

# Proyecto Fin de Master



Titulo: Cassandra Project

*Anexo B*

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A handwritten signature in black ink, appearing to read 'Marta Rojo Dominguez', is positioned below the author's name.

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## 1. Introduction

As a second-year student in the Master of Industrial Engineering program, I must complete my Master's thesis. I am currently doing an international internship at Amazon Grocery Logistics (AGL) in Milan, Italy, working for the EU Delivery Service Partner (DSP) team in the Operational Excellence (OE) team.

Amazon is one of the largest and most influential e-commerce and cloud services companies worldwide. It has evolved from an online bookstore to become a global powerhouse in various sectors, including retail, entertainment, technology, and logistics.

Within Amazon's operations, Amazon Grocery Logistics (AGL) represents a crucial branch for the company's expansion in the field of everyday consumer products. AGL handles the logistics and distribution of food products, allowing customers to purchase grocery items from the comfort of their homes via Amazon's online platform.

AGL's infrastructure includes a vast network of warehouses, distribution centers, and an efficient supply chain. These elements work together to ensure the quick and accurate delivery of fresh, packaged, and other grocery products to Amazon customers.

In the EU Delivery Service Provider team, we manage and coordinate delivery operations for products in the European market, working closely with delivery service providers (DSPs). We are responsible for supervising and optimizing the relationship with DSPs, ensuring deliveries are efficient, and guaranteeing the best consumer experience. This involves coordinating delivery routes, monitoring DSP performance, and ensuring Amazon's quality standards are met at all times.

In the Operational Excellence team, we identify areas for improvement in delivery processes and develop innovative solutions to maximize operational efficiency. This includes data and trend analysis to understand current performance and predict potential future challenges.

A crucial part of our work is developing and implementing strategies to improve the quality of delivery service, and as part of my contribution to the team, I am carrying out the Cassandra project, which I will use as my master's thesis project.

The Cassandra project aims to improve delivery services in terms of quality, consumer experience, and cost. It is a project focused on minimizing the impact of Large-Scale Events (LSEs) on our deliveries.

LSEs are events that occur in cities and affect "On The Road" (OTR) deliveries, which involve the process of delivery from the warehouse to the end consumer, or "Under The Roof" (UTR) processes in the warehouse. These include events such as protests, strikes, sporting events, social events, or weather events, which necessitate measures to minimize their impact on both the consumer experience and costs.

Currently, there are two tools: one that detects weather events and another that detects other events. These tools detect events days in advance to take necessary measures and prevent events from affecting our deliveries.

However, despite the existence of these tools, a significant number of unplanned LSEs have been detected: considering unplanned LSEs as those events that have not been properly detected (due to lack of information or erroneous information) or those where event conditions have changed despite detection. Therefore, it is necessary to carry out the Cassandra project: which aims to improve the current action plan for planned events and define the action plan for unplanned events so that the impact on consumer experience and costs is minimal. The goal is to carry out an optimal and efficient action plan, common to both cases, where the actions to be

taken according to different events are clearly defined, as well as the owner and responsible party for each action.

## 2. State of the art

The Cassandra Project is an initiative developed within Amazon Grocery Logistics (AGL) aimed at optimizing the quality of deliveries and the consumer experience. The project focuses on the management of large-scale events (LSE) that may impact delivery operations, both in the On the Road (OTR) and Under the Roof (UTR) domains.

The Cassandra Project aims to improve the current action plan for planned events and define a new one for unplanned events, thereby minimizing the impact on consumer experience and associated costs.

The field of logistics optimization and unforeseen event management is characterized by the use of advanced technology and data analytics to enhance efficiency in product delivery. Major companies like Amazon have implemented event detection and weather forecasting tools to anticipate potential disruptions in their logistical operations, tools like the meteorological event detection tool, that will be analyzed throughout the project.

However, these tools are not without limitations. For instance, although predictive algorithms have made significant progress, they still encounter challenges in detecting certain unexpected events or sudden changes in conditions. Additionally, integrating data from multiple sources can lead to inconsistencies and challenges in interpreting critical information for decision-making.

On the other hand, there is a growing focus on the creation of proactive strategies and action plans to address both planned and unforeseen events. These strategies often involve collaboration between different teams and departments, which adds complexity to coordination but also provides an opportunity for more holistic and effective solutions.

Regarding the detection of events, it is worth mentioning the following fields of research and work:

- **Data Analysis:** The extraction and analysis of historical data about events and their impact on deliveries allows us to identify patterns and trends that can be used to develop prevention and mitigation strategies.
- **Communication and coordination:** Effective communication between different teams and departments is crucial for effective event management, ensuring that all actors involved are informed and can take the necessary actions.

Regarding the management of this type of events, it is worth mentioning the following fields of research and work:

- **Typification of events:** The classification of events according to their nature, magnitude and potential impact allows the development of specific strategies for each type of event.
- **Event prediction:** The development of event prediction models, using techniques such as historical data analysis and machine learning, allows us to anticipate the occurrence of events and take preventive measures.
- **Action planning:** The development of detailed action plans for each type of event, including responsibilities, resources and communication protocols, guarantees a quick and effective response to any eventuality.

- Monitoring and evaluation: Continuous monitoring of the impact of events and evaluation of the effectiveness of the measures implemented allows identifying areas for improvement and optimizing management strategies.

Finally, it is important to keep in mind that optimizing LSE management not only impacts the efficiency of logistics operations, but also has a significant impact on the consumer experience and associated costs.

- Timely delivery of products in good condition is a key factor for customer satisfaction. Effective LSE management can help minimize delays, merchandise damage and order cancellations, thereby improving the overall consumer experience.
- LSEs can generate additional costs for businesses due to delayed deliveries, damaged merchandise, increased working hours and lost sales. Effective management of these events can help significantly reduce these costs.

In summary, although there are tools and methods to anticipate and manage events that affect logistical operations, it is necessary the research and experimentation continue to find new ways to improve effectiveness in this area. The key lies in the ability to adapt to changing situations and develop innovative solutions that minimize the impact of LSEs on consumer experience, operational costs and quality. With all this we see that the project addresses a real need at AGL, as the current management of unplanned LSEs is not effective in minimizing their impact on operations and consumer experience.

### 3. Motivation

The internship I am doing at AGL is allowing me to be part of an international organization that works daily to improve people's quality of life. Focusing on consumer experience and process optimization, being part of it is a unique opportunity for my development as an engineer and as a person.

The opportunity to undertake the Cassandra project is a chance to participate in a real project where I can face real-world situations, analyze daily data and metrics, and work with different tools within the company.

It is important to note that this is an international project that encompasses the markets of France, Germany, Spain, and Italy, and as a result, I have the opportunity to work in an international environment, understand how different markets operate, and learn from the similarities and differences. And moreover, I also get to learn from experienced professionals in logistics and process improvement who have years of experience in different countries.

This project will also allow me to face, for the first time, the requirements of projects in large companies like this one: delivery deadlines, presentations, and model iterations until achieving the best version of the project within the estimated work timeline.

Additionally, being able to undertake a project of this nature is a great advantage as it allows me to observe the final outcome after the project's implementation.

On the other hand, having the opportunity to work on this project allows me to acquire new knowledge and significantly improve my skills in data analysis, information analysis, writing, and programming, among other areas, which is highly valuable for my professional future.

I believe this is, without a doubt, a unique opportunity to put into practice all the engineering, organizational, and teamwork knowledge I have gained over these years at university.

Finally, it is important to emphasize that this is a unique opportunity to showcase my abilities and qualities to the company, with the aim of proving throughout the internship that I am a valuable asset to the team and can be a valuable addition at the end of my internship.

#### 4. Project Objectives

The Cassandra Project is an international project that aims to improve the quality of deliveries and the consumer experience of AGL. The project's objectives are as follows:

1. Understand the current process of event detection, including both weather-related events and city events. Study and understand the meteorological event detection tool, and the work of the city event detection team.
2. Gather the necessary information to create a history of events that have taken place in recent months to analyze them and study how they have affected our customers and delivery processes.
3. Understand which metrics need to be analyzed to conduct a thorough analysis of the event history.
4. Conduct a deep analysis of the collected information on each of the events that have affected us.
5. Understand areas for improvement in the current action plan and existing tools for planned events.
6. Collaborate with other team members and other teams to share opinions and improvement points for the project.
7. Create an initial draft of a unified action plan for both planned and unplanned events, including weather-related and other events.
8. Present the new action plan to the team, identify weaknesses and improvements, and iterate the model.
9. Implement the final version of the action plan.
10. Monitor the results of the new action plan and determine its success. Determine whether it has resulted in an improvement in the consumer experience or delivery processes.

On the other hand, completing this master's thesis project also involves a set of personal objectives, which are as follows:

1. Improve my technical skills and knowledge in data analysis, logistics, and operations management to strengthen my professional profile as an engineer.
2. Develop collaboration and effective communication skills by working with multidisciplinary and international teams to ensure the project's success.
3. Learn and perfect project management skills, including planning, monitoring, and evaluating projects to ensure the achievement of deadlines and objectives.
4. Develop creative and innovative solutions to the challenges identified in the Cassandra Project, improving operational efficiency and the consumer experience.
5. Be able to adapt to changing and dynamic environments, adjusting strategies and approaches according to the project's needs and changes in the project and environment.

6. Practice leadership by collaborating with different teams and managing complex situations, making informed and results-oriented decisions.
7. Enhance my oral and written communication skills by presenting my ideas and results clearly and persuasively to team members and superiors.
8. Practice and improve presentation skills to effectively communicate results and findings.
9. Learn to manage time effectively and prioritize tasks to maintain a balance between project needs and personal goals.
10. Develop an ethical approach to project execution, considering social responsibility and the implications of decisions in the business and community contexts.

## 5. Alignment with the Sustainable Development Goals (SDGs)

The Cassandra project aligns with several of the United Nations' Sustainable Development Goals (SDGs), reflecting a commitment to responsible and sustainable business practices within Amazon Grocery Logistics (AGL):

- SDG 9: Industry, Innovation, and Infrastructure: By optimizing logistics operations and improving responsiveness to unexpected events, the project fosters innovation in delivery processes, contributing to a stronger and more resilient supply chain. This focus on efficiency and adaptation aligns with the goal of building solid infrastructure and promoting inclusive and sustainable industrialization.
- SDG 11: Sustainable Cities and Communities: The project addresses challenges associated with urban events and aims to minimize their impact on deliveries. By proactively managing events such as protests, strikes, and sporting events, the project supports the creation of safer and more sustainable communities. This ensures that logistical operations can adapt to changing urban environments and maintain continuity of service.
- SDG 12: Responsible Consumption and Production: Enhancing efficiency in the delivery of fresh products and groceries minimizes waste and supports responsible consumption. The project's focus on timely and precise delivery helps reduce the spoilage of perishable goods, promoting sustainable production and consumption patterns.
- SDG 13: Climate Action: By mitigating the impact of extreme weather events on logistical operations, the project contributes to a more effective response to climate-related challenges. This includes developing adaptive strategies to maintain operations during adverse weather conditions, thus supporting broader efforts to combat climate change.

The Cassandra project demonstrates Amazon's commitment to sustainability and responsible business practices by addressing logistical challenges while simultaneously supporting the global sustainability agenda. By improving operational excellence in delivery processes and aligning with key SDGs, the project contributes to the ongoing effort to create a more sustainable future.

## 6. Working method

The Cassandra Project will be carried out following a structured and rigorous work methodology, using a combination of tools and resources available at Amazon Grocery Logistics (AGL).

## 1. Data Collection

- Internal Platforms: The following internal AGL platforms will be used to gather information about events that occurred in the first quarter of 2024:
  - Internal web site for detected issues
  - Proactive City Event File (internal file)
- Scarverse\_staging Database: This internal AGL database, accessible through ETL Manager, will provide access to relevant data and metrics for assessing the impact of events on customer experience and delivery processes.

## 2. Data Extraction and Processing

- SQL Programming Codes: These codes will be used to extract data from the aforementioned platforms and databases.
- Hubble Sagan: This Amazon data analysis platform will enable the creation of databases from the extracted information, facilitating analysis and visualization.
- Excel: Excel will be used for statistical analysis and to create visualizations that help understand the impact of events on AGL operations.

## 3. Data Analysis

- Descriptive Analysis: Descriptive analysis of the collected data will be conducted to identify patterns, trends, and relationships between variables.
- Statistical Analysis: Statistical analysis techniques will be applied to determine the significance of the findings and quantify the impact of events on AGL operations.
- Data Visualization: Graphs, tables, and other visualizations will be created to communicate the analysis results clearly and effectively.

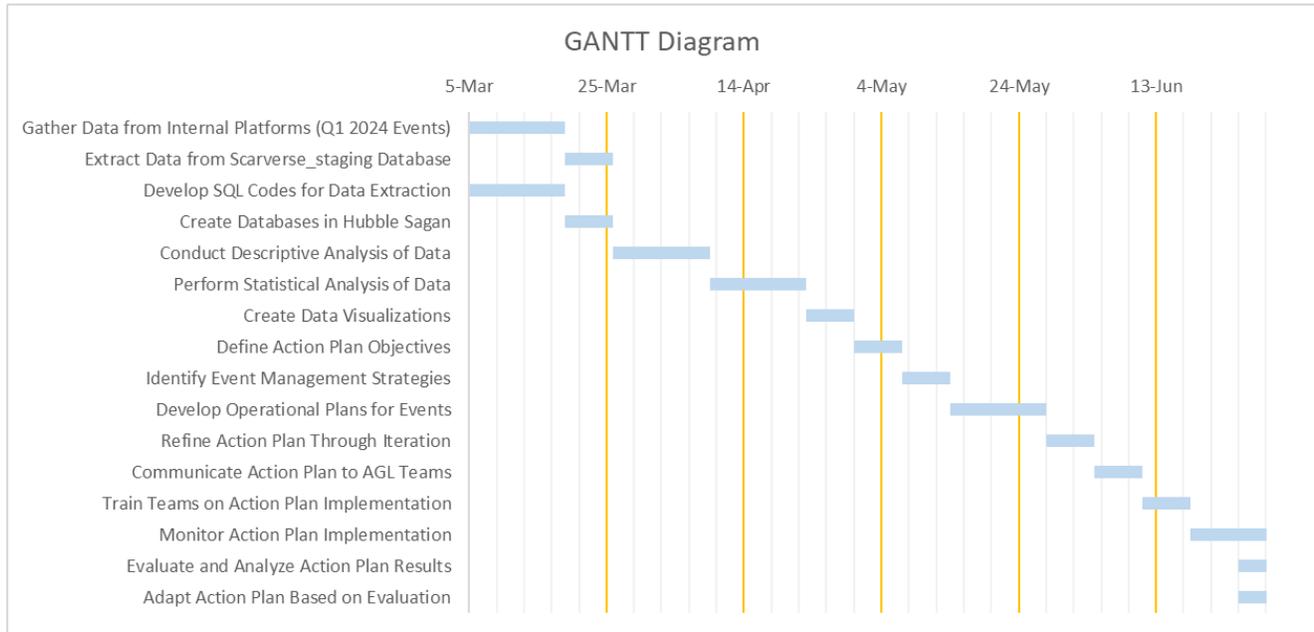
## 4. Development of the Action Plan

- Definition of Objectives: Clear and specific objectives will be established for the action plan, taking into account the data analysis results and AGL's needs.
- Identification of Strategies: Different strategies for managing planned and unplanned events will be identified and evaluated, considering aspects such as prevention, mitigation, and recovery.
- Development of Operational Plans: Detailed operational plans will be developed for each type of event, including responsibilities, communication protocols, and tracking metrics.
- Iteration and Continuous Improvement: The action plan will be reviewed and updated periodically based on the results obtained and changes in AGL's operational environment.

## 5. Implementation and Evaluation of the Action Plan

- Communication and Training: The action plan will be communicated to all relevant AGL teams and departments, providing information and support for its proper implementation.
- Evaluation and Analysis of Results: The impact of the action plan on AGL operations will be monitored using key performance indicators (KPIs) defined in advance. This way, the action plan results will be evaluated, identifying areas of success and opportunities for improvement.
- Adaptation and Adjustment: The action plan will be adapted and adjusted based on evaluation results and AGL's changing needs.

## 7. Gantt Diagram



## 8. Resources to be employed

Below are the resources that will be used to carry out the Cassandra project.

- **AGL Internal Tools:** The platforms and databases mentioned earlier will be used for data collection, extraction, and processing.
- **Hubble Sagan:** This Amazon data analysis platform will enable statistical analysis and data visualization.
- **Office Software:** Office tools such as Excel will be used for additional analysis and creating presentations.
- **Human Resources:** Collaboration will be sought from experts in logistics, data analysis, and project management at AGL for the development and implementation of the action plan.
- **Technological Infrastructure:** AGL's technological infrastructure will be utilized for data storage, processing, and analysis.
- Finally, it should be noted that the Cassandra Project will be carried out in an ethical and responsible manner, ensuring the protection of the privacy of company and customer data.