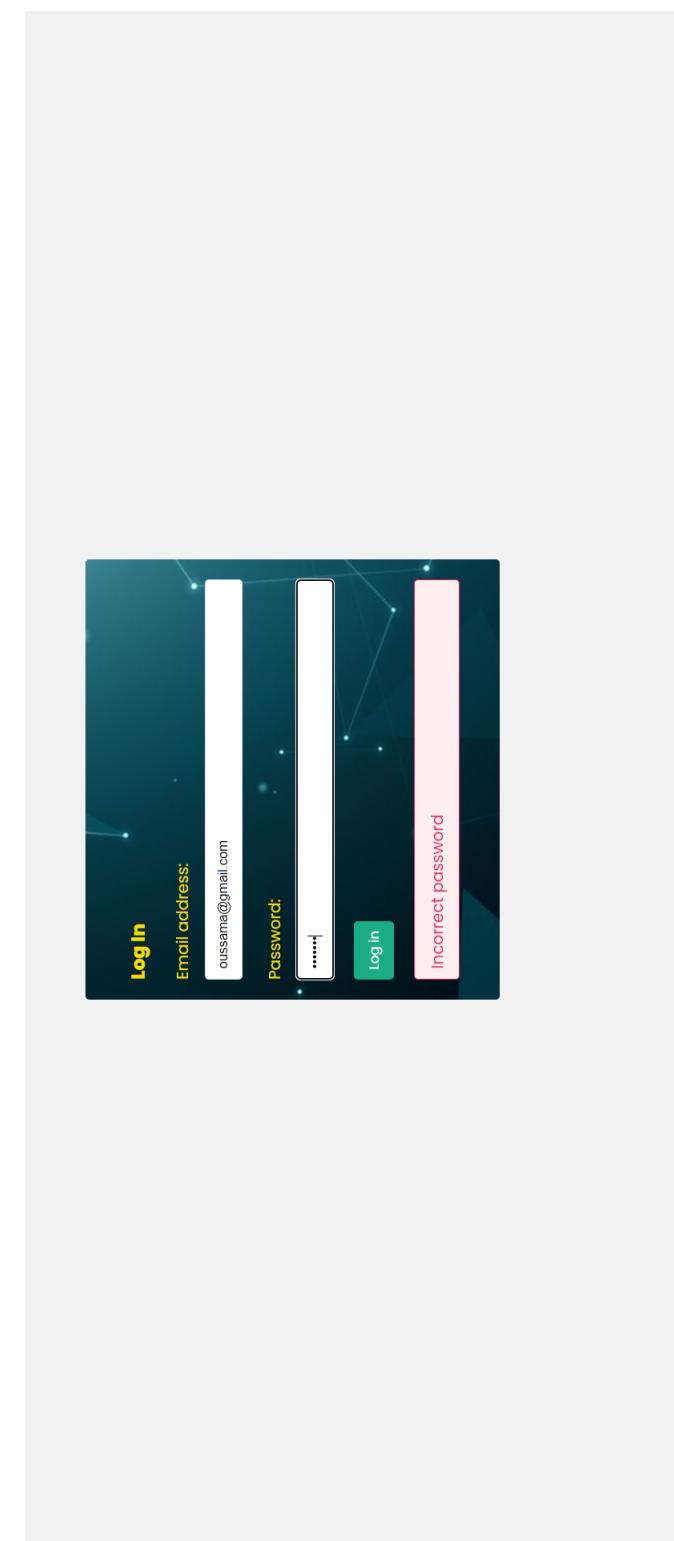


Figure 5.8: "Password Authentication"

## 5.6 Conclusion

In this chapter, we specified every user story in the first sprint. Then inserted graphical interfaces showing the main functionalities mentioned in it.

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## SPRINT 2

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### Plan

1	Introduction . . . . .	56
2	Product Backlog . . . . .	56
3	Detailed specification . . . . .	56
4	Conception . . . . .	65
5	Interfaces . . . . .	73
6	Conclusion . . . . .	80

## 6.1 Introduction

In this chapter, we will focus on the second sprint . Therefore, we will present use case and sequence diagrams of the user story. Finally, we will present few interfaces of our final result of this sprint

## 6.2 Product Backlog

For the second sprint we will work on the listed user stories in the table 6.1 down below which represents its backlog.

**Table 6.1:** backlog of the third sprint

Number	sprint Name
3	Manage phase
	Manage activity
4	Manage layer
	Manage sublayer
5	Manage role
	Manage subrole
6	Manage ressources
7	Consult platform

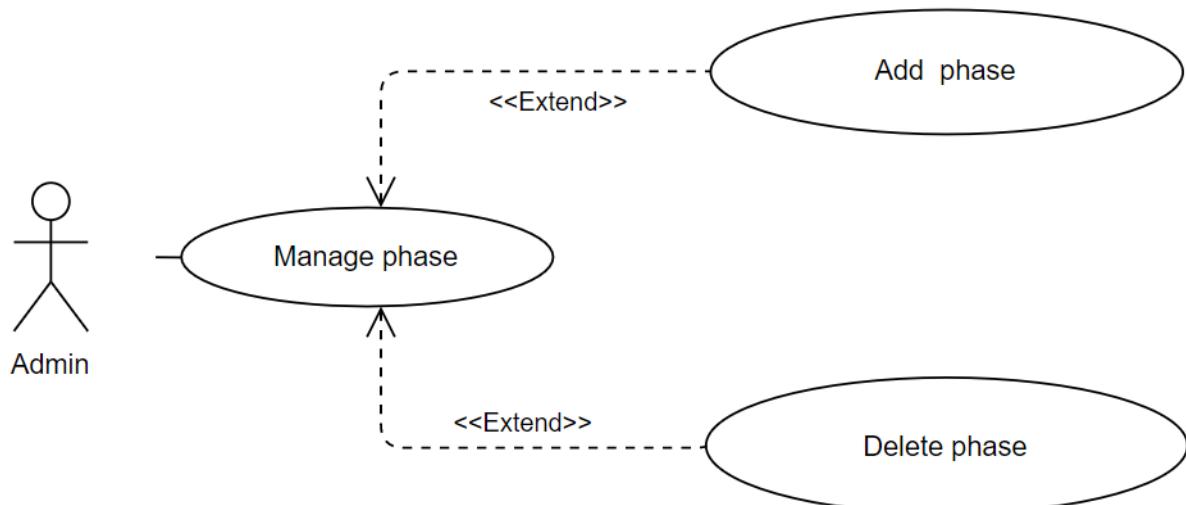
## 6.3 Detailed specification

In this section, we will specify, just like the previous sprint, each use case of the mentioned user stories in the table below.

**Table 6.2:** Detailed backlog of the second sprint

Sprint Name	User story	task id	task description
Manage phase	as an admin i want to create a phase	3	create phase model and controller
	as an admin i want to delete a phase	3.1	create phase interface
Manage activities	as an admin i want to create an activity	3.2	create activity model and controller
	as an admin i want to update an activity	3.3	create activity interface
Manage layer	as an admin i want to create a layer	4	create layer model and controller
	as an admin i want to delete a layer	4.1	create layer interface
Manage sublayer	as an admin i want to create a sublayer	4.2	create sublayer model and controller
	as an admin i want to update a sublayer	4.3	create sublayer interface
Manage role	as an admin i want to create a role	5	create layer model and controller
	as an admin i want to delete a role	5.1	create role interface
Manage subroles	as an admin i want to create a subrole	5.2	create sublayer model and controller
	as an admin i want to update a subrole	5.3	create sublayer interface
Manage ressources	as an admin i want to import a file	6	create file model and controller
	as a user i want to download a file	6.1	create file interface
Consult platform	as a user i want to consult the platform	7	create the detail interfaces

### 6.3.1 Refining The "Manage phase" use case



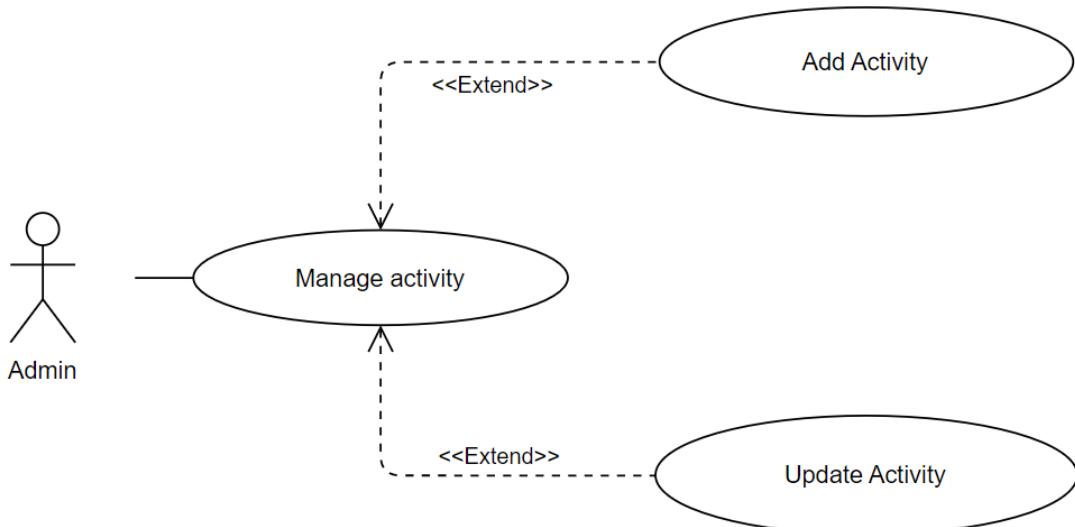
**Figure 6.1:** "Phase" use case diagram

The next table gives us an amplified description of the scenario

**Table 6.3:** Description of the phase user story

Case identification summary	
Title	Manage phase
Actor	admin
Summary	The admin can add and delete a phase in the platform.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- The admin fills the form of the phase;</li> <li>- the phase shows in the home page ;</li> <li>- the admin click on the delete button;</li> <li>- The phase gets deleted ;</li> </ul>	

### 6.3.2 Refining The "Manage activities" use cases



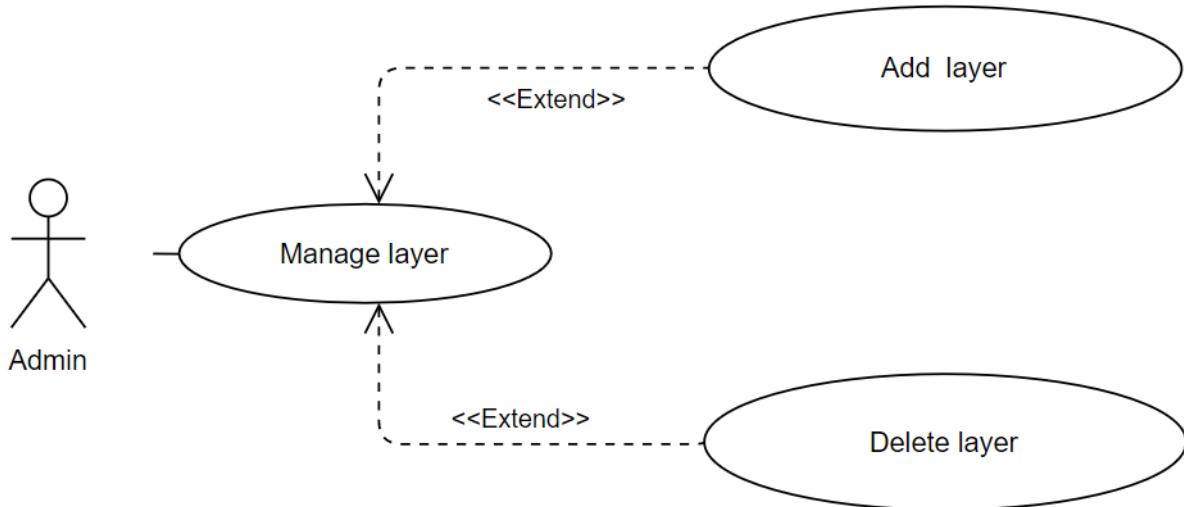
**Figure 6.2:** "Activity" use case diagram

The next table gives us an amplified description of the scenario

**Table 6.4:** Description of the "Activity" scenario

Case identification summary	
<b>Title</b>	manage activity
<b>Actor</b>	Admin
<b>Summary</b>	The user can create an activity on the phase created and updated it.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- the user clicks on the add button in the phase created and fills the form ;</li> <li>- the activity gets created based on the phase he chose to create an activity.</li> <li>- the admin clicks on the update button in the activity selected and updates;</li> <li>- the activity updates and redirect to home page.</li> </ul>	

### 6.3.3 Refining The "Manage layer" use case



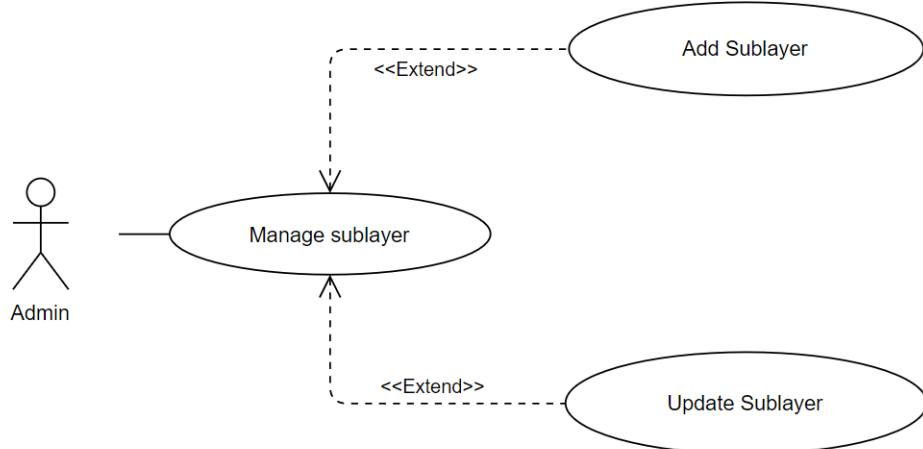
**Figure 6.3:** "Layer" use case diagram

The next table gives us an amplified description of the scenario

**Table 6.5:** Description of the layer user story

Case identification summary	
Title	Manage layer
Actor	admin
Summary	The admin can add and delete a layer in the platform.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- The admin fills the form of the layer;</li> <li>- the phase shows in the home page ;</li> <li>- the admin click on the delete button;</li> <li>- The layer gets deleted with it's sublayer ;</li> </ul>	

#### 6.3.4 Refining The "Manage sublayers" use cases



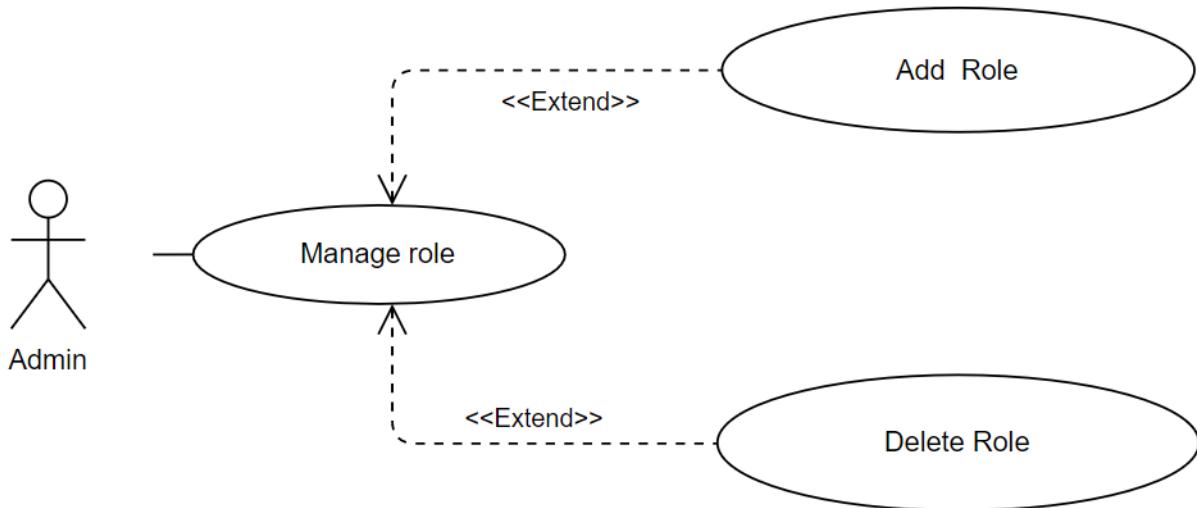
**Figure 6.4:** "Sublayer" use case diagram

The next table gives us an amplified description of senario

**Table 6.6:** Description of the "Sublayer" scenario

Case identification summary	
<b>Title</b>	Manage sublayers
<b>Actor</b>	Admin
<b>Summary</b>	The user can create an sublayer on the layer created and updated it.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- the user clicks on the add button in the layer created and fills the form ;</li> <li>- the sublayer gets created based on the layer he chose</li> <li>- the admin clicks on the update button in the sublayer selected and updates;</li> <li>- the sublayer updates and redirect to home page.</li> </ul>	

### 6.3.5 Refining The "Manage role" use case



**Figure 6.5:** "Role" use case diagram

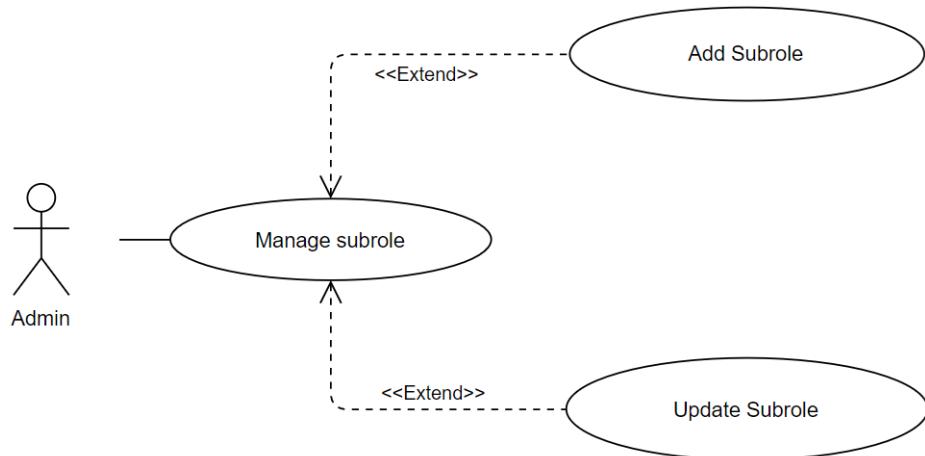
The next table gives us an amplified description of the scenario

**Table 6.7:** Description of the Manage role user story

Case identification summary	
<b>Title</b>	Manage role
<b>Actor</b>	admin
<b>Summary</b>	The admin can add and delete a Role in the platform.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- The admin fills the form of the Role;</li> <li>- the phase shows in the home page ;</li> <li>- the admin click on the delete button;</li> <li>- The Role gets deleted with it's subroles ;</li> </ul>	

—

### 6.3.6 Refining The "Manage subroles" use cases



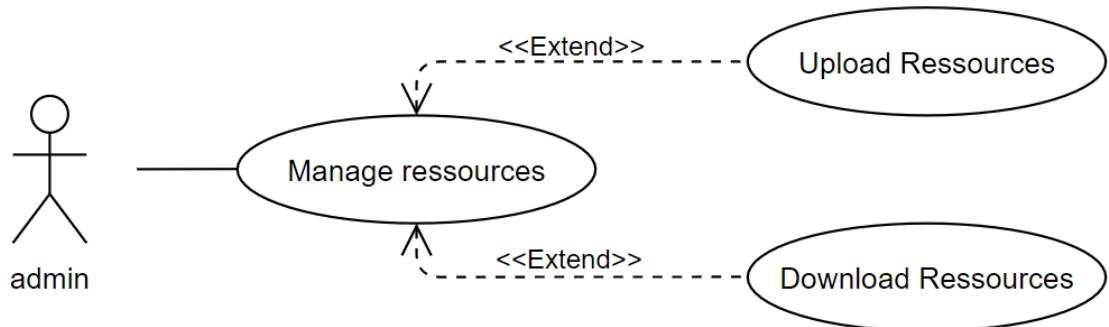
**Figure 6.6:** "subrole" use case diagram

The next table gives us an amplified description of the scenario.

**Table 6.8:** Description of the "Subrole" scenario

Case identification summary	
<b>Title</b>	Manage subrole
<b>Actor</b>	Admin
<b>Summary</b>	The user can create an subrole on the role created and updated it.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- the user clicks on the add button in the role created and fills the form ;</li> <li>- the subrole gets created based on the layer he chose</li> <li>- the admin clicks on the update button in the subrole selected and updates;</li> <li>- the subrole updates and redirect to home page.</li> </ul>	

### 6.3.7 Refining The "manage files" use case



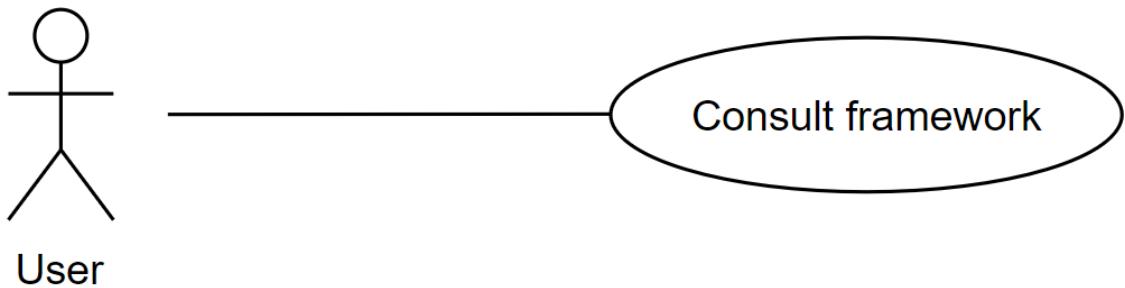
**Figure 6.7:** "files" use case diagram

The next table gives us an amplified description of the scenario

**Table 6.9:** Description of the file user story

Case identification summary	
Title	manage files
Actor	admin
Summary	The admin can upload a file in the platform and download it .
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- The admin clicks on import and chooses the file;</li> <li>- The file uploads in the platform ;</li> <li>- The user clicks on download file;</li> <li>- The file gets downloaded on his computer ;</li> </ul>	

### 6.3.8 Refining The "consult framework" use case



**Figure 6.8:** "consult framework" use case diagram

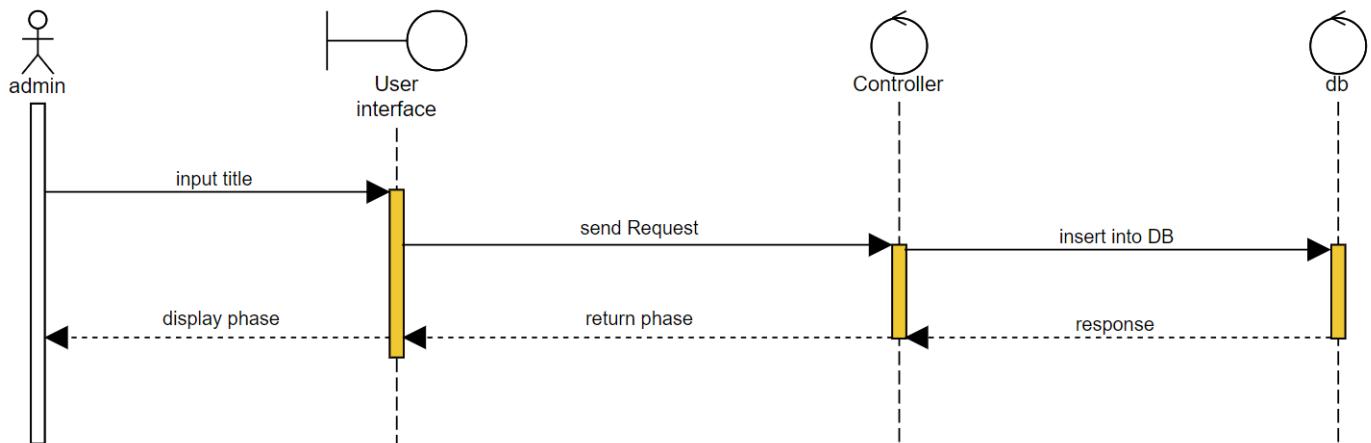
The next table gives us an amplified description of the scenario

**Table 6.10:** Description of the users user story

Case identification summary	
Title	Consult platform
Actor	user
Summary	The user can consult the details of activities, sublayer and subroles.
Sequence of events descriptions	
Scenario	
<ul style="list-style-type: none"> <li>- The user click on the desired activity, sublayer or subrole ;</li> <li>- The user will be redirected to the details page;</li> </ul>	

## 6.4 Conception

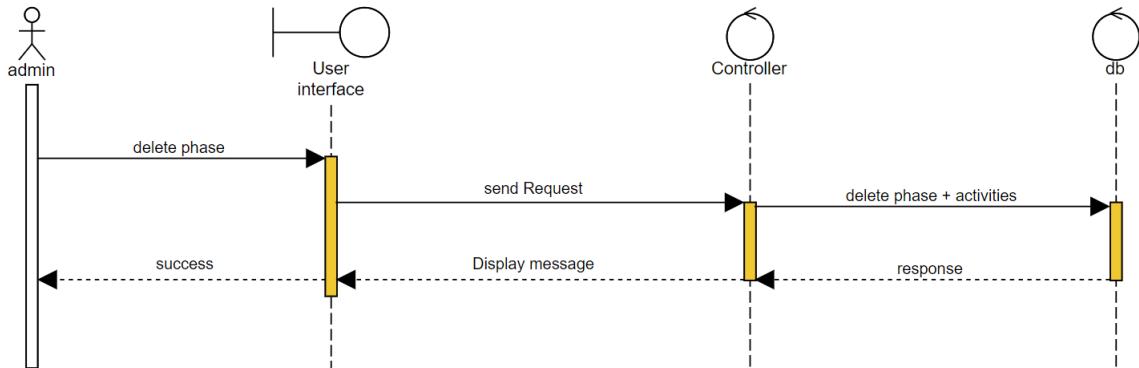
### 6.4.1 Sequence diagram "create phase" use case



**Figure 6.9:** "Create phase" sequence diagram

To create a phase you only have to insert a title in the phase form after authenticate and the phase will be presented in the phase details.

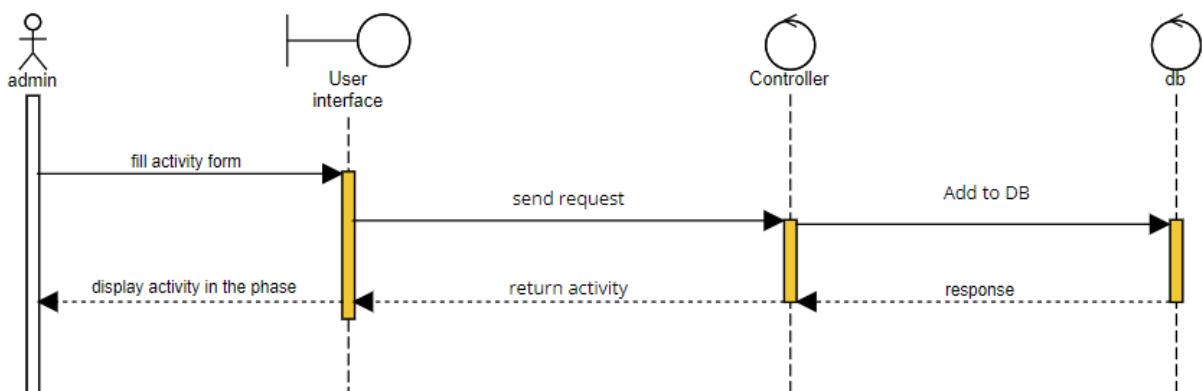
#### 6.4.2 Sequence diagram "delete phase" use case



**Figure 6.10:** "Delete phase" sequence diagram

If you want to delete the phase you have created all you have to do is click on the delete button where the phase will be deleted but also the activities that are in the phase are deleted as well.

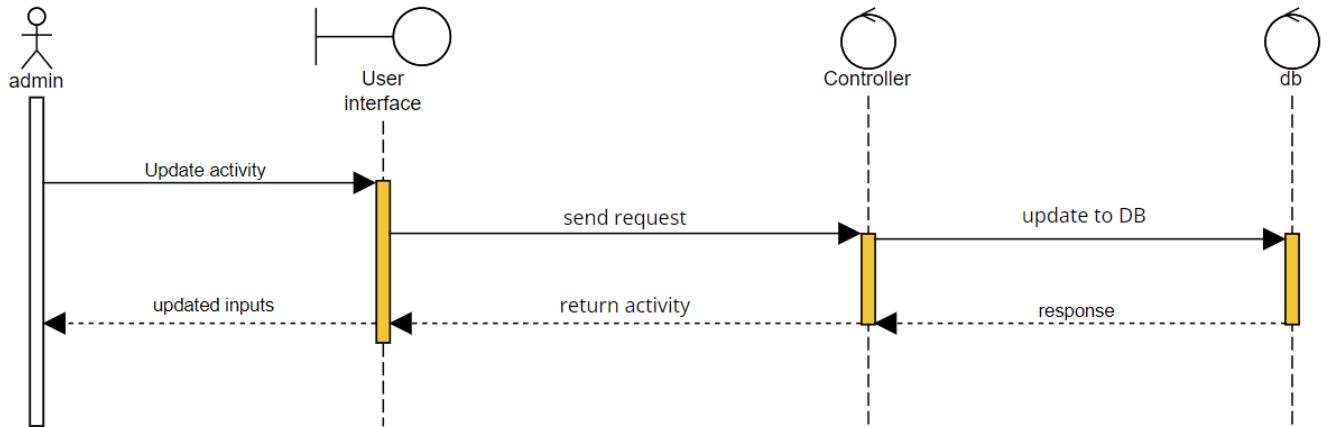
#### 6.4.3 Sequence diagram "create activity" use case



**Figure 6.11:** "Create activity" sequence diagram

The activities are the main objective of this project where you click the plus button in the phase desired and you fill the activity form and with that the activity will be created in the phase selected.

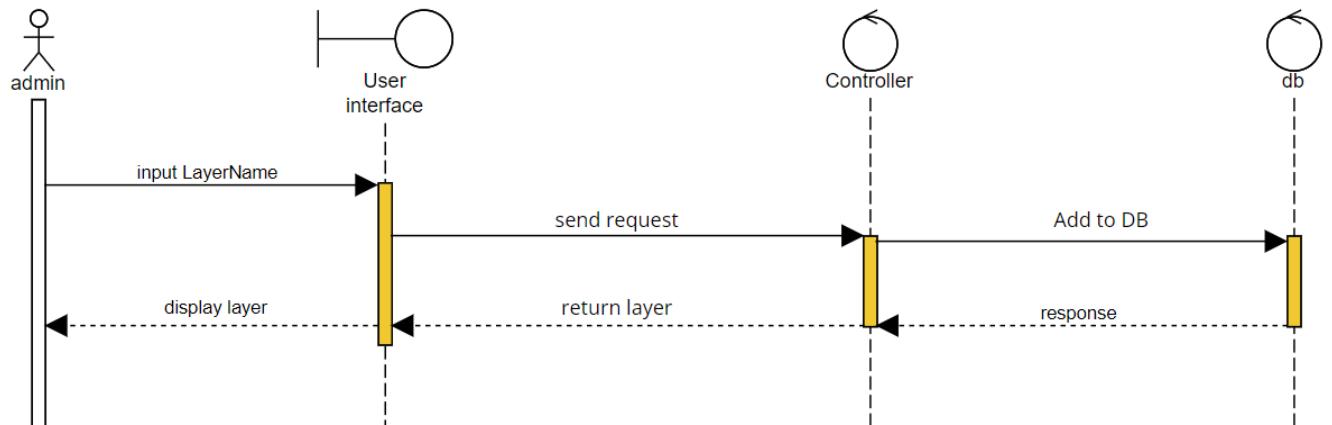
#### 6.4.4 Sequence diagram "update activity" use case



**Figure 6.12:** "Update activity" sequence diagram

To update the activity you get to the activity details and click on the update button where you can change any input of the activity selected.

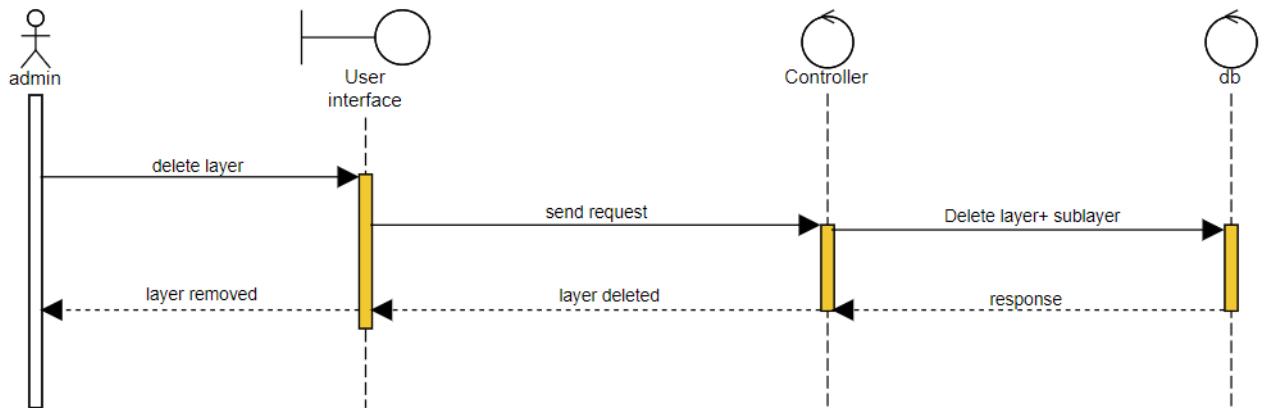
#### 6.4.5 Sequence diagram "create layer" use case



**Figure 6.13:** "Create layer" sequence diagram

Creating a layer is the same as creating a phase where you can also input the layer title and you will get the layer created in the interface.

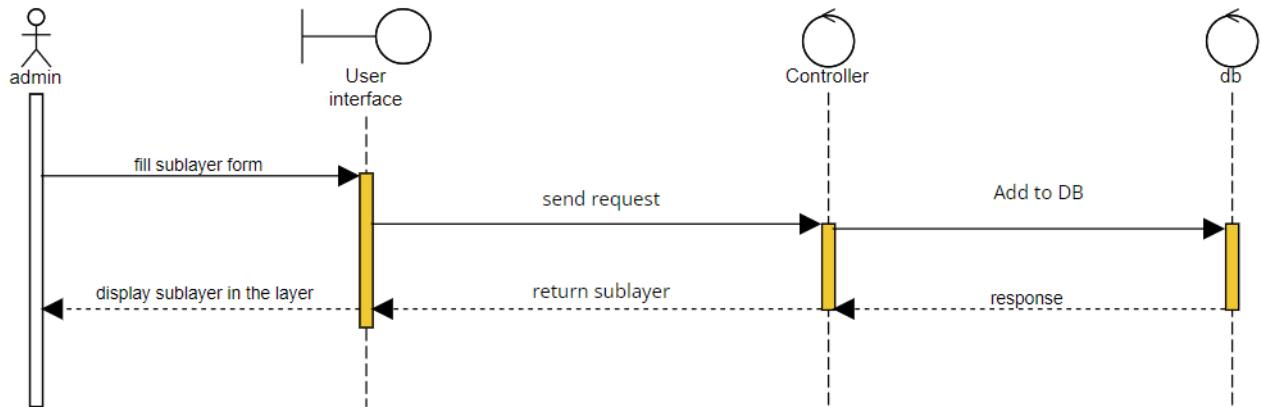
#### 6.4.6 Sequence diagram "delete layer" use case



**Figure 6.14:** "Delete layer" sequence diagram

As for the delete the layer will be deleted as well as the sublayer that is in that layer

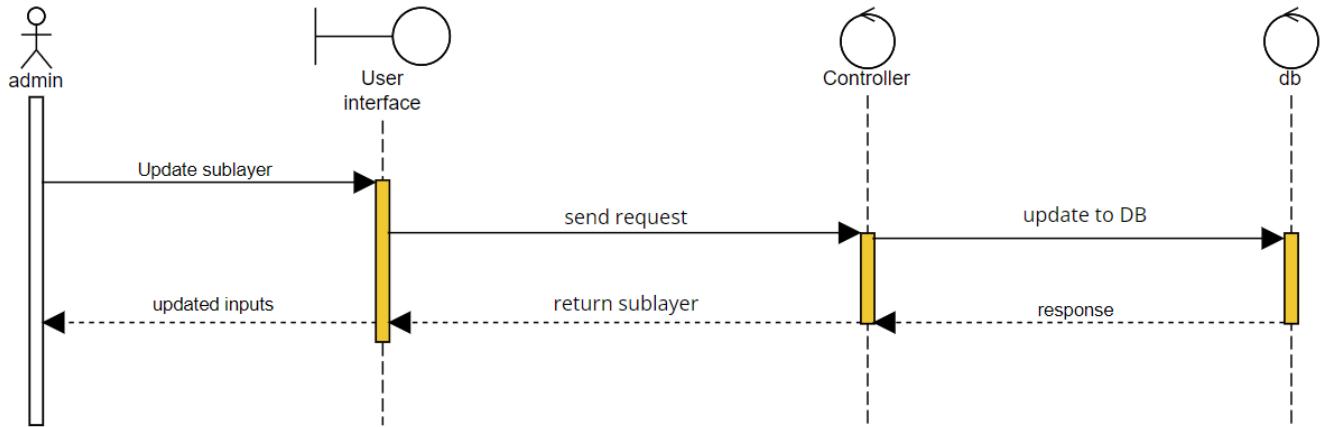
#### 6.4.7 Sequence diagram "create sublayer" use case



**Figure 6.15:** "Create sublayer" sequence diagram

create sublayer will be based on the layer selected where you fill the form and it will be displayed in that layer

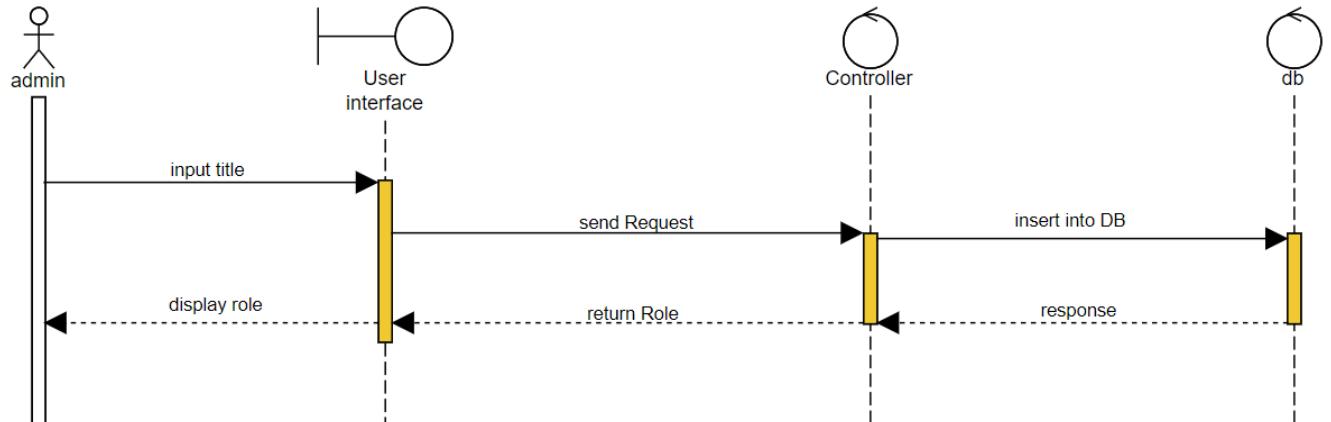
#### 6.4.8 Sequence diagram "update sublayer" use case



**Figure 6.16:** "Update sublayer" sequence diagram

updating the sublayer will require you to select the sublayer to be updated and change the input desired.

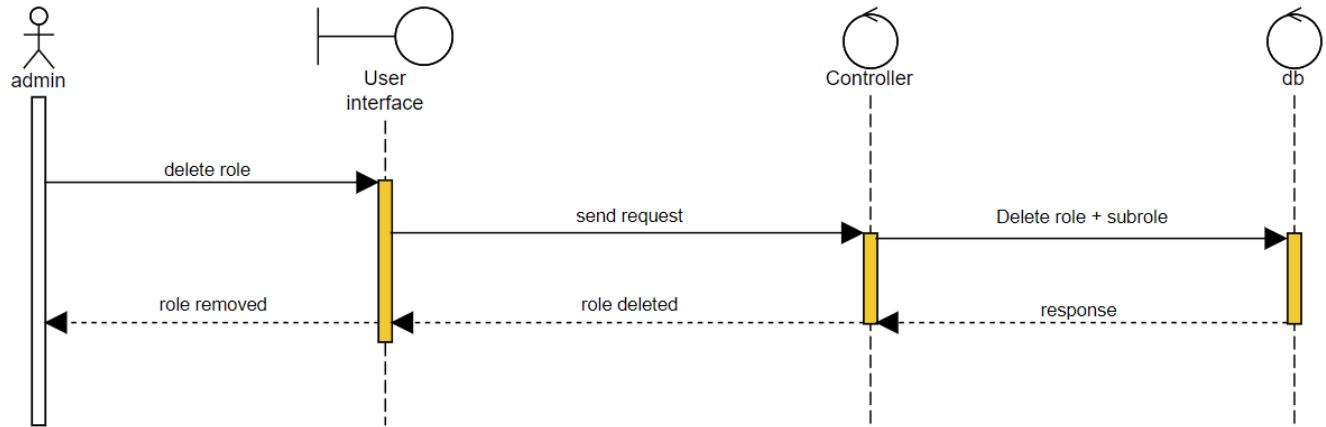
#### 6.4.9 Sequence diagram "create Role" use case



**Figure 6.17:** "Create Role" sequence diagram

Creating a role is the same as the previous one where you insert the role title and get it in the interface.

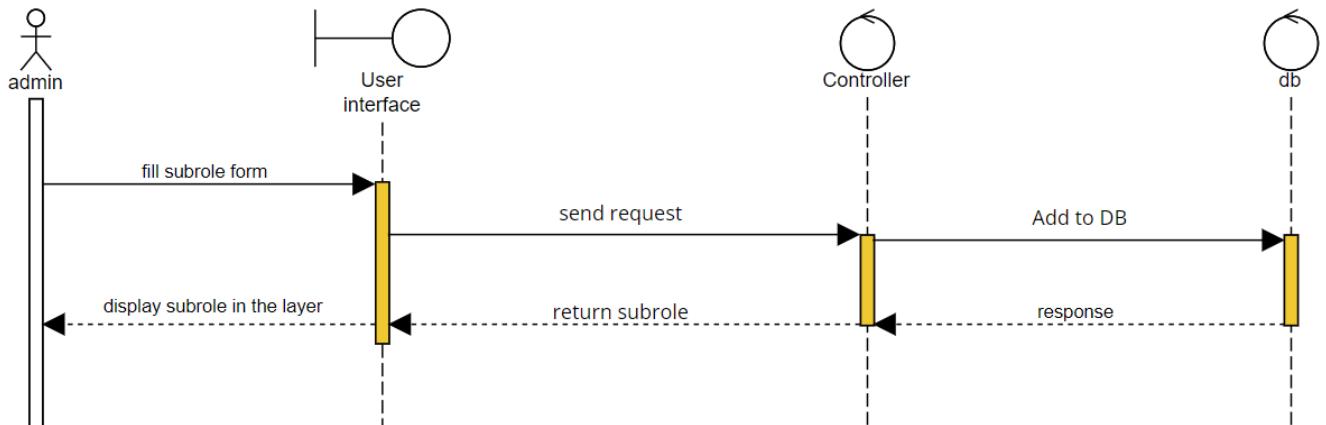
#### 6.4.10 sequence diagram "delete Role" use case



**Figure 6.18:** "Delete Role" sequence diagram

to delete the role the subrole will be deleted as well that is concerned that role deleted

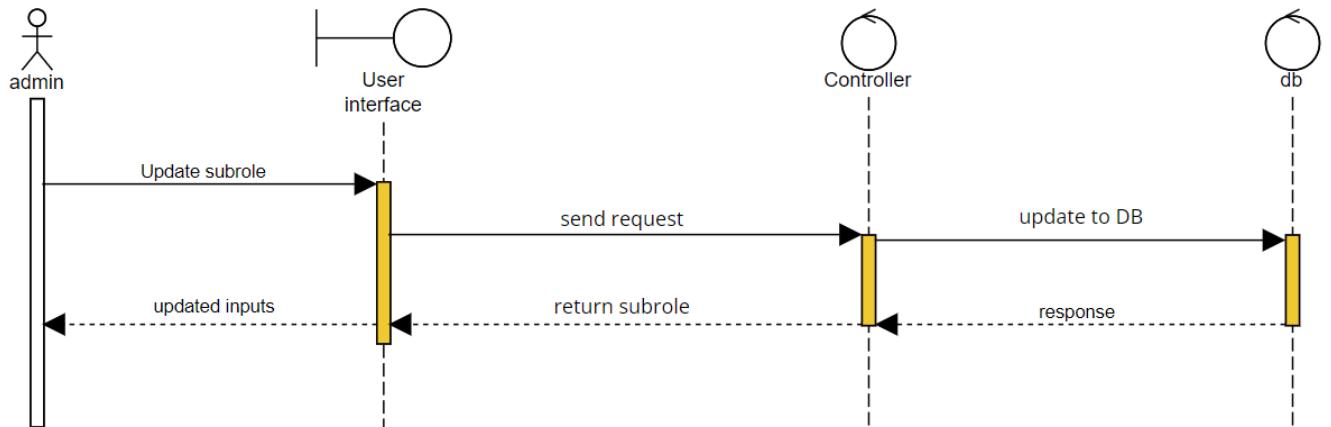
#### 6.4.11 Sequence diagram "create subRole" use case



**Figure 6.19:** "Create subRole" sequence diagram

creating a subrole will require you to select the role that you want to create a subrole in it and fill the form.

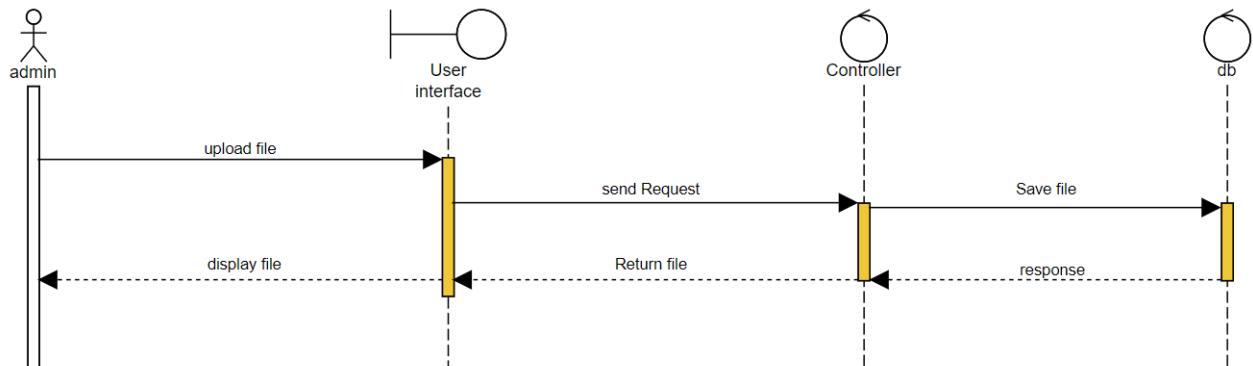
#### 6.4.12 Sequence diagram "update subRole" use case



**Figure 6.20:** "Update subrole" sequence diagram

to update the subrole you have to get the details of that role and change the input of it by clicking on the update button.

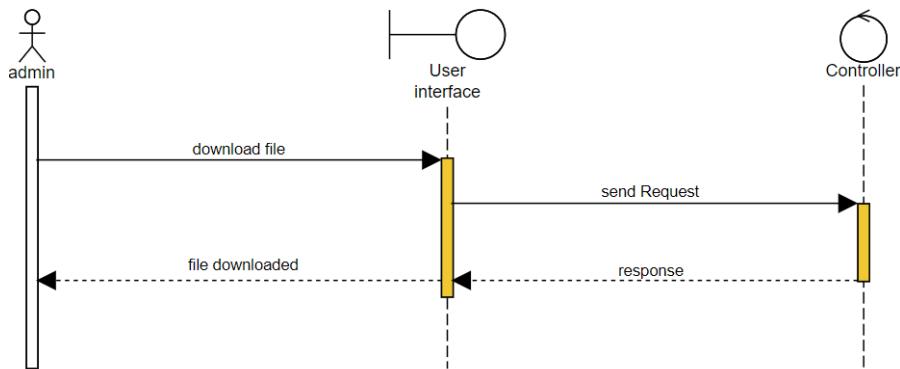
#### 6.4.13 Sequence diagram "upload file" use case



**Figure 6.21:** "Upload file" sequence diagram

To upload a file all you have to do is to select a file you want to import and it will be displayed in the interface.

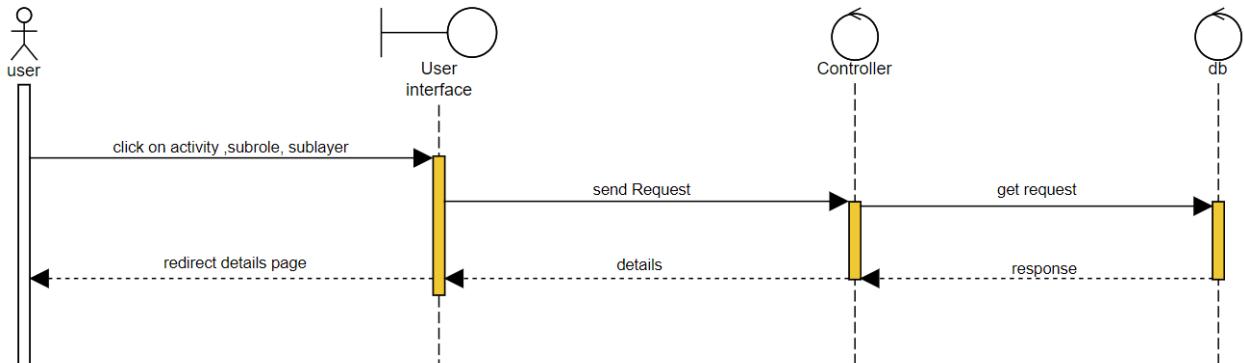
#### 6.4.14 Sequence diagram "download file" use case



**Figure 6.22:** "Download file" sequence diagram

To download a file you will have to select the file desired and click on the download button where you will get the file on your computer.

#### 6.4.15 Sequence diagram "consult framework" use case



**Figure 6.23:** "Consult framework" sequence diagram

The user will click on activiy or sublayer or role to get to it's details in a specific phase or layer or role and it redirect him to the detail page.

## 6.5 Interfaces

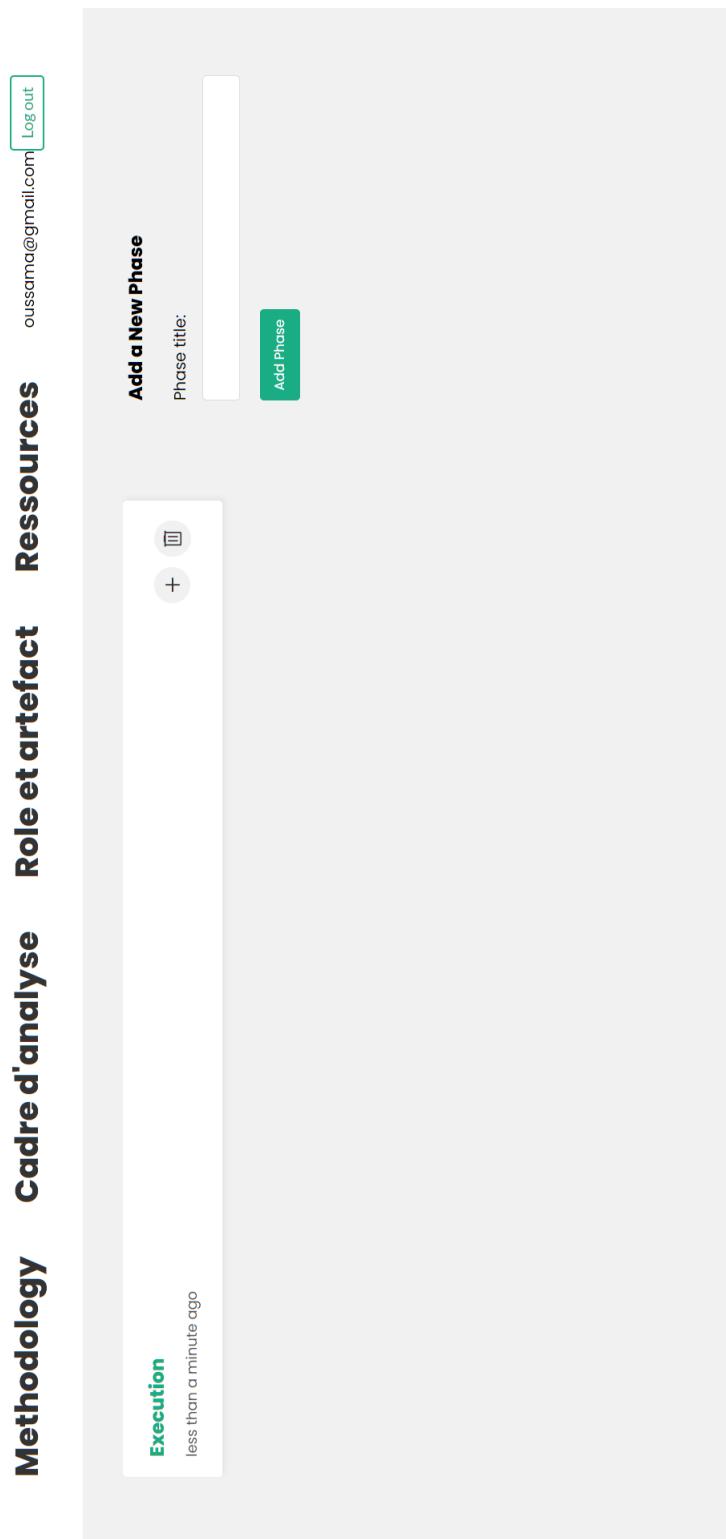


Figure 6.24: "Create phase interface"

The screenshot shows a web-based application interface for creating a new activity. At the top, there is a navigation bar with tabs: 'Methodology', 'Cadre d'analyse', 'Role et artefact', and 'Ressources'. On the far right of the top bar, there is a user profile placeholder 'oussama@gmail.com' and a 'Logout' button. Below the navigation bar, the main content area has a title 'Add a New Activity'. There are four input fields: 'Phase ID:' containing the value '644336923a6163cb7441826', 'Activity title:', 'Activity Description:', and 'Activity Steps:'. To the right of these fields is a green 'Add Activity' button.

Figure 6.25: "Create activity "

**Activity Details**

<b>Phase ID</b>	64a356923a6163cbb7441826
<b>Title</b>	Plan assistance
<b>Description</b>	Project management assistance refers to the support provided to project managers and teams to effectively plan, execute, and monitor projects. The objective of project management assistance is to enhance project success by providing guidance, resources, tools, and expertise throughout the project lifecycle.
<b>Steps</b>	For the steps of this activity you have 5 steps which are : Frame direction  <input type="button" value="Enable Fields"/> <input type="button" value="Update"/>

**Figure 6.26:** "Activity details"

**Activity Details**

<b>Phase ID</b>	64a356923a@163bbb7441826
<b>Title</b>	Project assistance plan
<b>Description</b>	Project management assistance refers to the support provided to project managers and teams to effectively plan, execute, and monitor projects. The objective of project management assistance is to enhance project success by providing guidance, resources, tools, and expertise throughout the project lifecycle.
<b>Steps</b>	for the steps of this activity you have 5 steps which are : frame direction

**Disable Fields** **Update**

**Figure 6.27:** "Update activity "

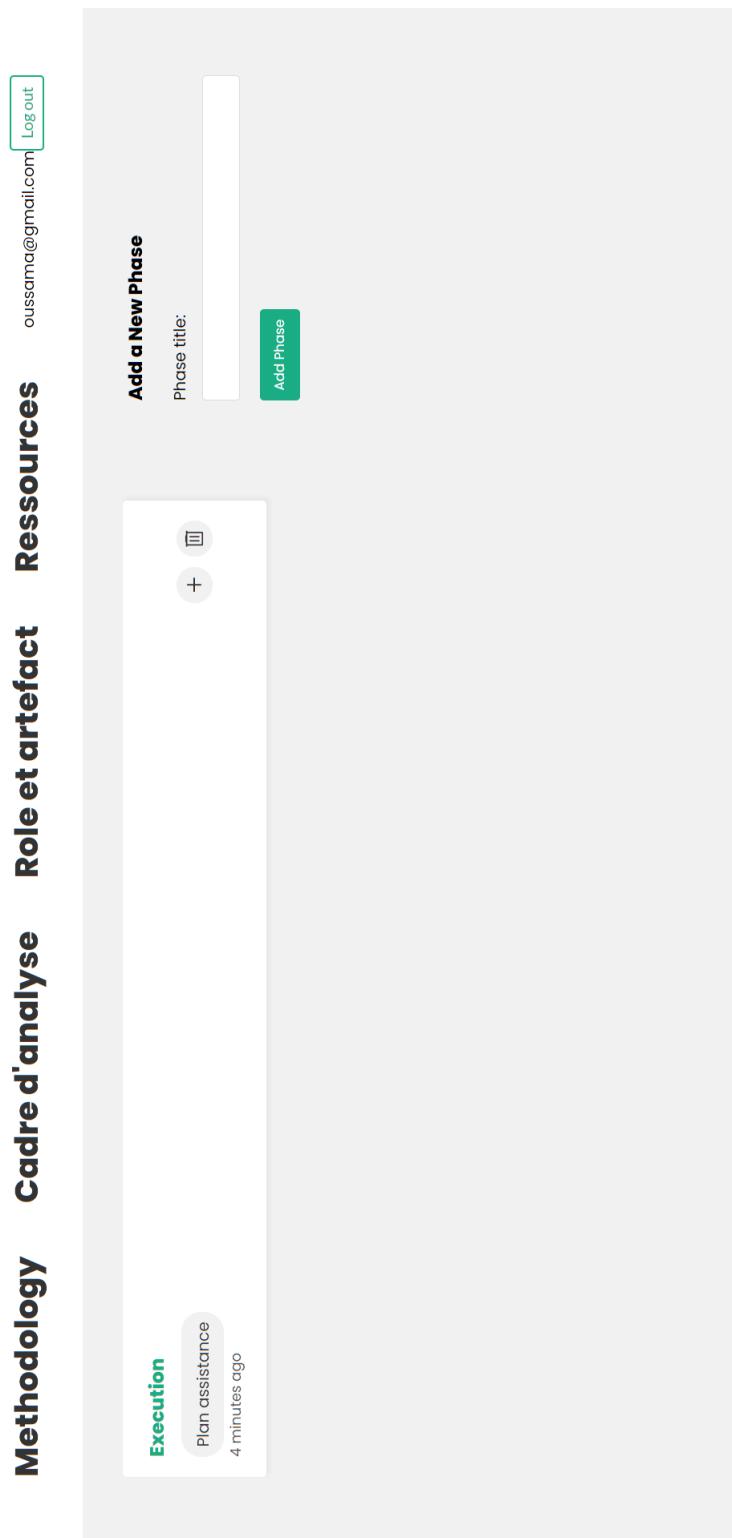
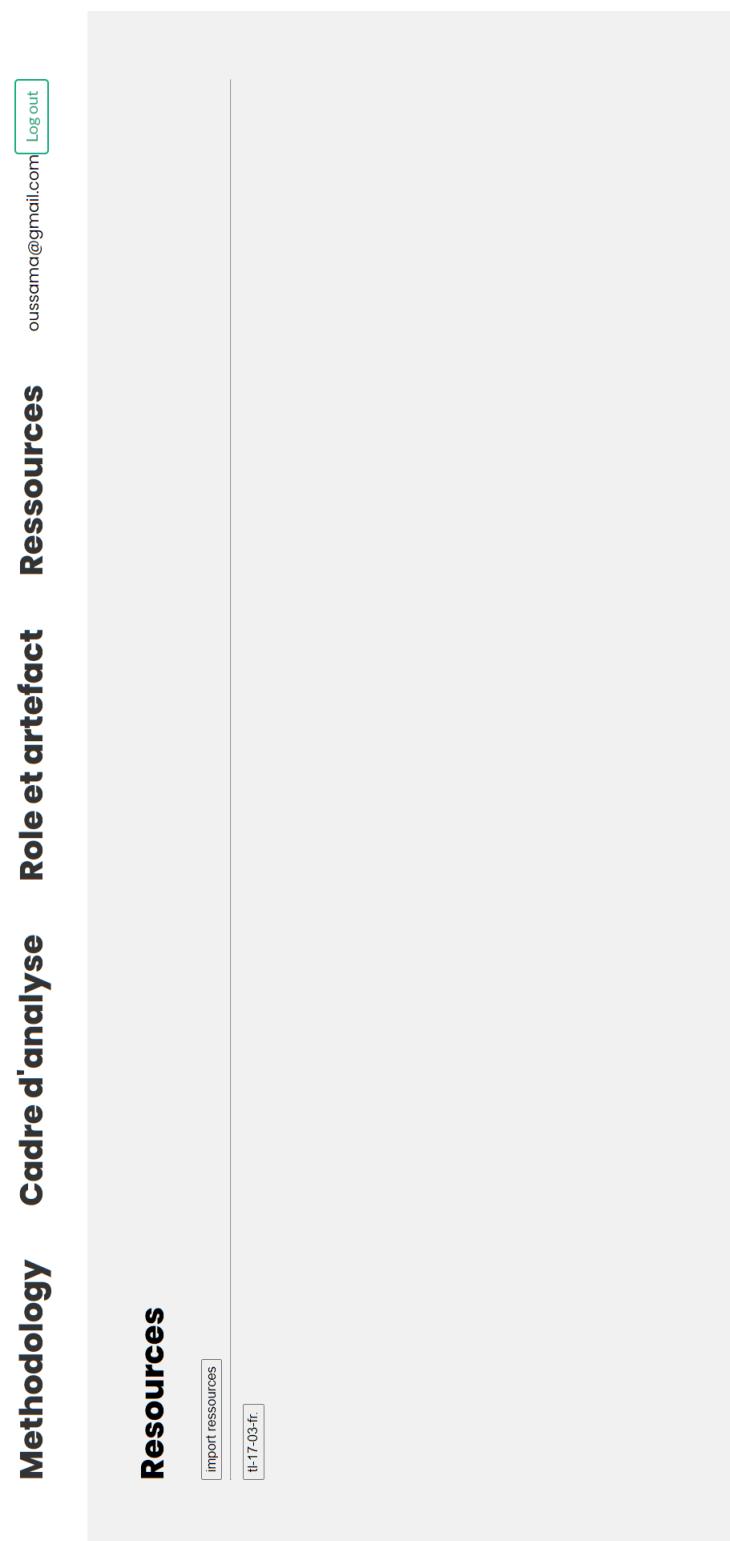


Figure 6.28: "Activity + phase"



**Figure 6.29:** "Ressources"

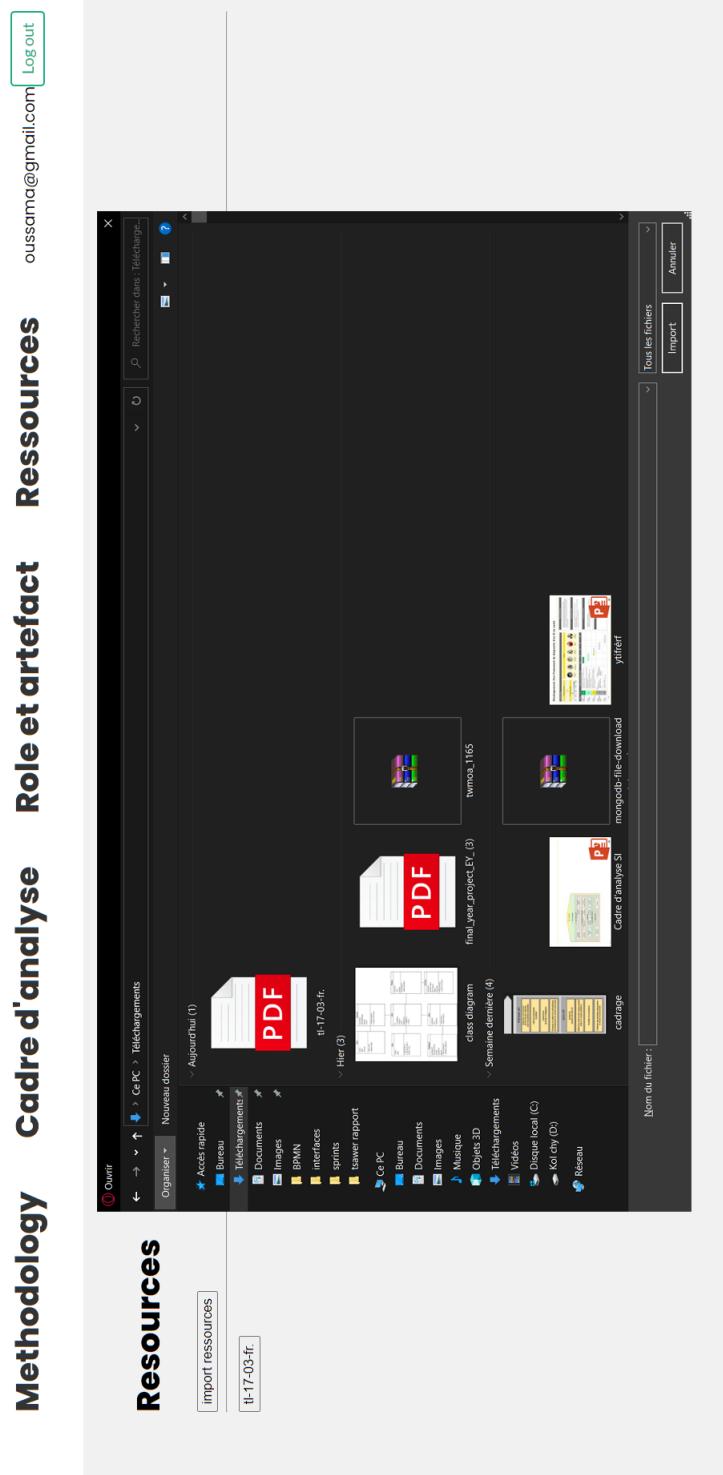


Figure 6.30: "Import ressources"

## 6.6 Conclusion

In this chapter, we specified every user story in the second sprint. Then inserted graphical interfaces showing the main functionalities mentioned in it

# Conclusion and Outlook

This report represents the result of the work carried during the internship in the company AMC ERNST YOUNG "EY". As part of our graduation project we designed and developed a Framework to diagnose and evaluate the health information system then implement in a web application. This manuscript describes all the tasks we have gone through to achieve the expected result.

This project focuses not only on providing an evaluation to the health information system but also as a guide for the consultants to achieve their missions and also provide them with a web application where they can share their resources to collaborate and follow the right path to minimise time and gain knowledge.

Also ,this professional experience was a golden opportunity for me for the great benefits I gained through it especially in the professional level. It gave me the chance to apply and practise all the theoretical and practical knowledge I had at the university and also work more on my soft skills and my professional persona. It allowed me to discover my both limits and skills and thus working on the good ones and changing the bad ones too.

Of course the resulted product of the project can and will be improved , since the company always looks for improvements and being always the best in its field. New services can be added, new architecture will be used and new security features will be implemented.

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## ملخص

يهدف هذا التقرير الى تقديم سير مشروع التدريب داخل شركة "EY" كانت مهمتنا هي تطوير إطار عمل لتشخيص وتقدير نظام المعلومات الصحية وتنفيذ إطار العمل هذا في تطبيق ويب من أجل تحقيق هذا المشروع ، تم استخدام وتعلم العديد من التقنيات مثل BPMN و Mern stack و غيرها

**كلمات مفاتيح :** Framework, Bpmn ,Mern stack, HIS

## Résumé

Ce rapport représente mon expérience de stage en tant que stagiaire dans la Ernst Young "EY". Notre mission consistait à développer un Framework de diagnostic d'un système d'information de santé et finalement implémenter ce framework dans un application web. Afin de réaliser ce projet, plusieurs technologies ont été utilisées et apprises, telles que BPMN, Mern stack,etc.

**Mots clés :** Framework, BPMN, MERN Stack, HIS

## Abstract

This report aims to represent internship experience as an intern in the company Ernst Young "EY". Our mission was to develop a framework to diagnose and evaluate the health informatino system and implement this framework in a web application. In order to realize this project several technologies were used and learned such as BPMN, Mern stack, and others.

**Keywords :** Fraemwork, BPMN, mern stack, HIS