Acknowledgments

At the end of this project, I would like to express my sincerest thanks to all the people who helped and supported me, thus contributing to making this internship both an enriching and unforgettable experience.

I would like to express my deep gratitude to the entire pedagogical team of l'École Normale Supérieure de l'Enseignement Technique de Mohammedia. Your dedication to education has been a constant source of inspiration throughout these five years of university education.

My thanks go to the members of the jury for their availability and rigor in the evaluation of this work.

I would also like to express my sincere gratitude to Mr. Mohamed-Amine EL KOUCHI for the honor and trust he placed in me by integrating me into the VENG team. Your warm welcome considerably enriched my professional experience.

I am infinitely grateful to my internship supervisors: Mrs. Yamina MAHIED-DINE, Computational Reliability and Durability Team Manager, Mr. Mohamed OUMRI, AI and Data Science Technical Team Leader, and Mrs. Jihane EL SAMRI, VENG Department Project Control Officer. The opportunity to carry out my internship within this prestigious entity has been an immense privilege. Your kindness, sympathy and support have been pillars of my success.

Futhermore, I thank the entire VENG team, particularly **Mr. Hicham ZAIDANE**, who provided me with invaluable help at each stage of the project. Your welcome, the time you dedicated to me, and the daily sharing of your expertise have been invaluable. Your trust allowed me to fully flourish in my missions.

I warmly thank **Prof. Mohammed QBADOU**, head of the Mathematics and Computer Science department at ENSET, and **Prof. Souad AHRIZ**, my head of branch, for their wise advice and valuable guidance.

Finally, I would like to express my gratitude to all the STELLANTIS staff for their warm welcome and constant kindness.

Abstract

As part of this project, we developed a web portal dedicated to managing digital simulation activities at Stellantis. This portal centralizes all operations carried out by both internal teams and subcontractors, thus optimizing activity management and improving communication among stakeholders.

The primary goal was to replace the existing tools, which were deemed inadequate, with a more efficient, modern, and accessible solution. Using the Agile methodology, particularly the Scrum framework, the project was completed in multiple sprints, each introducing new and improved features. Key functionalities of the portal include user management, role and permission assignments, and performance indicators such as On-Time Delivery (OTD) and First Time Right (FTR) metrics.

In addition to the technical aspects of the portal's development, particular attention was given to security and scalability to ensure the system's longevity and its ability to meet the company's growing needs. The project significantly reduced the number of email exchanges and optimized activity management through an intuitive user interface and a robust notification system.

Keywords: Web portal, activity management, digital simulation, Scrum methodology, KPIs, Stellantis.

Résumé

Dans le cadre de ce projet, nous avons développé un portail web destiné à la gestion des activités de simulation numérique chez Stellantis. Ce portail centralise l'ensemble des opérations effectuées par les équipes internes ainsi que les sous-traitants, permettant ainsi une gestion optimisée des activités et une meilleure communication entre les parties prenantes.

L'objectif principal était de remplacer les outils actuels, jugés peu adaptés, par une solution plus efficace, moderne et accessible. Grâce à la méthodologie Agile, et plus spécifiquement à la méthode Scrum, le projet a été mené en plusieurs sprints, chacun apportant des fonctionnalités nouvelles et améliorées. Parmi les fonctionnalités clés du portail, on retrouve la gestion des utilisateurs, des rôles et permissions, ainsi que des indicateurs de performance clés (KPIs) tels que le respect des délais de livraison (OTD) et la qualité des livrables (FTR).

En plus des aspects techniques liés au développement du portail, une attention particulière a été portée à la sécurité et à la scalabilité du système, afin de garantir sa pérennité et sa capacité à répondre aux futurs besoins croissants de l'entreprise. Le projet a permis de réduire considérablement le nombre d'échanges par email et d'optimiser la gestion des activités grâce à une interface utilisateur intuitive et un système de notifications performant.

Mots-clés : Portail web, gestion des activités, simulation numérique, méthode Scrum, KPIs, Stellantis.

List of Abbreviations

ATC Africa Technical Center

BEV Battery Electric Vehicle

CETIEV Centre Technique des Industries des Équipements pour Véhicules

FMI Fournisseur Majeur d'Ingénierie

FTR First Time Right

ICE Internal Combustion Engine

KPI Key Performance Indicator

MHEV Mild Hybrid Electric Vehicle

OTD On-Time Delivery

SCRUM Framework Agile de gestion de projet par itérations

SES Support Expertise and Steering

SI Système d'Information

UEC Unité de Compte Économique

UML Unified Modeling Language

UO Unité d'oeuvre

VENG Virtual Engineering

List of Figures

1.1	Logo of the STELLANTIS group.	8
1.2	STELLANTIS automotive brands.	9
1.3	STELLANTIS technical specifications.	9
1.4	STELLANTIS global distribution.	9
1.5	History of STELLANTIS's establishment in Morocco.	10
1.6	STELLANTIS Africa Technical Center.	11
1.7	ATC organizational chart.	11
1.8	VENG organizational chart.	12
1.9	SIPOC tool used by the SES team	13
2.1	SCRUM Development Model	17
4.1	Sequence Diagram for Domain Management	22
4.2	Sequence Diagram for Authentication	27
4.3	Sequence Diagram for Registration	27
4.4	Authentication Page	28
4.5	Registration Page - Step 1	28
4.6	Registration Page - Step 2	29
4.7	Profile Page	29
4.8	Sequence Diagram for Role and Permission Management	30
4.9	Sequence Diagram for User Management	31
4.10	Interface displaying the list of users	31
	Interface displaying the form for modifying user information	31
	Interface that displays the roles and their permissions	32
	Interface for adding a role and assigning permissions	32
	Sequence diagram for domain management	33
4.15	Interface displaying the list of Uecs and their status and possible actions	
	(add, modify and delete)	34
4.16	Interface displaying the list of Uecs and their status and possible actions	
	(add, modify and delete)	34
	Interface displaying a form for adding a domain	34
4.18	Interface displaying a form for modifying a domain	35
4.19	Interface displaying the list of perimeter specifications and their actions.	35
4.20	Interface displaying the list of companies and their actions	35
	Interface displaying the list of regions and their actions	36
	Interface displaying the list of clients and their actions	36
	Diagramme de séquence pour la gestion des projets	37
4.24	Interface displaying the list of programs and their actions	38

4.25	Interface displaying the list of projects and their actions.	38
4.26	Interface displaying the project addition form.	38
4.27	Interface displaying the list of configurations and their actions	39
4.28	Interface displaying the list of phases and their actions	39
	Interface displaying the list of energies and their actions.	40
4.30	Interface displaying the energy modification form.	40
4.31	Interface displaying the list of types and their actions	40
4.32	Sequence diagram illustrating the process of adding an activity	41
4.33	Sequence diagram illustrating the delivery and quotation processes of a	
	deliverable.	42
4.34	Interface displaying the activity insertion form.	42
4.35	Interface displaying the notification that the relevant people receive	42
4.36	Interface displaying the list of activities with their status, project, and	
	detailed information.	43
4.37	Column Filters - Menu for selecting columns to show or hide	43
4.38	Column Filters - Menu for selecting columns to show or hide	43
4.39	Display filters according to a chosen date.	44
4.40	Filters for each column for display according to choice.	44
4.41	Filters on the number of rows to display.	44
4.42	Flow after applying one of the filters	44
4.43	Activity details page which allows several options	45
4.44	Form that allows adding a delivery	46
4.45	Form allowing modification of deliverable information and its quotation	46
4.46	Form that allows adding a quotation	47
4.47	Form allowing modification of several information (convergence process,	
	quotation).	47
4.48	Unit flow for each activity	47
4.49	Sequence diagram for inserting a capacity	48
4.50	Interface displaying the list of capacities and the total invoices per UEC	
	and per month	49
4.51	Interface displaying a form to insert a capacity by choosing a UEC, a month	
	and a capacity.	49
4.52	Interface allowing modification of capacity information	49
F 1	Dealth and for the house section displaying matrice velocity data deliversity	
5.1	Dashboard for the home section, displaying metrics related to deliveries and costs of activities.	۲1
5.9	and costs of activities	51
5.2	and capacities by UEC.	52
5.3	FTR and OTD Evaluations for FMI and VENG across UECs	$52 \\ 52$
(1.()		14

General Introduction

The automotive industry is undergoing an unprecedented period of transformation, marked by the rapid evolution of technologies, strict environmental regulations, and changing consumer expectations. In this context, companies must adapt by innovating not only in the products they develop but also in their internal processes.

The Stellantis group, born from the merger of PSA and Fiat Chrysler Automobiles (FCA), is part of this transformation dynamic by relying on efficient digital processes. Among these processes, numerical simulation plays a key role in the design, validation, and optimization of vehicles, thus reducing production costs and time while improving product quality.

However, the tools currently used to manage numerical simulation activities, based on email exchanges and Excel files, are showing their limitations in the face of the increasing volume and complexity of projects. It has therefore become crucial to have a more centralized, modern, and efficient solution to optimally manage these activities.

In this context, this project aims to develop a web portal dedicated to managing numerical simulation activities within the Stellantis group. This portal will allow for better coordination between internal teams and subcontractors, optimized activity tracking, as well as a significant improvement in communication and traceability of actions taken.

The objective of this document is to present the context in which this project takes place, the challenges it addresses, as well as the different stages of its execution. We will begin with an analysis of the theoretical and methodological framework followed during the project, before detailing the technical specifications and tools used to design and develop the portal. Finally, we will discuss the results obtained, the prospects for improvement, and the lessons learned from this experience.

Chapter 1

General Context

1.1 Introduction

This chapter opens with an introduction to STELLANTIS, tracing its evolution, global presence, as well as its brands and services. We will then review the main departments and professions within the company, also introducing the work team. Finally, we will present the project as a whole, describing the challenges to be met, the objectives to be achieved, and detailing the timeline for its completion.

1.2 Presentation of the Host Organization



Figure 1.1: Logo of the STELLANTIS group.

1.2.1 STELLANTIS Group: Merger of PSA and FCA

STELLANTIS was born from the merger of PSA and Fiat Chrysler Automobiles (FCA), becoming a major player in the automotive industry despite the challenges of the global health crisis.

• FCA designs, manufactures, and markets vehicles under brands such as Abarth, Alfa Romeo, Chrysler, and Dodge. With nearly 200,000 employees worldwide, FCA has a strong international presence and a diversified portfolio.

• PSA stands out for its innovative automotive experiences and mobility solutions, bringing together five brands and connected services under Free2Move. Its "Push to Pass" strategy focuses on the development of autonomous and connected vehicles.

1.2.2 STELLANTIS Brands

STELLANTIS, with its varied brand portfolio, covers a wide range of automotive needs, from luxury to utility. Present in 30 countries and over 130 markets, the group offers a wide choice to consumers. The figure below shows the main brands of the group.



Figure 1.2: STELLANTIS automotive brands.

1.2.3 STELLANTIS Technical Specifications

Date de création	Fondé le 16 janvier 2021
Chiffre d'affaires	189,5 milliards € (2023)
Siège social	Hoofddorp, Pays-Bas
Président	John Elkan (Président FCA)
Directeur général	Carlos Tavares (PSA)
Effectif	240 000 employés (au monde)
Secteur d'activité	Constructeur Automobile

Figure 1.3: STELLANTIS technical specifications.

1.2.4 Global Presence of STELLANTIS

STELLANTIS is present on five continents with industrial and commercial sites adapted to local markets.



Figure 1.4: STELLANTIS global distribution.

Expanded Europe (EE)

- 48 sites, Fiat, Peugeot, Citroën, Opel, etc.

- 172,500 employees

North America (NA)

- 27 sites, Jeep, Dodge, RAM, Chrysler
- 83,000 employees

South America (SA)

- 13 sites, Jeep, Fiat, Peugeot
- 30,000 employees

China (CHN)

- 9 sites, Peugeot, Citroën, Jeep
- -1,800 employees

Middle East and Africa (MEA)

- 6 sites, Fiat, Peugeot
- -5,800 employees

India-Asia-Pacific (IAP)

- 6 sites, Peugeot, Jeep
- -2,700 employees

STELLANTIS combines local and global to meet needs.

1.2.5 STELLANTIS Presence in Morocco

The STELLANTIS Group is the only manufacturer covering the entire value chain in Morocco and Africa. Its research and development center in Casablanca (ATC), its production and trade plant in Kenitra, and its testing center are the pillars of its presence in Morocco.

For its first significant establishment on the African continent, construction of the STELLANTIS plant in Kenitra began at the beginning of 2017. The plant aims to support the increase in sales in the Middle East and Africa by producing engines and B-and C-segment vehicles for Peugeot, Citroën, DS Automobiles, and Opel.



Figure 1.5: History of STELLANTIS's establishment in Morocco.

1.2.6 Africa Technical Center (ATC)

This section presents the *Africa Technical Center* (ATC) of STELLANTIS, the entity where my internship takes place.

History of the ATC



Figure 1.6: STELLANTIS Africa Technical Center.

In 2018, STELLANTIS opened an automotive design center at Casablanca Nearshore, including an Open Lab and a research and development center called the "Africa Technical Center" (ATC). The center is dedicated to creating the interior and exterior designs of future vehicles that will be manufactured in Morocco. Located in the Shore 22 building in Casablanca, it occupies four floors with a total area of 6,000 m².

ATC Organizational Chart

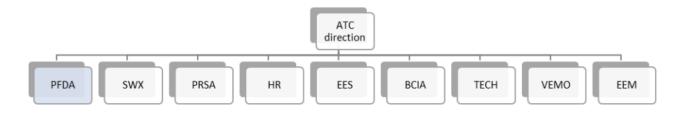


Figure 1.7: ATC organizational chart.

The center is structured into several specialized entities covering different areas of STELLANTIS product development for the DMOA (Middle East and Africa Development) region. The activities are organized around four main areas:

- Vehicle functional architecture.
- Electricity and Electronics.
- Powertrain and Chassis.

• Body, Carriage, and Interior.

VENG Team

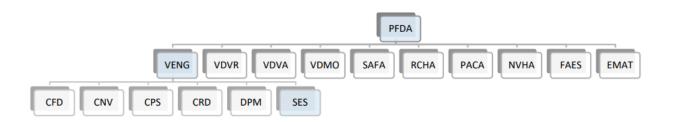


Figure 1.8: VENG organizational chart.

The VENG team provides essential models and numerical simulations for the design of PFDA vehicle projects. Its missions include:

- Leading the creation of models and simulations within deadlines and budgets.
- Reducing simulation time.
- Improving robustness and simplifying trade-offs.
- Creating an effective communication tool.
- Reducing physical testing through digital channels.
- Offering methodological support.

VENG Team Specialties

The specialties are divided into five units:

- **CFD** : Aerodynamics, cabin, and engine thermal.
- **CVN** : Vibrations and noise.
- **CRD** : Endurance and vibration fatigue.
- **CPS** : Crash simulations.
- **DPM** : Digital modeling.

The **SES** team supports these units in terms of digital tools and management.

1.2.7 Overview of the SES Team

This section presents the SES team, in which I completed my internship.

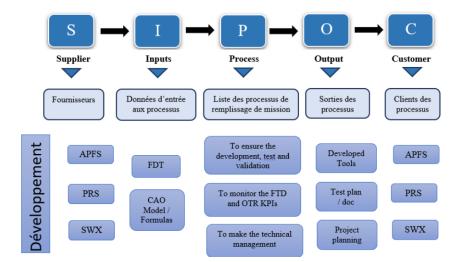


Figure 1.9: SIPOC tool used by the SES team.

SIPOC Tool

The SIPOC tool, which stands for *Supplier*, *Input*, *Process*, *Output*, *Customer*, is a methodology used to model and document a business process in detail, from suppliers to customers. This approach is used to better define the scope of work and facilitate information sharing with collaborators.

The VENG teams, including the SES Data team, regularly use this technique, illustrated in the following diagram:

SES Team Missions

The SES team manages and provides expertise on the SI ESSAIS projects, including:

SI ROULAGE : A system for storing and analyzing data from instrumented vehicle tests. A BIG DATA web portal provides access to data and test results.

Data Science : Development of KPIs and monitoring of data collected in Big Data databases on vehicle fleets, in line with STELLANTIS's business requirements.

APOGEE : Software support, request analysis, incident tracking, and resolution of software-related issues.

1.3 Conclusion

This chapter has introduced STELLANTIS, its global presence, industrial and commercial activities, and the importance of the ATC in Casablanca for innovation. The VENG team has been highlighted for its role in numerical modeling and simulations, and the SES team for its missions and use of SIPOC.

The next chapter will detail my project within the SES team and its stages of implementation.

Chapter 2

Project Framework

2.1 Introduction

In this chapter, we will present the overall framework of the project, outlining both the context in which it is set and the various challenges it addresses. The project consists of implementing an IT solution adapted to the needs of an increasingly complex environment, with the objective of improving the efficiency of activity management processes and communication between stakeholders. We will also detail the management methods adopted to ensure the success of this project.

2.2 Project Context

The project takes place in an environment where the current processes for managing numerical simulation activities have become obsolete. Indeed, Stellantis, and more specifically VENG, rely on work methods based on email exchanges and the extensive use of Excel files. These tools, although somewhat effective for small-scale operations, are no longer suited to the increasing complexity of the numerical simulation operations carried out within VENG, particularly due to the growing number of users and the diversity of subcontractors involved.

The decentralized nature of the tools used creates multiple sources of errors, with a lack of coordination in activity tracking and inefficient communication between teams. This results in delays in project completion and inconsistencies in summary reports. To address these shortcomings, the implementation of a centralized web portal is necessary, capable of managing and monitoring activities in a more structured and collaborative manner. The new system must not only simplify activity management but also enable better traceability and optimization of collaboration between VENG, Stellantis, and the various subcontractors such as Capgemini, MG2, Segula, and Alten.

2.3 Problem Statement

The problem this project addresses is related to the management of numerical simulation activities and the improvement of communication flows between stakeholders. Currently, the lack of centralization and the inefficiency of tools like Excel and emails make activity tracking extremely complex. The information exchanged lacks clarity and uniformity, and the absence of a unified information system undermines the overall performance of project management.

To better understand this problem, we adopted an approach based on the QQOQCP tool, which helps structure the essential questions around project management. This tool is particularly useful for asking fundamental questions about the dimensions of the project (What, Who, Where, When, How, Why) to obtain an overview and address the specific challenges of the project. The following table summarizes the application of this tool to our specific case:

Questions	Sub-questions	Answers
Who?	Who is involved?	VENG teams, Stellantis, subcon-
		tractors (Capgemini, MG2, Seg-
		ula, Alten).
What?	What is it about?	Development of an information
		system (IS) for managing numer-
		ical simulation projects and sum-
		mary reports with Power BI.
Where?	Where will it be used?	Within Stellantis, primarily
		VENG, as well as among partner
		subcontractors.
When?	When does the problem arise?	During the management of nu-
		merical simulation activities,
		which have become too complex
		due to the growing volume of
		activities and the ineffective use
		of current tools, particularly
		Excel and email exchanges.
How?	How is the project being managed?	The project follows an Agile
		methodology with sprint orga-
		nization. Each sprint is dedi-
		cated to a specific feature of the
		portal, and tools such as Gantt
		charts and sequence diagrams are
		used to plan and monitor activity
	W71 1.411	progress.
Why?	Why is this project necessary?	To simplify activity management,
		improve collaboration between
		stakeholders, and reduce ineffi-
		ciencies in communication and
		project tracking.

Table 2.1: Summary of project questions and answers according to the QQOQCP tool

2.4 Project Management and Planning

The management of this project is based on a rigorous and well-structured working methodology, ensuring optimal organization at each stage of the implementation. The adoption of the Agile method, more specifically the SCRUM framework, allows for flexible planning and better adaptation to the constantly evolving needs of the project. Risk management is also considered through tracking tools such as dashboards and Gantt charts, which enable real-time monitoring of various activities and adjustments to planning in response to unforeseen events.

2.4.1 Working Methodology

The SCRUM framework is used to manage the project. SCRUM, which is part of Agile methodologies, promotes an iterative and incremental approach to development, enabling it to meet the changing needs of stakeholders throughout the sprints. This approach allows for continuous improvements, priority adjustments, and the integration of new features while maintaining a high level of user satisfaction.

The SCRUM master, as the facilitator, plays a central role in ensuring the smooth running of the teams, ensuring the proper execution of sprints and resolving any obstacles that may arise. Among the main responsibilities of the SCRUM master are:

- \rightarrow Planning and organizing the sprints;
- \rightarrow Leading the daily SCRUM meetings to track work progress;
- \rightarrow Managing team communication, promoting effective collaboration among members;
- \rightarrow Anticipating and managing risks to optimize collective performance.

2.4.2 Why SCRUM?

SCRUM is particularly suited to this project due to its ability to structure work into short, flexible cycles. This method allows for efficient project management by ensuring that each feature is developed, tested, and validated before moving on to the next one. SCRUM also offers several advantages, such as:

- \rightarrow Flexible priority management, tailored to the changing needs of the project;
- \rightarrow Improved project visibility through tracking tools such as Kanban boards and sprint reports;
- \rightarrow Enhanced communication within teams, fostering collective intelligence;
- \rightarrow Greater responsiveness to unforeseen events, with the ability to quickly readjust planning;
- \rightarrow Time savings through close collaboration among teams and frequent iterations.

The following figure illustrates the SCRUM development model used in this project:

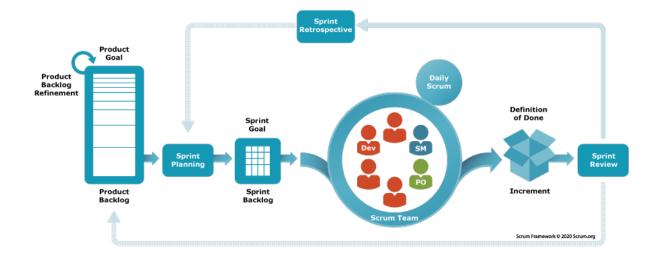


Figure 2.1: SCRUM Development Model

2.5 Conclusion

In conclusion, the project aims to address the numerous challenges related to the decentralized management of numerical simulation activities at VENG and Stellantis. The implementation of a centralized web portal not only simplifies activity management but also improves collaboration between the various project stakeholders. Thanks to the adoption of the Agile methodology, particularly SCRUM, the project benefits from great flexibility and a better capacity to adapt to the changing needs of users.

This methodological framework ensures a clear organization and well-defined step-bystep progression, ensuring that the project's objectives are achieved efficiently and within the given time frame. Regular activity monitoring, coupled with the use of efficient project management tools, ensures smooth task execution and optimal collaboration between teams.

Chapter 3

Project Specifications

3.1 Introduction

This chapter is dedicated to the detailed analysis of the requirements specifications for the VENG web portal. The main objective of this section is to define the expectations in terms of functionalities and technical requirements, so that the final solution is perfectly aligned with the objectives of managing digital simulation activities for Stellantis and VENG. The centralization of data, the streamlining of communication between internal teams and subcontractors, as well as the optimization of cost and deadline convergence processes are the key elements to consider. An in-depth analysis of functional and non-functional requirements is crucial to ensure that the final product is both robust, performant, and capable of meeting the long-term expectations of users.

3.2 Specifications of Requirements

3.2.1 Objectives

The main goal of the project is to implement a centralized platform that will allow for more efficient management of digital simulation activities carried out by VENG. Currently, these activities are scattered across multiple tools, including emails and Excel sheets, leading to coordination and tracking issues. The web portal should therefore provide a single interface where all stakeholders can interact, submit, and monitor their activities in real time, while facilitating the convergence of deadlines and costs.

The sub-objectives associated with this project include the following elements:

- **Improve visibility**: The tool should offer a clear and consolidated view of workload forecasts and deadlines for each project.
- Automation of communications: The system should reduce the need for email exchanges by automating notifications and communications with subcontractors through optimized workflows.
- **Real-time activity tracking**: Each user, whether a subcontractor or internal team, should be able to track in real time the progress of tasks and assigned activities.

• Optimization of KPIs (OTD, FTR): The tool should allow for precise tracking of key performance indicators, such as On-Time Delivery (OTD) and First Time Right (FTR), to improve the quality of deliveries and adherence to deadlines.

3.2.2 Functional Requirements Specifications

Functional requirements are the core of the project in terms of what the portal must enable users to accomplish. Below is a description of the main expected features:

- 1. Authentication and rights management: The portal must integrate a secure login system based on Stellantis accounts, with role management that differentiates administrators, managers, and subcontractors. Each user must have specific access rights according to their role, ensuring data security and a clear distribution of responsibilities.
- 2. **Recording and tracking activities**: Users must be able to record and track their digital simulation activities directly through the portal. This includes entering key information such as forecasted costs, material or human resource needs, as well as the start and end dates of the simulations. A real-time tracking dashboard must be available to provide an overview of activities.
- 3. Activity convergence: A specific feature must be implemented to facilitate the convergence between the agreed costs and deadlines between Stellantis and subcontractors. This process includes the validation or negotiation of initial forecasts.
- 4. **Deliverable management**: The portal must allow subcontractors to deliver final or intermediate reports of their simulations directly via the interface. Stellantis teams must be able to validate or reject these deliverables, with comments to ensure precise feedback.
- 5. **KPI tracking**: The system must automatically calculate key KPIs related to simulation performance, such as on-time delivery (OTD) and delivery quality (FTR). These indicators should be displayed in a visual dashboard for quick consultation.
- 6. **Cost management and invoicing**: The portal must include a cost management module, allowing tracking of expenses associated with simulation activities. A monthly summary of costs per project or subcontractor should be automatically generated, with validation and adjustment options by managers.

3.2.3 Non-Functional Requirements Specifications

Non-functional requirements are equally crucial to ensure that the web portal is performant, secure, and sustainable. They concern the technical aspects that will ensure a smooth and reliable user experience.

1. **Performance**: The portal must be able to handle a large volume of data and users without loss of responsiveness. Page and dashboard load times should be optimized to ensure smooth use, even during peak activity periods.

- 2. Security: Special attention must be given to the security of sensitive data exchanged on the portal. This includes multifactor authentication, encryption of data in transit and at rest, as well as regular audits to detect potential vulnerabilities.
- 3. Scalability: The portal must be designed to easily scale based on the growing number of users, activities, and subcontractors. The database, servers, and system architecture must be dimensioned to support this growth.
- 4. Accessibility: The portal must be compatible with major web browsers and comply with accessibility standards (WCAG) to ensure use by all users, including those with visual or motor disabilities.
- 5. Availability: A high availability rate is required to ensure that users can access the portal at any time, with minimal tolerance for downtime. Redundancy and backup mechanisms must be in place to ensure this availability.

3.3 The Product Backlog

The product backlog represents the list of tasks and features to be developed during the sprints. Each sprint is a development iteration where we focus on a specific set of features. The backlog allows us to plan the work to be done and to track the progress of the project.

Sprint	Feature	Description
Sprint 0	Setting up the environment	Configuration of design and develop-
		ment tools, setting up the necessary
		hardware and software environment.
Sprint 1	Authentication and profile management	Implementation of the authentication
		system and user account management.
Sprint 2	User and permission management	Implementation of roles and permis-
		sions for different types of users
		(administrators, managers, subcon-
		tractors).
Sprint 3	Management of UECs, domains and clients	Management of UECs (Client Team
		Units), skill domains, scope specifica-
		tions and clients.
Sprint 4	Program and project management	Monitoring of programs, projects,
		technical configurations, development
		phases, energy types and other associ-
		ated elements.
Sprint 5	Activity and notification management	Monitoring of digital simulation activi-
		ties, implementation of the notification
		system to inform stakeholders.
Sprint 6	Capacity and billing management	Implementation of simulation capacity
		management and billing processes.

Here is a summary of the main sprints with their respective features:

Table 3.1: Product backlog with associated sprints and features

3.4 Conclusion

The functional and non-functional requirements specifications defined in this chapter are essential to ensure that the VENG web portal meets the expectations of end users. The features cover critical aspects such as authentication, activity management, and key performance indicator monitoring. In parallel, the technical requirements ensure that the system will be efficient, secure, scalable and accessible.

These specifications will serve as a basis for the next design and development phases, ensuring that the final solution aligns perfectly with the operational objectives of the project and that it can evolve according to future needs.

Chapter 4

Conceptualization and Development

4.1 Introduction

This chapter presents the technical architecture and the tools used for the development of the VENG web portal. The Agile Scrum methodology is at the heart of the process, allowing flexible and reactive project management thanks to rapid iterations. This chapter is divided into several sections, each describing the steps of setting up the work and development environment, as well as the techniques employed.

4.2 Global Class Diagram

This class diagram represents the basic structure of the project, defining the different entities and their interaction within the system. Each activity, user, and subcontractor is modeled as a class with specific attributes and associated methods.

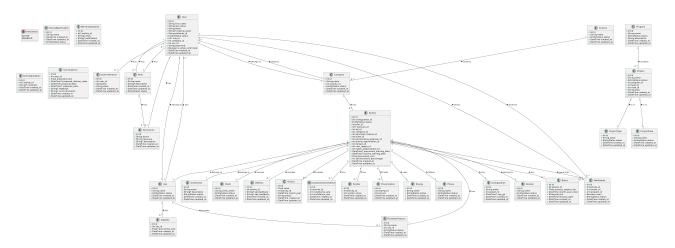


Figure 4.1: Sequence Diagram for Domain Management

4.3 Sprint 0: Setting up the Technical Environment

4.3.1 Design Tools

To ensure effective project management and an effective architecture, several tools were chosen.

Jira for Agile Scrum

👎 Jira

Jira is the central tool for managing the project using the agile Scrum method. Each sprint, task, and user story is tracked via Jira, allowing clear visibility on project progress, obstacles, and priorities. Jira also facilitates backlog management, task assignment, and bug tracking, while ensuring fluid communication between team members.

UML Language



The use of the UML (Unified Modeling Language) allows formalizing the different parts of the project through class, activity, and sequence diagrams. UML helps to model the system architecture by making relationships and processes clearer before the actual coding.

Instagantt for Timeline

😑 Instagantt

Instagant is used to visualize project timelines, organize tasks according to sprints, and ensure deadlines are met. It allows planning each iteration and monitoring progress in real time. This tool helps anticipate delays and adjust priorities if necessary.

Communication using Microsoft Teams



For continuous and effective communication, the team uses Microsoft Teams. Whether for quick discussions, daily Scrum meetings, or file sharing, Teams centralizes all exchanges.

4.3.2 Development Tools

To guarantee the performance and modularity of the portal, a modern and efficient technology stack was chosen.

TypeScript



Project development is carried out in TypeScript, a superset of JavaScript that adds static typing. TypeScript offers significant advantages in terms of error management and code readability, while facilitating the development of complex and scalable applications.

Node.js



Node.js is used to manage the portal's backend server. Thanks to its ability to handle a large number of simultaneous connections and its speed, Node.js allows building a high-performance and scalable API, essential for a project of this scale.

Next.js

NEXT.Js

Next.js is the chosen framework for the application. In addition to offering server-side rendering (SSR) to optimize SEO and performance, Next.js facilitates route management and API integration. This allows creating a smooth user experience while optimizing page load time.

React.js

React

React.js is the JavaScript framework used to create the user interface components. It allows for rapid and modular development, with efficient management of the application state and dynamic updating of views based on user interactions.

TailwindCSS

< tailwindcss

TailwindCSS is the CSS style library used for the portal design. It allows creating modern and responsive interfaces while facilitating the maintenance and evolution of the design. Its utility-first approach reduces the number of custom CSS classes, making the code cleaner and easier to maintain.

PostgreSQL

PostgreSQL is the chosen database to store all portal data, including activities, users, and KPIs. PostgreSQL is recognized for its reliability, robustness, and adaptability to the growing needs of a large-scale project.

Prisma



Prisma is used as an ORM (Object-Relational Mapping) to facilitate the management of the PostgreSQL database. It simplifies SQL queries while ensuring efficient management of relationships between tables, making the backend code cleaner and more maintainable.

ShadCN/UI (UI component library)

// shadcn/ui

ShadCN/UI is a UI component library that simplifies the development of complex interfaces. It allows quickly creating consistent user interfaces while ensuring a high-quality user experience thanks to reusable components.

Nginx (Reverse proxy + caching)

NGIИX

Nginx is used as a reverse proxy server and for caching. Since the application runs only on the company's internal network, Nginx ensures the security of connections, optimizes performance, which improves the portal's processing capacity.



TanStack Table is used to display activities in complex tables containing more than 30 columns and thousands of rows. This tool is chosen for its optimal performance and its ability to handle large amounts of data while offering an excellent user experience.

4.3.3 Techniques Used

The project is developed following an **agile methodology** based on development **sprints**. Each sprint lasts approximately two weeks and includes several phases, including planning, development, validation, and review.

The Scrum method is adopted with well-defined ceremonies:

- **Sprint planning**: At the beginning of each sprint, the team defines the objectives to be achieved based on the backlog priorities.
- **Daily Stand-up**: Every day, the team meets briefly to discuss progress, roadblocks, and next steps.
- **Sprint review**: At the end of the sprint, the team presents the completed work, allowing for feedback and ensuring that the deliverables meet expectations.
- **Sprint retrospective**: The team reviews internal processes to identify areas for improvement.

This iterative approach allows adapting to the changing needs of the project, integrating user feedback continuously, and ensuring rapid delivery of critical functionalities.

4.4 Sprint 1: Authentication, Registration and Profile Management

4.4.1 Objective

The main objective of this sprint is to set up an authentication and user profile management system, guaranteeing the security and integrity of user data. As the portal is exclusively accessible via the Stellantis internal network, the authentication system relies on Stellantis credentials (**ID** and **password**). Users must be able to register, log in, and manage their personal profile.

The key features to be developed during this sprint are:

- Secure authentication.
- Session management with **cookies** for secure login persistence, preventing malicious scripts from accessing them with XSS attacks. The token stored in the cookie is used to authenticate subsequent requests, thus ensuring session persistence.
- Secure password management with a robust hashing algorithm which is **Bcrypt**. This mechanism ensures that even in the event of a data leak, passwords remain protected.

4.4.2 Sequence Diagram

Authentication

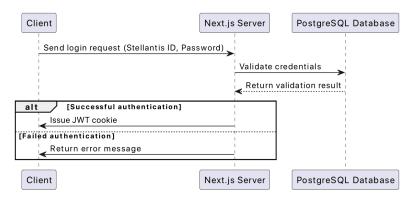


Figure 4.2: Sequence Diagram for Authentication

Registration



Figure 4.3: Sequence Diagram for Registration

4.4.3 Implementation

For the implementation of authentication, we opted for a custom authentication system based on the fact that users log in using their **Stellantis ID** and password. During login, the server verifies the authenticity of the information.

Here are some of the main aspects of the implementation:

- CRUD for profile management: Users can:
 - Create their account via the registration process.
 - **Read** and view their profile information.
 - Update certain information such as their first name, last name, and password.

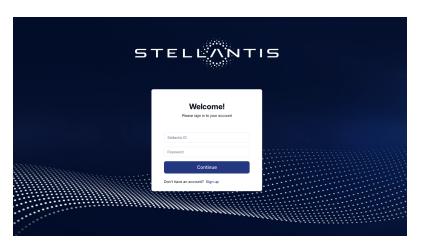


Figure 4.4: Authentication Page



Figure 4.5: Registration Page - Step 1



Figure 4.6: Registration Page - Step 2

STELLANTIS		📮 🛛 Admin Demo 🗠
5≣ Activities		
Projects		
Programs	AD	
Invoices		
A Users		
⑦ Roles	Profile Information	0
Companies	First Name Last Name	
III Activity Specifications	Admin Demo	
🖨 UECs	Password	
A Clients	*****	
Perimeter Features	Email	
Domains	admin@stellantis.com	
	Stellantis ID	
	SF11111	
	Role UEC	
	Admin DSMA	
	Company	
	Stellantis VENG MO	
« Collapse		

Figure 4.7: Profile Page

4.5 Sprint 2: User Management, Role Management and Permissions

4.5.1 Objective

The objective of this sprint is to develop an interface dedicated to administrators to facilitate the management of users and roles within the platform, as well as the precise allocation of permissions associated with each role. These features offer detailed and personalized control over the access and actions that each user can perform, whether in terms of viewing, creating, modifying, or deleting data. This allows administrators to define specific rights for each user, based on their role and responsibilities within the system.

4.5.2 Sequence Diagram

Sequence Diagram - Role Management

The role diagram illustrates the process of adding and updating roles as well as assigning permissions. The administrator first views the list of existing roles, then can add a new role via a form, defining the desired permissions. They can also modify an existing role to adjust permissions. All modifications are then saved in the database.

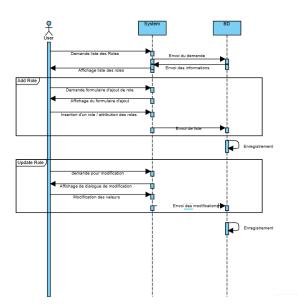


Figure 4.8: Sequence Diagram for Role and Permission Management

Sequence Diagram - User Management

The user diagram shows the user management process, including displaying the list of users, modifying their information, and assigning roles and permissions. The administrator modifies the user's details via a form, then the changes are saved in the database, ensuring that access and information are updated.

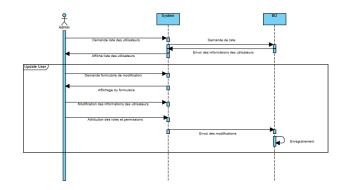


Figure 4.9: Sequence Diagram for User Management

4.5.3 Implementation

User Management

User management allows administrators to control access and actions on the platform. The interface displays details such as the ID, name, email, role, UEC, and approval status of each user. By clicking on *Edit*, the administrator can modify the information and assign roles, which displays the associated permissions. It is also possible to add specific permissions. The administrator can approve logins with *User Approved* or disable an account with *Disable*.

age the u	sers and their ro	vles & permissions.							
			Search						
	First Name	Last Name	Email	Role	UEC	Company	User Approved?	Account Status	Actions
F33333	Htt	Henten	hh@gmail.com	externe	DSMA	Alten	~	ACTIVE	Disable
22222	ауа	Aya	aya@gmail.com	Manager RUEC	DSMA	Stelantis VENG MO	~	ACTIVE	Disable
F11681	Chris	Heaney	Quinn_Powlowski21@hotmail.com	SPE	АТНА	Stellantis VENG MO	× 🛩	ACTIVE	Disable
F97534	Johnson	Quitzon	Adele_Sawayn91@gmail.com	PCO	АТНА	Segula TU	× 🛷	ACTIVE	Disable
F55321	Agustina	Zboncak	Brendan Hackett§hotmail.com	Other/visitor	MTDWA	Stellantis VENG MO	× 🛷	ACTIVE	Disable
F78394	Arne	Kemmer	Trystan Gislason Bhotmail.com	externe	NVHA	Stellantis VENG WE	× 🛷	ACTIVE	Disable
F47507	Gerson	Kassulke-O'Kon	Mylene.Bode19@gmail.com	Manager RUEC	NVHA	Stellantis VENG WE	× 🛷	ACTIVE	Disable
F24851	Santa	Torp	Julian.Wintheiser54@gmail.com	Manager RUEC	DSMA	Segula TU	× 🛷	ACTIVE	Disatle

Figure 4.10: Interface displaying the list of users.

	Stellantis ID		Role			-			
	SF33333		extene		0				
	First name		Q Bearch	h role					
	н		✓ extend	,					
	Email		BEX				ING MO		
	ht@gmail.com			ger RUEC					
	Company		Manag Other/	ger RUEM			NG MO		
	Alten		Admin						
	Permissions		interne						
	Resource	read	update	create	delete				
	Activities	52	8	2	8		ENG MO		
	Companies	53		2			ING WE		
	Uecs								
	Perimeter Features						NG WE		
	Clients								
	Domains								

Figure 4.11: Interface displaying the form for modifying user information.

Role and Permission Management

Role management displays existing roles and their associated permissions, which can be modified or deleted by the administrator. When adding a role, the administrator defines the permissions, allowing actions such as viewing, creating, updating or deleting data. Specific permissions can also be assigned or removed from users.

Permission Functionality

Permissions control user access to sections of the application (activities, companies, clients, etc.), according to authorized actions. This ensures that each user only accesses functionalities corresponding to their permissions, ensuring secure data management.

Role	Description	Permissions	Members	+ Add Role
extene		update on activities delete on activities read on companies	8	Edit Role Dek
BEX		read on perimoter features counts on perimoter features road on clients create on clients update on invokes	6	Edit Role Del
Manager RUEC	responsable de unite	read on activities create on activities update on activities delete on activities read on companies create on companies update on companies delete en companies read on uncs	7	Edit Role Dek
Manager RUEM		read on activities create on activities update on activities	6	Edit Role Dek
Other/visitor		read on activities	8	Edit Role Dek
		mad or scholar, is care on scholar, updat an scholar, dante an scholar, mad en scholar, mad en scholar, and en updat en ensemble delta en compani, mad scholar, gelate a present. Makt et moss matte on printere deltate un company and printere printere scholar and printere deltate rester an et delta ensemble deltate scholar. Tereform hannen i cente enderen scholar and ensemble rester an et deltate scholar. Scholar and etter and ensemble cente and enderen scholar and ensemble deltate an eteremisti anti-scholar.		
Admin		create en projects update on projects delete en projects read on roles create on roles update on roles	1	

Figure 4.12: Interface that displays the roles and their permissions.

Roles Manage the different roles and their associated details						
		d new role ate new role. Click save when you're done.	×		+ 40	1 Role
	Permissions Role	a Name				
	update on activitie	deme				
BEX		cription				
		missions spdato on activities × delete on activities × > read on companies × create on companies ×				
		updata on companies *				
	cr		Î			
	read on activities of re- update on companies or read on particular frame create on clients or delete on domains readonate	mente un companie reate on ueos pdate on ueos defer on ueos aud on partimetan-features maio en partimetan-features	update on sec astures (delo reste on density ms) (delete or			

Figure 4.13: Interface for adding a role and assigning permissions.

4.5.4 Conclusion

This user, role, and permission management functionality allows structuring access and actions within the application in a flexible and secure manner. Administrators can effectively manage user accounts while precisely controlling access rights via roles and permissions. This ensures that each user only has the necessary access for their functions, while guaranteeing data protection.

4.6 Sprint 3: Management of UECs, Domains, Perimeter Specifications, Subcontracting Companies, Regions, and Clients

4.6.1 Objective

The objective of this sprint is to develop an intuitive interface for the centralized management of UECs, domains, perimeter specifications, subcontractors, regions and clients of Stellantis. Each feature aims to offer a fluid experience and rigorous organization of entities. This solution allows consulting, adding, modifying or deleting these entities while guaranteeing data consistency throughout the system.

4.6.2 Sequence Diagram

The sequence diagram below shows the interactions between the user, the system, and the database during domain management. Available operations include requesting the list of domains, adding, deleting and updating domain information.

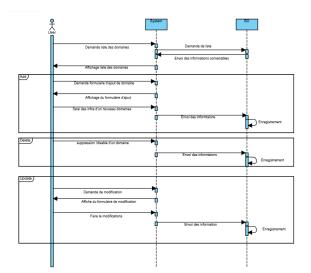


Figure 4.14: Sequence diagram for domain management

4.6.3 Implementation

In this section, we present the implemented interfaces and functionalities to manage the different entities, such as UECs, domains, perimeters, companies, regions and clients.

UEC Management

The UEC management interface allows the user to **view**, **add**, **modify** and **delete** UECs. Each UEC is associated with specific domains in which it operates. This interface ensures organized UEC management by providing clear information on their activities and their role within Stellantis.

UECs				+ Add U
ID	Nom	Status	Actions	
1	DSMA	ACTIVE	a 🙃	
2	DMOA	ACTIVE	8 0	
3	SAFA	ACTIVE	a C	
4	ATHA	ACTIVE	8 0	
5	NVHA	ACTIVE	a C	
6	MTDWA	ACTIVE	8 0	

Figure 4.15: Interface displaying the list of Uecs and their status and possible actions (add, modify and delete)

Domain Management

Domains represent the main fields of activity of UECs. The domain management interface allows the user to easily manipulate them. They can **add** new domains to reflect the evolution of Stellantis' activities, **update** information to keep it relevant, and **deactivate** certain domains while retaining historical data, without definitive deletion.

domains and their statuses.		+ Add Domein
Domain Name	Domein Status	Actions
Chassis	ACTIVE	D D Disable
OPTIM	ACTIVE	D D Disable
Multibody	ACTIVE	D D Duade
Model Building	ACTION	D D Duadde
CPD	ACTIVE	D D Duadde
Safety	ACTIVE	D D Duadde
NVH	ACTIVE	D D Duadde
DSM	ACTIVE	St 🗊 Daabie

Figure 4.16: Interface displaying the list of Uecs and their status and possible actions (add, modify and delete)

fomains lange domains and their statuse						
					+ Add Donain	
				0 8		
	ĺ	Add New Domain Drive the name of the new domain.	×	8		
	w.			8 8		
	ulding	Add Donair	Careel	8		
		(ACTIVE)		8		
				88		
				8		
				2 3		

Figure 4.17: Interface displaying a form for adding a domain

Perimeter Specifications Management

Perimeter specifications, or *perimeter features*, are sub-domains defining the specific activities of UECs at Stellantis. The management interface allows adding new specifications, **modifying** existing specifications as needed, or **deactivating** those that have become obsolete. This granular management ensures a clear distribution of tasks within the UECs.

			+ Add Donaid	
		9.0		
Edit Domain Update the domain name.	×			
Change		9		
Update Domain	Server			
		9		
		9		

Figure 4.18: Interface displaying a form for modifying a domain

Perimeter Feature		tatuses.					
		Search					+ Add Perkneter Feature
	Name		uec	Status	Actions		
	Modeling NVH		OMOA	ACTIVE	Ø	8	Disable
	Modeling Crast	h	DMDA	ACTIVE	e	9	Disable
	NO		NORA	ACTIVE	ø	8	Dispble
	Occupant		SAFA	ACTIVE	Ø	Ð	Disatre
	Thermal Protec	tion	АТНА	ACTIVE	e	B	Disable
	Thermal Comfo	art.	ATHA	ACTIVE	e	8	Disable
	Water Manager	ment	ATHA	ACTIVE	ø	8	Disable
	Bumper		SAFA	ACTIVE	Ø	Ð	Disable

Figure 4.19: Interface displaying the list of perimeter specifications and their actions.

Subcontracting Companies Management

Subcontracting companies are **strategic partners** with whom Stellantis collaborates. Each company is associated with a country. The interface allows **managing these com-panies**, from their creation to their modification, including deactivation. This management ensures effective collaboration between Stellantis and its subcontractors.

ompanies anage companies ar	nd their statuses.			
	Search			+ Add Company
	Company Name	Country	Company Status	Actions
	Capgemini MO	мо	ACTIVE	Dicoble
	Stellantis VENG WE	WE	ACTIVE	Disable
	Segula MO	MD	ACTIVE	Disable
	Alten	мо	ACTIVE	Disoble
	Stellarris VENG MO	мо	ACTIVE	Disable Disable
	MG2	мо	ACTIVE	Disoble
	Segula TU	ти	ACTIVE	Disable

Figure 4.20: Interface displaying the list of companies and their actions.

Region Management

Regions allow structuring UECs and companies geographically. The region management interface offers the possibility to **create**, **modify** and **deactivate** regions according to Stellantis' activities and work areas. This geographical organization facilitates the management of international operations.

	Search				+ Add Region
Region Name		Regions status	Actions		
ти		ACTIVE	Ľ	₿	Disable
мо		ACTIVE	Ľ	•	Disable
China		ACTIVE	Ø	8	Disable
ир		ACTIVE	Ø	8	Disable
SE		ACTIVE	Ľ	Û	Disable
NA		ACTIVE	e	Ð	Disable
SA		ACTIVE	Ø	٥	Disable

Figure 4.21: Interface displaying the list of regions and their actions.

Client Management

The client management interface allows Stellantis to **view** and **manage** customer relationships. It offers options to **add**, **modify** and **deactivate** clients while preserving the integrity of data related to past collaborations. This management contributes to improving Stellantis' strategic relationships with its clients.

nage clients and the	r statuses.	Search					+ Add Client
	Client Name		Client Status	,	ctions		
	VDVV		ACTIVE		ର	Û	Disable
	EMAT/THER/TAQC		ACTIVE		Ø	8	Disable
	EMAT/AERO		ACTIVE		ନ	8	Disable
	SAF		ACTIVE		ନ୍ଧ	8	Disable
	NVH		ACTIVE		Ø	8	Disable
	BCI/BODY		ACTIVE		ନ୍ତ	8	Disable

Figure 4.22: Interface displaying the list of clients and their actions.

4.6.4 Conclusion

This sprint allowed implementing a centralized and intuitive management of UECs, domains, perimeters, subcontracting companies, regions, and clients. These functionalities reinforce Stellantis' operational efficiency by facilitating the management of entities with which the company collaborates.

4.7 Sprint 4: Management of Programs, Projects, Configurations, Phases, Energies, Types and Cases

4.7.1 Objective

The objective of this sprint is to develop a complete and intuitive module for the management of programs and projects, as well as related elements such as configurations, phases, energies, types and cases. This module aims to centralize the management of these entities and facilitate the addition, modification and deletion of projects and their associated attributes.

4.7.2 Sequence Diagram

The sequence diagram below illustrates the interactions between the user, the system, and the database during project management. Available operations include consulting the list of projects, adding a new project, and updating the information of an existing project.

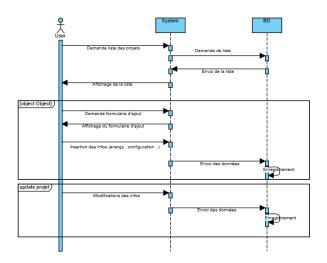


Figure 4.23: Diagramme de séquence pour la gestion des projets

4.7.3 Implementation

This section describes the interfaces for managing programs, projects, configurations, phases, energies, types and cases.

Program Management

The interface allows to **view**, **add**, **modify**, and **delete** programs, each program grouping several projects. The user can consult, add, modify or delete programs via a form. This organized management facilitates the monitoring of projects related to each program.

Programs		Search	+ Add Program			
ID	Program Name	Description	Status	Actions		
1	CUESCQD	Sequi templum synagoga coepi usus antepono arceo commodi sapiente.	ACTIVE	8		
2	WD05QFP	Eos timidus patruus unus.	ACTIVE	8		
3	P004LLL	Tabella suscipio quia deporto ustilo adstriingo colligo abutor cupio.	ACTIVE	9		
4	NV81UVP	Adfero cubicularis amita approbo talus tondeo considero competio.	ACTIVE	9		
5	DQ13WJI	Adhicto creptio testimonium dens.	ACTIVE	9 0		
6	JP57RXN	Alloqui speculum cedo trucido spiculum taedium capillus uberrime placeat.	ACTIVE	9 0		
7	DW18UGG	Stips ater crebro sortitus.	ACTIVE	a 💼		

Figure 4.24: Interface displaying the list of programs and their actions.

Project Management

delete programs as needed. This feature ensures organized program management, facilitating the monitoring of different projects attached to each program.

Projects	Projects					_		
		Search		+ Add Project				
Projects	ID	Project Name	Program Name	EOTP	Туре	Case	Status	Actions
Configurations	1	Generic Concrete Car	ULSSOVC	ZD25WQL	Top hat	Program launcher	ACTIVE	ନ ତ
Configurations	2	Unbranded Frozen Bacon	JP67RXN	VB3BCFW	Pattern	Reskin	ACTIVE	8 0
Phases + Add Phase III View List Phases	3	Electronic Frozen Pants	QR59IDF	JM97GAD	Pattern	Program Isuncher	ACTIVE	0
Energies	4	Ergonomic Concrete Bacon	DWIEUGG	OR04YHO	Battern	(Program launcher)	ACTIVE	8 0
+ Add Energy 🗈 View List Energies	5	Handmade Concrete Chair	FT77QIF	0Y75XQD	Top hat	Reskin	ACTIVE	8 0
Cases	6	Electronic Frozen Tuna	FT27QIF	0167.04	Top hat	Program launcher	ACTIVE	8 0
+ Add Case 🗄 View List cases	7	Refined Metal Shoes	C\$37POH	DOBULNT	Platform	Program launcher	ACTIVE	9 0

Figure 4.25: Interface displaying the list of projects and their actions.

The project management interface allows to **view**, **add**, **modify**, and **delete** projects. When adding, the user selects a program, as well as attributes such as EOTP, type, and case to classify the project.

A form allows entering the required information: project name, associated program, EOTP, type, and case, guaranteeing consistent input. This organized management of programs facilitates the monitoring of related projects.

Projects	Projects						
Projects		Add new project Create a new project. Click save when you're done.	×			+ Add Project	
		Project Name	DTP				
Configurations		Project rearra	025W0	L Tephot	Program launcher		
		Program Select a Program V	BBBCFV	Badam	Reskin		
Phases		EOTP	MOTGAE	Bidam	Program laurebur		
+ Add Phase		Type Select a Type 🛩					
Energies		Case Select a Case 🗸 🗸	R04YHC	D Hadam	(hugun laircher)		
+ Add Energy 🗄 View Ust Energies	5	Create Project	¥75XQD	Tephat	Bastin		
		Electronic Frozen Tuna F17706	OY67.IVE	Tophit	Program launchar		

Figure 4.26: Interface displaying the project addition form.

Configuration Management

Configurations represent sets of parameters related to projects. The interface allows to **view**, **add**, **modify** and **delete** configurations associated with projects. Each configuration is identified by a unique name and is linked to a specific project.

Projects	Configur	search		+ Add Co	onfiguration
Projects	ID	Configuration Name	Project Name	CAE GO	Actions
Configurations	1	North America	Gorgeous Frozen Computer	2024-10-22	Ø 🖸
Configurations	2	GEM S-SR Child- mecha	Electronic Frozen Tuna	2024-08-06	Ø 🖸
Phases + Add Phase View List Phases	3	B-CROSS	Unbranded Frozen Bacon	2024-10-05	<mark>۵</mark>
Energies	4	North America	Gorgeous Frozen Computer	2024-12-02	۵ <u>۵</u>
+ Add Energy	5	North America	Refined Metal Shoes	2024-07-12	໑ 🖸
Cases + Add Case 🗄 View Ust cases	6	B-CROSS	Refined Metal Shoes	2024-05-07	Ø 0
+ AUD Case	7	GEM S-SR Child- mecha	Unbranded Frozen Bacon	2024-04-11	2 0

Figure 4.27: Interface displaying the list of configurations and their actions.

Phase Management

Phases represent the stages of a project. This interface allows to **manage phases** by offering options to **add**, **modify**, and **delete** phases. These phases are essential to track the progress of a project over time.

anagement List nage (Projects, Configurations, Phases, Energies,	Case, Type) and their associated details.				
Projects	Configurations Search		+ Add Con	guration	
	ID Configuration Name	Project Name	CAE CO	Actions	
Configurations	Add new Phase Create a new phase. Click save when yo	× u're dane. Frozen Computer			
Phases	2 Phase Name	Frozen Tuna			
+ Add Phase 🗄 Wew List Phases	3 Create Phase	d Frozen Bacon			
Energies + Add Energy 🗇 View List Energies	5 North America	Frazen Computer			
Cases					
+ Add Case					
Types					

Figure 4.28: Interface displaying the list of phases and their actions.

Case Management

Cases are specific scenarios or use cases of a project. This interface allows to **manage these cases**, offering options to **add**, **modify**, and **delete** cases according to the needs of the projects.

Energy Management

Energies represent the types of energy associated with a project (e.g., BEV, ICE, MHEV, etc.). The energy management interface allows the user to **add**, **modify** and **delete** energy types.

Projects	Configurat	ions				
		(Search			+ Add Co	nfiguration
	List of I	Energy				
Configurations	ID	Energy Name	Actions	Computer		
Configurations	1	BEV	۵ ۵			
	2	ICE	0	Tura		
+ Add Phase 🗄 View Ust Phases		NOL.		Bacon		
	3	MHEV	٥ ھ			
Energies				Computer		
+ Add Energy 🗄 View List Energies		North America	PARTY	eu maia an óes		
Cases						
+ Add Case 🔠 View List cases						

Figure 4.29: Interface displaying the list of energies and their actions.



Figure 4.30: Interface displaying the energy modification form.

Type Management

Types are specific categories assigned to projects. The user can **add**, **modify** and **delete** types through a dedicated interface.

ojects	List of	Types		\otimes	+ Add Co	
		Phase Name	Actions	÷	CAE GO	Actions
figurations	1	SYNC1	2 0	Computer		
nRgurations	2	SYNC2	a 0	Turo		
	3	SYNC3	9 0	Baton		
dd Phase 🕀 View List Phases	4	SYNC4	2 0	Computer		
idd Energy	s	SYNC5	a 🖸			
505		8-CROSS		Refined Metal Shoes		
Add Case 🗄 View List cases						

Figure 4.31: Interface displaying the list of types and their actions.

4.7.4 Conclusion

This sprint allowed the implementation of a centralized management of programs, projects and their associated attributes (configurations, phases, energies, types, and boxes). This management is essential to ensure organized and detailed monitoring of projects, by facilitating the addition, modification, and deletion of each element. Thanks to this complete interface, users can efficiently manage their projects and programs, while ensuring data consistency across all associated entities.

4.8 Sprint 5: Management of Activities, Their Flows, and Notifications

4.8.1 Objective

The objective of this sprint is to implement efficient management of activities, from their creation to their delivery, with notifications, KPIs such as FTR (First Time Right) and OTD (On-Time Delivery), as well as flow management. This system improves coordination between teams, ensures traceability of actions, and offers a clear visualization of progress via dashboards.

4.8.2 Sequence Diagram

This sprint is illustrated by several sequence diagrams showing the information flow between the actors (internal and external), the system and the database. These diagrams detail the processes of adding activities, managing convergence statuses, delivery and quotation.

Adding an Activity and Convergence Process

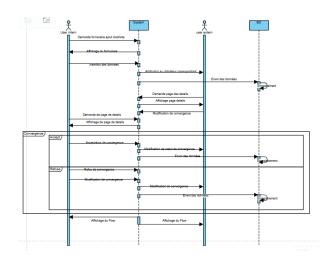


Figure 4.32: Sequence diagram illustrating the process of adding an activity

The sequence diagram above shows the process of adding an activity by an internal or external user. The activity is automatically assigned based on the area of expertise. For an internal activity, the status changes to *Converged*, while an external activity changes to *Waiting for FMI Feedback*, initiating a validation process with stakeholders.

Activity Delivery and Quotation

The second diagram describes the process of delivering an activity, its monitoring, and the quotation by Stellantis. After validation, the FTR KPI measures the quality of the deliverable and the OTD verifies compliance with deadlines. These KPIs are essential for evaluating the performance of deliveries.

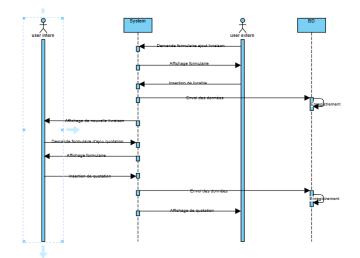


Figure 4.33: Sequence diagram illustrating the delivery and quotation processes of a deliverable.

4.8.3 Implementation

This sprint resulted in an intuitive interface for activity management, including components to track the complete life cycle of activities, from creation to delivery.

Adding an Activity

Adding an activity is done via a form where the user specifies the project, phase, energy, configuration, responsible region, and type of activity (internal or external). The people in charge are also selected. Once created, a notification is sent to the relevant users. The start dates can be calculated automatically via the CAE GO and GAP fields, but remain modifiable.

Worldwide information activities		Staffing					
CAE activities:	Activity specification:	SPL/CPL:					
	Select ActivitySpecification	Select SPL/CPL					
Project:		SPE: Q. Bearch SPL/CPL					
Select project		Select SPE Admin Demo	۰ ا				
Phase:	Energy:	Perimeter Fea Martin Zieme					
Select phase	Select energy	Select Perime Damian Bins	0				
Configuration:	Domain:	Performance Greta Schultz					
Select configuration	Select domain	Select perform Hertha Cormier	•				
Region responsability:	Client:	Josiane Conroy	-				
Select country	Select client	Realisator: Madie Bruen	*				
		Select Realisator					
Autofilling of the flow		Input data					
CAE GO:							
CAE GO:	GAP:	Worsheet reference:					
Activity starting Date:		Input data reference:					
Standard Activity Duration:	Need date:	DE Availability:					

Figure 4.34: Interface displaying the activity insertion form.

```
+ Admin Demo created an activity :
4 days ago
```

Figure 4.35: Interface displaying the notification that the relevant people receive.

Activity Page

ctivities									ity Starting Da	
nage activities, flows and convergences.								8	Sep 01, 202	4 - Sep 30, 2024
ow / Hide Columns 👻									- 1	+ Create Activ
Activity Status	Region Responsability	Country In Charge	Program	Project	Project Type	Project Case	EOTP	Phase	Energy	Configuration
Select Activity Status	Select Region	Select Countr	Search Prog	Search Project	Select	Select	Search EOTP	Selec	Select	Search Config
Quoted And Invoiced	SE	WE	NEOSYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC3	ICE	Normal
Delivered Awaiting Stellantis Validation	IAP	MO	JP67RXN	Unbranded Frozen Bacon	Platform	Reskin	V838CFW	SYNC2	BEV	GEM S-S
Defvered	MO	MO	NEOBYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC4	ICE	Normal
Delivered Awaiting Og	NA	MO	NEDSYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC4	BEV	Normal
Converged	China	MO	ULSSGVC	Generic Concrete Car	Top hat	Program.	ZD25WQL	SYNC1	ICE	Normal
Rework	IAP	MO	NE08YGJ	Small Steel Chicken	Platform	Program.	HY05QZO	SYNC1	MHEV	Normal
Converged	NA	MO	FT77QIF	Electronic Frozen Tuna	Top hat	Program.	OY67JVF	SYNC2	BEV	GEM S-S
Rework	NA	MD	NEOSYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC1	BEV	Normal
Rework	SA	MO	NEOBYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC5	BEV	Normal
Hard Pt	CE	MO	NE08YGJ	Small Steel Chicken	Platform	Program.	HY05QZO	SYNC3	ICE	Normal
Rework	MO	MO	NE08YGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC2	BEV	Normal
Welting for Stellantis Feedback	CE	MO	NEDBYGJ	Small Steel Chicken	Platform	Program.	HYDSQZD	SYNC1	ICE	Normal
Delivered	NA	τu	NEOBYGJ	Small Steel Chicken	Platform	Program.	HY05QZD	SYNC3	BEV	Normal

Figure 4.36: Interface displaying the list of activities with their status, project, and detailed information.

The activity page presents a dashboard grouping all ongoing activities, with filtering options by status, project, start date, etc. Statuses are indicated by predefined colors (Converged, Rework, Delivered), facilitating management.

The user can show or hide columns via a "Show/Hide Columns" menu and use additional filters to display only activities matching a specific date or status.



Figure 4.37: Column Filters - Menu for selecting columns to show or hide.

	Show / Hide Columns	·
8	ase Activity Info	
~	Activity Status	ital
~	Region Responsability	
	Country In Charge	
~	Program	
~	Project	280
~	Project Type	ed
	Project Case	alti
~	EOTP	
~	Phase	964
~	Energy	×
~	Configuration	200
~	Domain	
	Client	×

Figure 4.38: Column Filters - Menu for selecting columns to show or hide.

														Activit	y Starl	ing Da	ite:			
														Ħ	Sep 0	1, 202	24 - S	ep 30	, 202	4
<		Septe	mber	2024	ı				Octo	ober 2	2024					Nove	mber	2024		>
Su	Мо	Tu	We	Th	Fr	Sa	Su	Мо	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7			1	2	3	4	5	27	28	29	30	31	1	2
8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	7	8	9
15	16	17	18	19	20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16
22	23	24	25	26	27	28	20	21	22	23	24	25	26	17	18	19	20	21	22	23
29	30	1	2	3	4	5	27	28	29	30	31	1	2	24	25	26	27	28	29	30
	То	p hat		ZD25	woi		SYNC1		ICE			Norm	al	Chr	assis			SAF		

Figure 4.39: Display filters according to a chosen date.

Activity Status	Regi
Select Activity Status ~	
^	
Converged	
Delivered	
Delivered Awaiting Qg	
Delivered Awaiting Stellantis Validation	
Draft	
Hard Pt	
Quoted And Invoiced	
Rework	
Stand By	
Waiting For Fmi Feedback	
Waiting For Stellantis Feedback	
Clear filter	
Rework	
Waiting For Stellantis Feedback	
Delivered	
Delivered Awaiting Stellantis Validation	
Delivered Awaiting Stellantis Validation	

Figure 4.40: Filters for each column for display according to choice.

Rows per page	15	~

Figure 4.41: Filters on the number of rows to display.

													se	pteml	bre 20	24													
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
				10.5		9.5	0.5		14				14	7.5	14.5	11.5	15		3			0.5			2.5		13		
				4.5		8					4	19.5	18					18		8	2				19.5		4.5		3.5
								12.5	15.5		6.5	2.5	12.5	7.5												12.5	2.5	16.5	
							11.5			15.5	1.5		11	3		11.5		2		5.5	15.5			8	14.5	19		5.5	18
							13		0.5	0.5	20	12		13	2	10.5		11.5	17			14.5		15.5	20	13			
						15			7	3		11.5			15							19.5		9.5	14.5	11		18.5	15.
0	0	0	0	15	0	32.5	25	12.5	37	19	32	45.5	55.5	31	31.5	33.5	15	31.5	20	13.5	17.5	34.5	0	33	71	55.5	20	40.5	37

Figure 4.42: Flow after applying one of the filters.

Activity Details

Once an activity is created, the user can access a details page by double-clicking the corresponding row in the table.

		Ref Doc Info WP			
ctivity Specification: Reactiv		Fdt Entity:			Save Changes
Related Projects		Staffing Details		Environement Work	
Details of related projects		Region Cost Center:	ATC 🛩	Tes Ref:	
Project Name:	Electronic Frozen Tuna	Region Responsibility:	NATO		
Type:	Top hat	Country in Charge:	NWE	Tex Ref:	
Case:	Program launcher	SPL/CPL:	Damian SA	Main Snapshot:	
EOTP:	0Y87JWF	SPL/CPL Entity:	SA		
Phase:	SYNC2 ~	Pilot:	Martin Z SE	Worksheet Reference:	
Energy:	BEV 🛩	Pilot Entity:	CE	Input Data Reference:	
Configuration:	GEM S-SR Child- mecha 🛩	Performance Engineer:	BCI/BODY -		
Domain:	NVH 🗸	CAE Realisator:	Admin Demo 🛩	DE Availability:	No
Client:	NVH ¥	CAE Realisator Entity:	MO2		
CAE Activities:	hth	UEC:	DSMA		
		Perimeter Feature:	Durability 🛩		
eliveries	_				+ Add New Delivery
ealisator: (Jessy Kiełws7@gwail eal.cost: 83 Real Deliv	rery date: 10/09/2024				
earcost: w RearDein	ery date: hitekazza				
Delivery Reference doc/info	Delivery Advancement Com	ments Status Delivery Track	ing Date Delivery status	Rework Com	ments Actions
		10(09/2024	Dalbarred Availting State	ants Veldeter	/ 0
Delivery Quotation	best	10/09/2024	Calivared Annalise Stat		+ Add Delivery Quotation
	best Defay/OTD	Month Quotation	Dativered Available Data	Rotex	
Delivery Quotation			Conversion Available that	- Dobax	+ Add Delivery Quotation
Delivery Quotation		Month Quotation	Converting that	- Refer	+ Add Delivery Quotation
Delivery Quotation		Month Guotalian			Add Delivery Oustation
Delivery Quotation	Defey(GTD -	Meth Gustation Convergence Date	p/Cost P	FMI Flow	Add Delivery Dustation
Delivery Quotation DeadBy/FTR Quotation VENG KPI LT File Delivery Date:	Defey(GTD -	Merri Questation	p/Cost	FMI Flow Real Starting Date:	Add Delivery Dustation
Delivery Quotation	Defey(GTD -	Month Contraction	y/Cost // 2024-09-19 2024-09-19	- FMI Flow Real Starting Date: GAP:	Add Delivery Dustation
Delivery Quotation	Defey(GTD -	Month Questation Convergence Date Previoland Starting Date Convergence State ::	y/Cost // 2014 00 10 2014 00 2014 00 2000 00000000000000000000000000	FMI Flow Real Starting Date: GAP: Activity Starting Date:	Add Delivery Dustation
Delivery Quotation Country:0118 Quotation VENG KRPLT File Delivery Date: thead Delivery Date to me Statisticat Country:0118	Defey(GTD -	Month Guoritation	ر (Cost المعنية) معنية معنية معنية معنية	FMI Flow Real Starting Date: GAP: Activity Starting Date: Standard Activity Duration:	Add Delivery Dustation
Delivery Quotation Desity/078 Quotation VENG KPLT File Delivery Date: Baid Delivery Date: Baid Delivery Date: Desity/0717	Defey(GTD -	Meete Question	y/Cost 332-09-19 (00000000) (9)	FMI Flow Real Starting Date: GAP: Activity Starting Date:	Add Delivery Dustation
Delivery Quotation Control Con	Defey(GTD -	Muth Question	ر (Cost المعنية) معنية معنية معنية معنية	FMI Flow Real Starting Date: GAP: Activity Starting Date: Standard Activity Duration:	Add Delivery Dustation
Delivery Quotation Coalty#78 Quotation VENC Quotation VENC Quit File Delivery Date:: ballwivery Date to the DataWay Date to the Delivery Date:: ballwiver Date:: ballwiver Date:: ballwiver Date:: ballwivery Dia	Defey(GTD -	Meete Question	y/Cost 332-09-10 (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/000) (2004/00) (2	FMI Flow Real Starting Date: GAP: Activity Starting Date: Standard Activity Duration:	Add Delivery Dustation
Delivery Quotation Control T2 Con	Defey(GTD -	Month Questation	y/Cost // 2014 040 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	FMI Flow Real Starting Date: GAP: Activity Starting Date: Standard Activity Duration:	Addon
Delivery Quotation	Desy0715	Meete Questation Convergence Date Previsional Starting Date: Previsional Starting Date: Previsional Starting Date: Previsional Convergence Status : Previsional cost: Convergence Cost: Convergence Cost: Convergence Cost: Cost Comment: Cost Compliance and C	V/Cost	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addon
Delivery Quotation Delivery Quotation Control of the second sec	Desys(07)	Meete Questation Convergence Date Previsional Starting Date: Previsional Starting Date: Previsional Starting Date: Previsional Convergence Status : Previsional cost: Convergence Cost: Convergence Cost: Convergence Cost: Cost Comment: Cost Compliance and C	y/Cost // 2014 040 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addon
Delivery Quotation	Desys/075	Meete Questation Convergence Date Previsional Starting Date: Previsional Starting Date: Previsional Starting Date: Previsional Convergence Status : Previsional cost: Convergence Cost: Convergence Cost: Convergence Cost: Cost Comment: Cost Compliance and C	V/Cost	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addon
Delivery Quotation Control VENC CPUT In Control VENC CPUT CPUT CPUT CPUT CPUT CPUT CPUT CPU	Design705	Meete Questation Convergence Date Previsional Starting Date: Previsional Starting Date: Previsional Starting Date: Previsional Convergence Status : Previsional cost: Convergence Cost: Convergence Cost: Convergence Cost: Cost Comment: Cost Compliance and C	V/Cost	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addition
Delivery Quotation	Design705	Meete Questation Convergence Date Previsional Starting Date: Previsional Starting Date: Previsional Starting Date: Previsional Convergence Status : Previsional cost: Convergence Cost: Convergence Cost: Convergence Cost: Cost Comment: Cost Compliance and C	V/Cost	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addonny Guardian Action Core Much Guardian
Delivery Quotation Control of the second sec	Design705	Ment Question	V/Cost	FMI Flow Real Starting Date: CAP: Activity Starting Date: Stardard Activity Duration: Need Date: Scatter Score	Addon

Figure 4.43: Activity details page which allows several options.

This page offers the following functionalities:

- Modification of activity information (domain, phase, configuration, etc.).
- Adding deliveries and quotations after activity validation.
- Monitoring of progress statuses and FTR and OTD KPIs.
- Deletion of the activity, with a notification sent to the pilot for validation before final deletion.

Delivery and Quotation

When an activity is completed, a delivery can be added to the system. This delivery is subject to validation and quotation by Stellantis. The delivery page includes the following information:

- Deliverable reference
- Delivery status (pending validation, delivered, etc.)

CAE Activities:		UEC:			
Deliveries		Submit new delivery	×		
Realisator: (Juny.Conditor		create a new delivery. Click save when you're done.			
	elivery date:	leivery Reference Dacinfo			
		servery reference populate			
Delivery Details					
	Date	lelivery Advancement Comment			
		8754			
		Submit new deliver	,		

Figure 4.44: Form that allows adding a delivery.

Deliveries Realisator: Anny Xistra 170 grad	Lcom				
Real cost: 89 Real Deli	very date: 10/08/2024				
Delivery Details					
Delivery Reference doc/info	Delivery Advancement Comments	Status Delivery Tracking Date	Delivery status	Rework Comments	Actions
test	test	10/09/2024	Delivered Awaiting Stellantis Validation		Save Cancel
Delivery Quotation			Delivered Awaiting Qg Quoted And Invoiced		
Quality/FTR	Delay/OTD	Month Quotation	Rework Delivered	Retex	Actions
ABOVE_EXPECTATIONS	✓ IN_ADVANCE	v novembre 2024	8		Save Cancel

Figure 4.45: Form allowing modification of deliverable information and its quotation.

- FTR KPI to assess the quality of the deliverable
- OTD KPI to assess compliance with deadlines

Once validated, the quotation is saved, and the FTR and OTD KPIs are updated automatically.

Convergence and Status

The convergence process is a key element in activity management. For internal activities, they are automatically marked as *Converged* after their creation. However, for external activities, the status goes through several phases (Waiting for FMI Feedback, Rework, etc.) before reaching the final status.

Notifications are sent with each status change to keep stakeholders informed of progress. The color codes associated with the statuses allow quick reading of the status of an activity in the dashboard.

KPIs and Notifications

The FTR (First Time Right) and OTD (On-Time Delivery) KPIs are essential performance indicators monitored throughout the activity life cycle. They allow measuring the quality of deliveries as well as their timeliness. The system generates automatic notifications when a critical action is performed (activity creation, delivery, deletion, etc.).

Unit Flow and Flows

The system includes advanced activity flow management via an interactive calendar that allows visualization of the flows associated with each activity. The statuses of the activities (with their associated color) are directly reflected in the calendar, thus offering a clear overview of the schedule and progress of the activities.

Each change in the convergence status immediately affects the display of the flow in the calendar. The user can manually adjust the flow dates for better planning.

		C C C C C C C C C C C C C C C C C C C	The Constant	- Subscriter G.		
		N 4	dd VENG Quotation	×		
		N N	PILT File Delivery Date:			
			tren/aaaa 🐵)		
			eal Delivery Date to the Stellantis Customer:			
Quotation	n VENG		j/mm/2000 🖾	4	FMI Flow	
		0	waitg/FTR:	1024-09-13		
			Select FTR	× 1024 09-22		
		0	eleviOTD:	CONTRACTOR		
			Select OTD	×		
			forth Qualition:			
			0			
		°	onment			
letex			add Quotation		Scatter Score	
		Lesson				

Figure 4.46: Form that allows adding a quotation.

Quotation VENG		ů /	Convergence Date/C	Cost	× 0	FMI Flow			×
KPI LT File Delivery Date:	07/09/2024	8	Previsional Starting Date:	13/09/2024	œ	Real Starting Da	te:	203	4-09-1
Real Delivery Date to the Stellantis Customer:	20/09/2024	10	Previsional Delivery Date:	20/09/2024	8	GAP: 9			
Quality/FTR:	ABOVE_EXPECTATI	ions 🗸	Convergence Status :	CONVERGED	~	Activity Starting Date:	12/09/2024		G
Delay/OTD:	LATE_LESS_THAN_	3_DAY 🛩	Previsional cost: Proposed cost:		0	Standard Activit	y 9		
Month Quotation:	décembre 2024	Ð	Cost Comment:	88		Need 12/08	/2024		6
Comment:		6			// Save				Save
	Sava	Save	Compliance and Cor	nfidence Save	Cancel	Scatter Sco	re	Save	Ca
Retex								Scatter Score Month	
Process Respect Month Quantities		essons Lear lelivery Date	Compliance Confiden Rate Rate	ce Month Year		Scatter Score		Quotation	
Process Respec	t KPI delivery L			Ce Month Year		Scatter Score			0

Figure 4.47: Form allowing modification of several information (convergence process, quotation...).

Flow Instance of this Activity																													
< Pre	viou	3													Se	otember	2024												Next
Sept	emb	ier 2	024																										
1	2	3	4	5	6	7	8	9	10	n	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
			-			ŕ						54.67			11.07	14.07	14.07	14.60	14.00										

Figure 4.48: Unit flow for each activity.

4.8.4 Conclusion

This sprint delivered a complete solution for managing activities and deliverables. Thanks to the integration of FTR and OTD KPIs, and optimized management of progress statuses (convergence, delivery, quotation), the system offers a global and precise view of the status of projects. The ability to filter activities, add deliveries, and manage flows via an interactive calendar allows users to efficiently monitor and manage their projects. The automated notification feature ensures that each actor is informed in real time of critical actions to be taken, thus facilitating team collaboration and responsiveness.

4.9 Sprint 6: Capacity Management

4.9.1 Objective

Sprint 6 aims to create a capacity management system to track the capacity and invoiced amounts per STELLANTIS entity each month. The PCO user can view, add, modify and delete capacities via an intuitive interface, with selection of years, months, and UECs. The objective is to compare capacities with the sum of activity invoices for each UEC over a given month.

4.9.2 Sequence Diagram

The sequence diagram below illustrates the interactions between the PCO user and the system during capacity insertion.

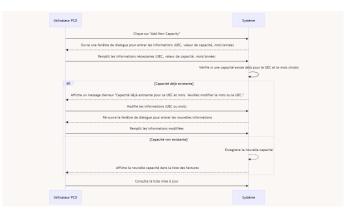


Figure 4.49: Sequence diagram for inserting a capacity

4.9.3 Implementation

This section describes the interactions between the PCO user and the system during capacity management. The main steps are described below:

- Access to the Invoices section: The PCO user accesses the "Invoices" section via the side menu.
- **Displaying the invoice list:** The system displays the list of existing invoices, including capacity information, month/year and UEC. The user can apply filters to refine the search, as shown in the image below.
- Action Add: The PCO user clicks on "Add New Capacity" to add a new capacity. Each capacity relates to a chosen UEC and month, as well as the sum of activity invoices for that month.
- **System:** A dialog box opens (as shown in the image), allowing the PCO user to fill in the necessary information (UEC, capacity value, month/year).

					🚨 🧔 Admin Demo
12 Activities					
11. Projecta	Capacity and	Invoices			+ Add New Capacity
C Programa	oupdoity and	involucio			
Invaices					Select Year 👻 Select Month 👻 AT UECs 👻
E Users	Capacity	Marth Year	UEC	Total Invoices	Actions
8 Roles	Capacity				
d Companies	33565	2024-09	DSMA	287428.00€	× 💿
Activity Specifications	43309	2024-10	DSMA	9000	× 0
di utos					
B Clients	π.5	2024-09	NV154.	68788.00 C	× 🔟
B Perimeter Foatures	13.5	2024-09	DMOA	638057.02 €	/ 0
Domains	14.4	100 × 10	0.0004	Same and a C	· •
O. Review					

Figure 4.50: Interface displaying the list of capacities and the total invoices per UEC and per month.

Month Year	Add Capacity	ces ×
2024-09	UEC Select UEC	→ →
2024-10	Capacity Value:	
2024-09	Month Year Capacity:	e
2024-09	Add Capacity	0€

Figure 4.51: Interface displaying a form to insert a capacity by choosing a UEC, a month and a capacity.

• Action - Modify/Delete: The PCO user can also choose to modify or delete an existing capacity from the list.

Capacity and Invoices					+Add New Capacity
					Select Year 👻 Select Month 👻 All UECs 👻
Capacity	Month Year	UEC		Total Invoices	Actions
33565	September 2024	DSM	× •	297428.00€	Save
43369	2024-10	DSMA		0.00 €	

Figure 4.52: Interface allowing modification of capacity information.

4.10 Conclusion

This chapter described the design and development of the web portal for the management of digital simulation activities. Using Scrum, we designed a modular and scalable system, adapted to the needs of Stellantis and its subcontractors.

The technological choices (TypeScript, React.js, Next.js, PostgreSQL) ensured performance, security and scalability. Key features, such as user, role, permission, notification and activity management, were successfully implemented.

Modularity allows for the addition of future functionalities, although optimization of response times for large data volumes remains to be improved.

In summary, this chapter highlighted the importance of careful design and methodical development to guarantee the robustness of the solution.

Chapter 5

PowerBI Summary

5.1 Introduction

The integration of PowerBI into the project aims to offer an overview of the activities and performance related to numerical simulations. PowerBI allows for the centralization of data, visualization of key indicators, and facilitates decision-making through interactive dashboards.

5.2 Objective

The objective of implementing PowerBI is to provide a tool for monitoring key performance indicators (KPIs), tracking progress made by subcontractors and Stellantis, and analyzing the costs and timelines associated with simulation activities.

5.3 Dashboards

The PowerBI dashboard presents various metrics essential to activity management, including delivery times, costs, and project convergence indicators. Users can visualize this data in real time, filter by project, subcontractor, or business area, and generate automatic reports for more in-depth analysis.

5.3.1 Home

The dashboard illustrated below allows for the analysis of deliverables and delivery details of activities according to different filters. It displays information such as total programs, active projects, as well as planned and actual costs associated with modeling, analysis, optimization, and simulation activities.



Figure 5.1: Dashboard for the home section, displaying metrics related to deliveries and costs of activities.

The dashboard includes:

- Navigation bar with tabs: Home, Billing, RATING FMI AND VENG, HR.
- Year selector (2024-2025) and menu for the month.
- Counters: 15 programs, 11 projects, 3K activities.
- Pie chart for convergences by activity.
- Line graph for tracking deliveries by specification.
- Detailed table of deliveries (specifications, dates, costs, etc.).
- Filters on the right to refine the data.

This dashboard provides an overview of activities, allowing for tracking progress, costs, and deliveries.

5.3.2 Billing

The following dashboard highlights the evolution of invoices based on the work capacity per entity (UEC). It also shows the evolution of the workload per project and domain. The graphs allow for comparison of the billed capacity and the actual need, as well as tracking monthly billing by UEC.



Figure 5.2: Dashboard for the billing section, illustrating the evolution of workloads and capacities by UEC.

5.3.3 FMI and VENG Evaluation

This section presents a comparative analysis of the evaluations for FMI (Faurecia Modules Interior) and VENG (Vehicle Engineering) based on two key performance indicators: FTR (First Time Right) and OTD (On-Time Delivery). The data is visualized through a series of line graphs, offering insights into performance across different UECs (Elementary Design Units).



Figure 5.3: FTR and OTD Evaluations for FMI and VENG across UECs

The Figure 5.3 displays four graphs:

- 1. **FMI Evaluation (FTR) :** Shows the FTR performance for FMI by UEC, with the variation in the quality of deliverables from subcontractors.
- 2. **VENG Evaluation (FTR) :** Presents the FTR performance for VENG by UEC and the quality of delivered activities.
- 3. **FMI Evaluation (OTD) :** Illustrates the OTD performance for FMI by UEC, showing the deadlines for submitting deliverables.
- 4. VENG Evaluation (OTD) : Depicts the submission deadlines for VENG by UEC.

The graphs use a color code for the FTR categories (ABOVE EXPECTATIONS, ACCEPTABLE, BELOW EXPECTATIONS, UNACCEPTABLE) and OTD (AHEAD

OF SCHEDULE, LATE). Time filtering (2024-2025) and monthly filtering allows for detailed analysis, facilitating FMI/VENG comparison and the identification of UECs to improve.

5.3.4 Analysis of Performance Indicators

This dashboard monitors the KPIs of simulation activities, with interactive filters to explore data by domain, project, or subcontractor. The graphs offer an overview while allowing for detailed analysis of costs and deadlines.

5.4 Conclusion

The integration of PowerBI improves visibility on simulation activities, optimizing resource and deadline management. The interactive dashboards facilitate collaboration between Stellantis and subcontractors, strengthening decision-making and process management.

General Conclusion

The project presented in this report is part of an innovation and process improvement dynamic within the Stellantis group. The implementation of a web portal dedicated to the management of numerical simulation activities has addressed several challenges faced by internal teams and subcontractors, particularly in terms of information centralization, communication optimization, and effective project tracking.

Thanks to the use of the Agile methodology, specifically the Scrum framework, we were able to progress iteratively, ensuring the gradual integration of features and continuous validation of the results obtained. The developed portal now allows for better role and permission management, more detailed tracking of key performance indicators (KPIs), as well as the centralization of deliverables and notifications.

The success of this project is largely due to the active collaboration between the various stakeholders, the adoption of modern technology, and the application of best project management practices. The use of tools such as TypeScript, React.js, and PostgreSQL also contributed to ensuring the system's robustness, scalability, and security.

However, although the project has achieved its main objectives, several areas for improvement remain. The first concerns the optimization of portal performance to handle even larger volumes of data. Furthermore, the integration of advanced data analysis tools, such as Business Intelligence modules, could further enhance the portal's features and provide a more comprehensive view of key indicators for decision-making.

In conclusion, this project has provided a concrete and effective solution to a real problem, while paving the way for new development opportunities for the Stellantis group. The increasing digitalization of processes and the implementation of efficient collaborative tools represent a major challenge for companies in the automotive sector, and this project is a concrete illustration of that.

References

Schwaber, K. and Sutherland, J. (2020). *The Scrum Guide*. Scrum Alliance. Available at: https://www.scrumguides.org.

Bierman, G., Abadi, M., and Torgersen, M. (2014). Understanding TypeScript. Microsoft Corporation. Available at: https://www.typescriptlang.org.

Next.js Documentation (2023). Next.js: The React Framework for Production. Vercel. Available at: https://nextjs.org/docs.

Abramov, D., and Clark, D. (2015). Building User Interfaces with React. New React Documentation. Available at: https://react.dev.

PostgreSQL Global Development Group (2023). PostgreSQL 15 Documentation. Available at: https://www.postgresql.org/docs/.

Prisma Documentation (2023). Prisma: Next-Generation ORM for Node.js. Prisma.io. Available at: https://www.prisma.io/docs.

Tailwind Labs (2023). Tailwind CSS Documentation. Available at: https://tailwindcss.com/docs.

Nginx Inc. (2023). Nginx: The High-Performance Web Server and Reverse Proxy. Available at: https://nginx.org/en/docs/.