Final Report - Corporativo

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1. General project information

Information	Details
Partner Company	Startup de Pagamento LTDA
Project name	Dumbo's Project
Development Team	Gustavo Ferreira
Advising Professor	Guilherme Cestari
Start date	21/04/2025
Estimated End Date	26/06/2025

2. Project Objectives

The main objective of this project is to develop an optimized solution to correlate customer action event data from the API and Database of payments with their respective users **using graphs**. This will enable a more integrated and automated view of customer interactions, reducing data fragmentation and improving operational efficiency.

Additionally, an interactive dashboard will be developed for analyzing this data, serving two main audiences:

- **Support Team:** Will have a tool that speeds up problem diagnosis, avoiding manual queries across multiple databases and reducing SLA breaches.
- **Area Developers:** Will be able to publish data on product usage by their clients following the defined data standard, resulting in a unified database of event and customer data.

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3. Project Scope and Backlog

This module focuses on the development of the user interface, with special attention to enhancing the user experience for both the support and business teams. The goal is to design and implement intuitive, efficient, and visually consistent interfaces that simplify data interaction and visualization.

3.1. Epics and Features

Below are the epics that were developed during the module, which were discussed and planned in collaboration with the partner company and the advising professor.

- **Epic 1: Frontend Architecture and Tool Selection**
  - **Feature 1.1:** Conduct a benchmark analysis of tools and technologies best suited for frontend development, ensuring seamless integration with the backend.
  - **Feature 1.2:** Evaluate solutions such as Obsidian and define the most efficient architecture for the project.
- **Epic 2: Interface Design and Prototyping**
  - **Feature 2.1:** Create low-fidelity wireframes to define the core structure and layout of the interface**.**
  - **Feature 2.2:** Develop the first screens for the support team, focusing on usability and access to essential system functionalities.
- **Epic 3: Development of Business Team Interfaces**
  - **Feature 3.1:** Implement initial screens tailored for the business team, offering a strategic and analytical perspective of the available data.
- **Epic 4: User Testing and Validation**
  - **Feature 4.1:** Conduct usability tests with end users to validate the efficiency, intuitiveness, and consistency of the developed interfaces.
- **Epic 5: Feedback Analysis and Iterative Improvements**

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- **Feature 5.1:** Analyze user feedback collected during testing and apply targeted improvements to optimize the overall user experience and meet stakeholder expectations.

4. Module Roadmap and High-Level Schedule

As in Inteli's standard work model, it was agreed with the partner company that each sprint would last two weeks, ending with a presentation (sprint review) to validate the results achieved and align the next steps. Below is an overview of what was carried out during each sprint:

Sprint 1:

1. Tools Benchmark: Analysis of the most suitable tools and technologies for frontend development, considering integration with the backend. Note: Consider tools such as "Obsidian."

Sprint 2:

1. Low-Fidelity Wireframe: Creation of initial wireframes to define the interface structure in a simple and efficient way.
2. Implementation of Initial Screens - Support Team: Development of the first screens focused on the support team, ensuring basic functionalities for system viewing and interaction.

Sprint 3:

1. Implementation of Initial Screens – Business Team: Development of the initial screens for the business team, providing a more strategic and personalized view of the information.

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Sprint 4:

1. User Testing: Conducting tests with end users to validate the interface and usability of the screens implemented.

Sprint 5:

1. Feedback Analysis and Adjustments: Analysis of the feedback collected during testing and adjustments to the screens, ensuring that user needs are met.

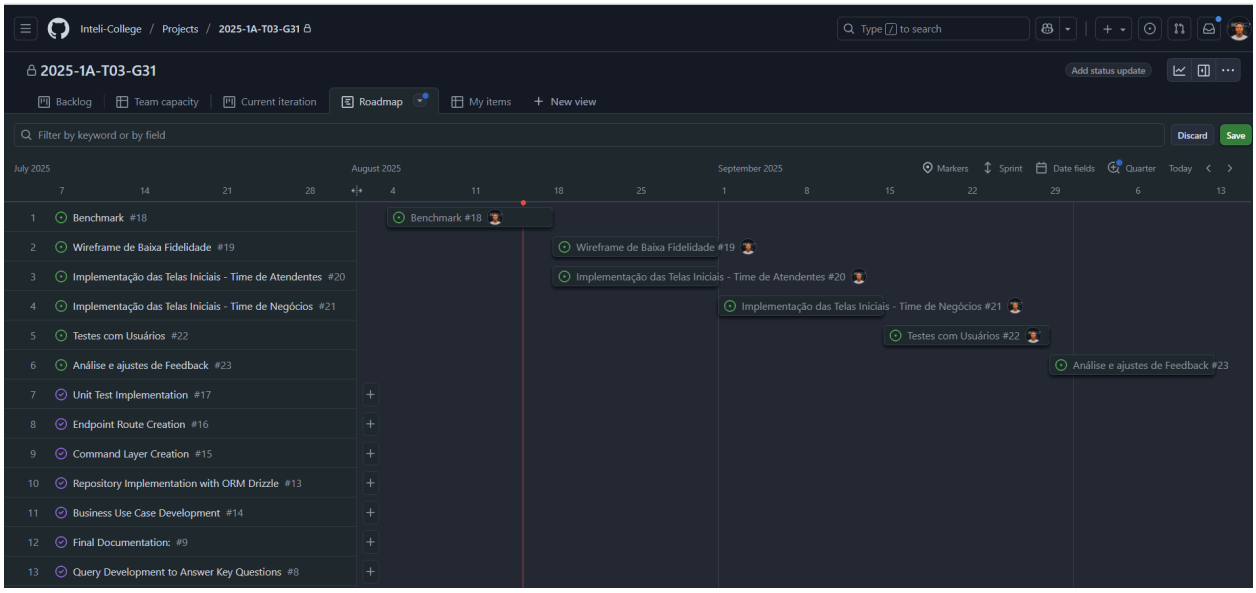

Figure 1: Project Kanban Board on GitHub

5. Project Constraints

Since this is an MVP (Minimum Viable Product) intended for validation before final implementation, the project must follow key constraints to ensure the solution's security, compliance, and efficiency, as well as data protection.

The main constraints to be considered are:

1. **Restricted Data Access**

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a) External users or those without a direct link to the company will not have access to internal information, ensuring data security and confidentiality.

2. **Dependency on Existing Infrastructure**

a) The solution must integrate with tools already used by the partner, such as Azure and AWS, without requiring drastic changes to the current infrastructure.

3. **Data Processing Restrictions**

a) Data handling and analysis must comply with strict security and regulatory rules established by the LGPD (General Data Protection Law), preventing unauthorized access or exposure of sensitive information such as: company name, CNPJ or CPF, list of performed transactions, and recipient companies.

b) The implementation must not compromise the performance of existing systems or databases.

4. **Preservation of Current Customer Service Structures**

a) The new system must not completely replace current service practices without a carefully planned and validated transition.

6. Development

6.1. Benchmark

During the analysis phase, a benchmark of tools for dashboard creation and graph visualization was conducted to evaluate their suitability for handling complex graph-based data. The focus was placed on Metabase, NeoDash, and Apache Superset, selected for their open-source availability, flexibility, and support for interactive visualizations.

6.2. Metabase

Provides a low-code environment for building dashboards and performing queries across multiple data sources. Its intuitive interface and quick deployment make it ideal for prototyping and exploring data. However, it

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does not provide specialized graph visualizations out-of-the-box, which can limit its expressiveness for graph-focused use cases.

6.3. NeoDash

It is specifically designed for the Neo4j ecosystem. It enables dashboards that directly expose relationships between nodes and edges, offering a more natural representation of graph structures. Internally, it leverages libraries such as @react-force-graph and @nivo to render interactive graphs and charts. This makes it a suitable choice for projects where visualizing graph data is central.

6.4. Apache Superset

Delivers an enterprise-grade solution with flexible query capabilities, multiple visualization options, and scalability for large datasets. Its architecture allows embedding dashboards and customizing visualizations while maintaining control over user access and data governance. Superset is particularly suitable for projects that require robust dashboards with varied data sources.

In addition to these tools, using TypeScript-based libraries for graph visualization remains a viable approach. Libraries like D3.js, Plotly.js, and Highcharts enable rendering of nodes, edges, and dynamic relationships programmatically. This approach allows full control over style, interactivity, and integration with front-end frameworks, providing maximum flexibility for custom dashboard solutions.

Overall, the benchmark highlights that each option has trade-offs. NeoDash excels when working with Neo4j and graph-specific visualizations. Metabase and Superset provide quick deployment and general-purpose

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dashboards, and custom TypeScript libraries offer the flexibility to build highly tailored solutions when needed.

6.5. Wireframe and Metabase

Durante a sprint 2, o foco principal foi a configuração dos ambientes para rodarem de forma on premise por meio do docker, o metabase já que a base de dados e o backend já haviam sido configurados anteriormente, além da inicialização da prototipação do wireframe com as telas de dashboards para o time de negócios, porém ambos os objetivos enfrentaram dificuldades durante o seu processo de execução, sendo eles:

6.6. Metabase

Metabase, in turn, does not offer native support for direct connections with Neo4j or other graph-oriented databases. However, it is possible to use a plugin called APOC, which needs to be installed both on Neo4j and on Metabase. On developer bbenzikry's GitHub, you can find a step-by-step guide for this installation.

That said, the approach proved to be inefficient. The plugin is community-maintained, without official Metabase support, and is limited to version 0.36, while the latest release of the tool is already at 52. Due to these limitations, we had to look for alternatives for graph data visualization, and the solution adopted was Neodash — a tool also evaluated in the benchmarking process and recommended by the Neo4j team itself.

Another challenge we faced was Metabase's compatibility with cloud PostgreSQL databases, such as Supabase or Neon, especially with the most recent versions (15, 16, and 17). In these cases, Metabase could not properly save initialization settings without corrupting data previously created by the tool itself. To overcome this issue, we opted to use a PostgreSQL database on-premise, configured with Docker and Docker Compose, which ensured greater stability in the use of the platform.

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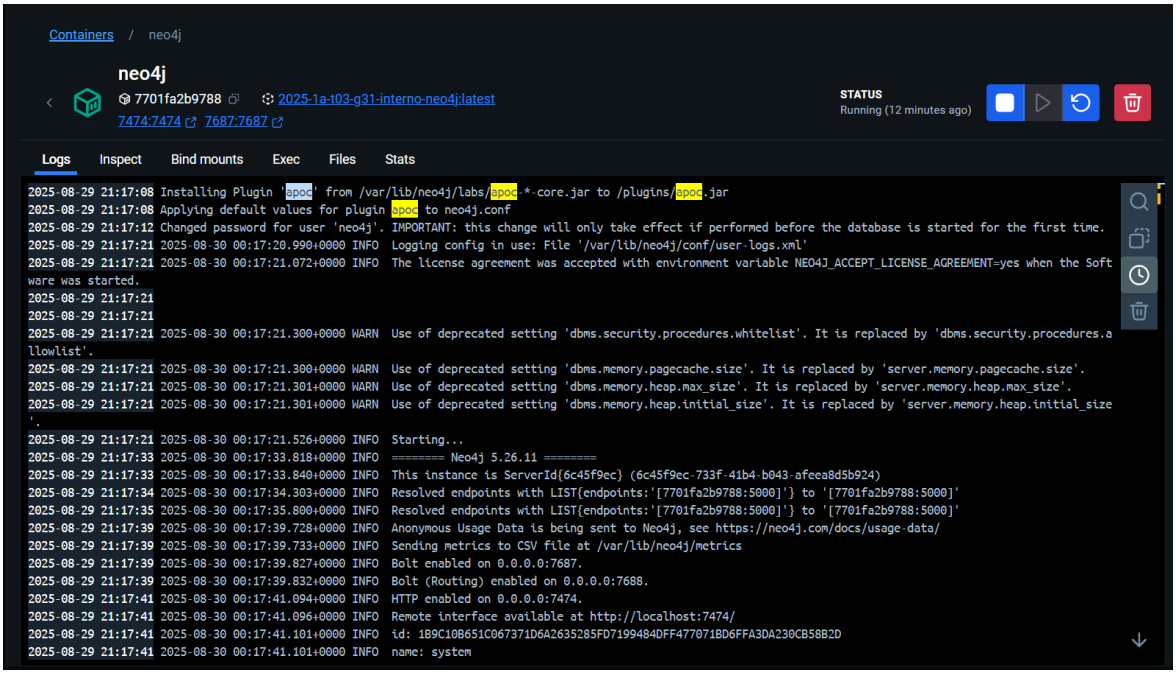

Figure 19: Installation of the APOC plugin on the Neo4j database

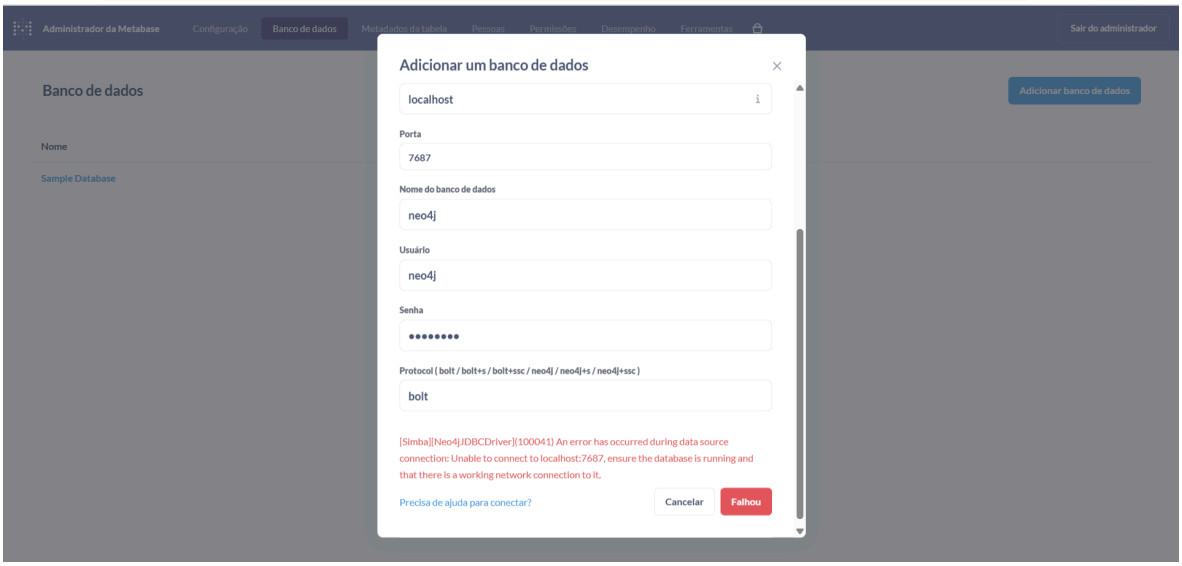

Figure 20: Attempt to connect Metabase to the Neo4j database

6.7. Wireframe

The Figma community offers a wide variety of free templates, without copyright restrictions, that can be freely used in other projects. However, there are

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currently no UI kits or component libraries that faithfully replicate the types of charts available in Metabase.

Given this limitation, it was necessary to search for similar charts in other kits and adapt them. Based on these references, we customized and refined the visuals so that the charts would meet the project's needs. This process enabled the creation of a functional wireframe, with screens specifically designed to support the customer service team, ensuring visual consistency and a user experience closer to the real environment.

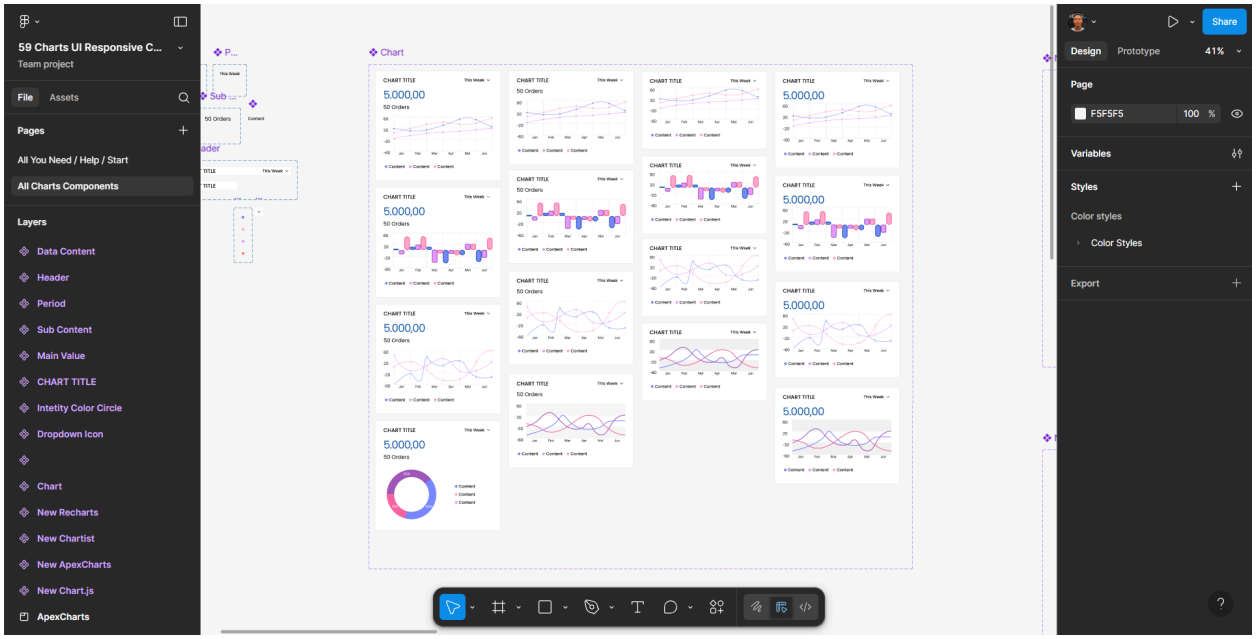

Figure 21: Chart components in Figma.

6.8. NeoDash

During Sprint 3, the focus was placed on refining the dashboards used by both the Customer Support and Business teams, with the goal of improving user

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experience and ensuring that critical information is delivered in a clear and specific manner.

The main improvements included:

- Graph titles and displayed information: Adjusted for clarity and consistency, allowing users to quickly interpret insights without ambiguity.
- Automatic refresh: Each chart now updates every 60 seconds, ensuring that data remains current during continuous monitoring.
- Expanded visualization: Introduced the option to expand charts to full screen, improving readability and enabling zoom control for detailed analysis.
- Export capabilities: Users can now export charts directly in PNG format, supporting reporting activities and external sharing.

It is worth highlighting that all modifications were first prototyped in the wireframe, incorporating feedback from the supervising professor, and only then implemented in NeoDash. This iterative approach ensured alignment between business needs, user expectations, and the technical solution.

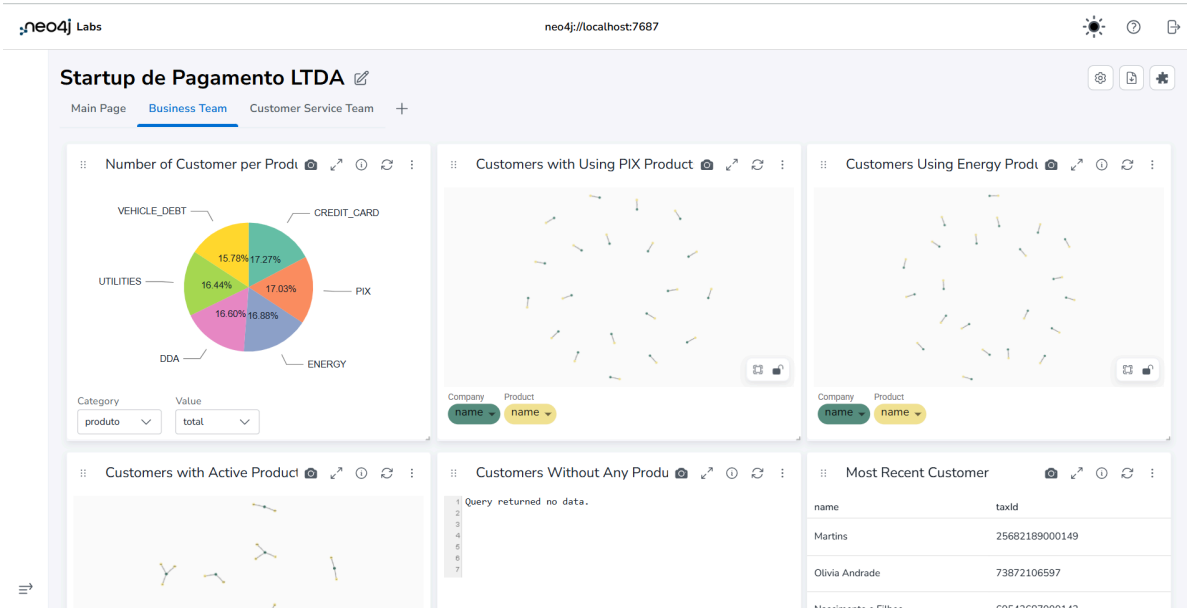

Figure 22: Business team dashboard.

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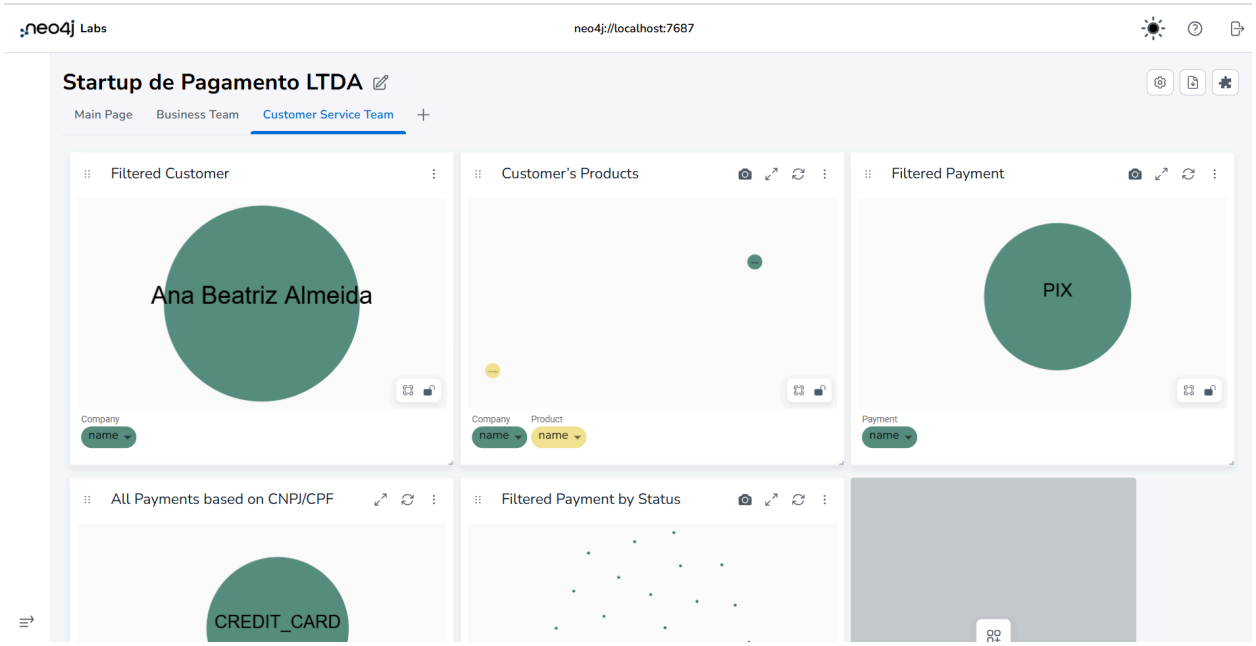

Figure 23: Customer Support team dashboard.

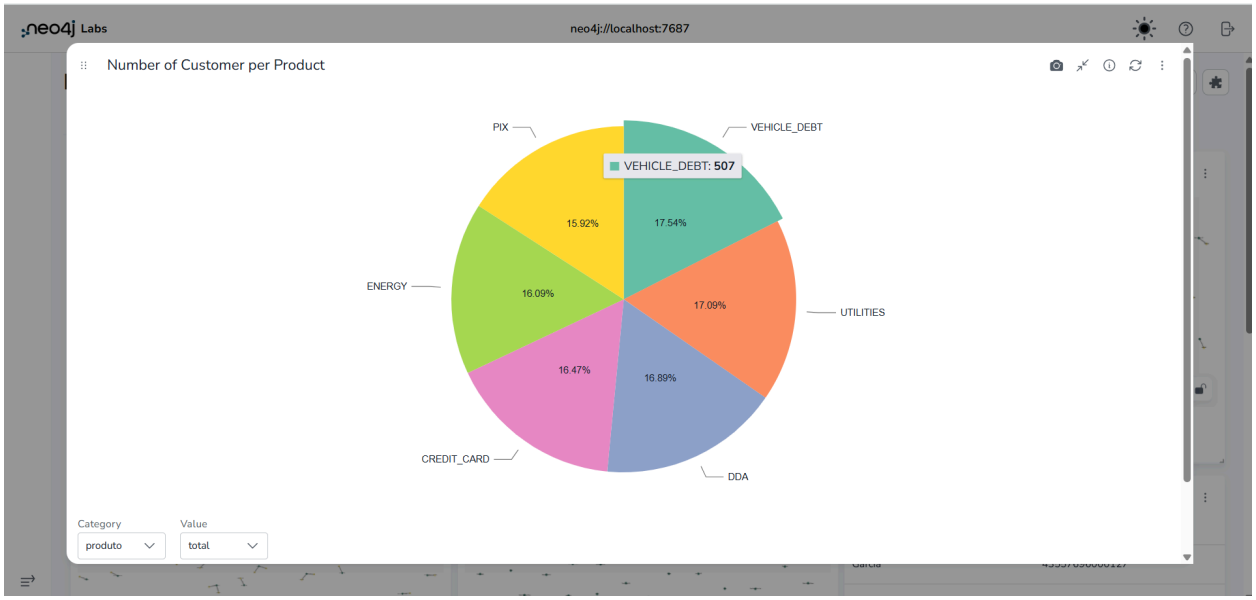

Figure 24: Expanded view chart.

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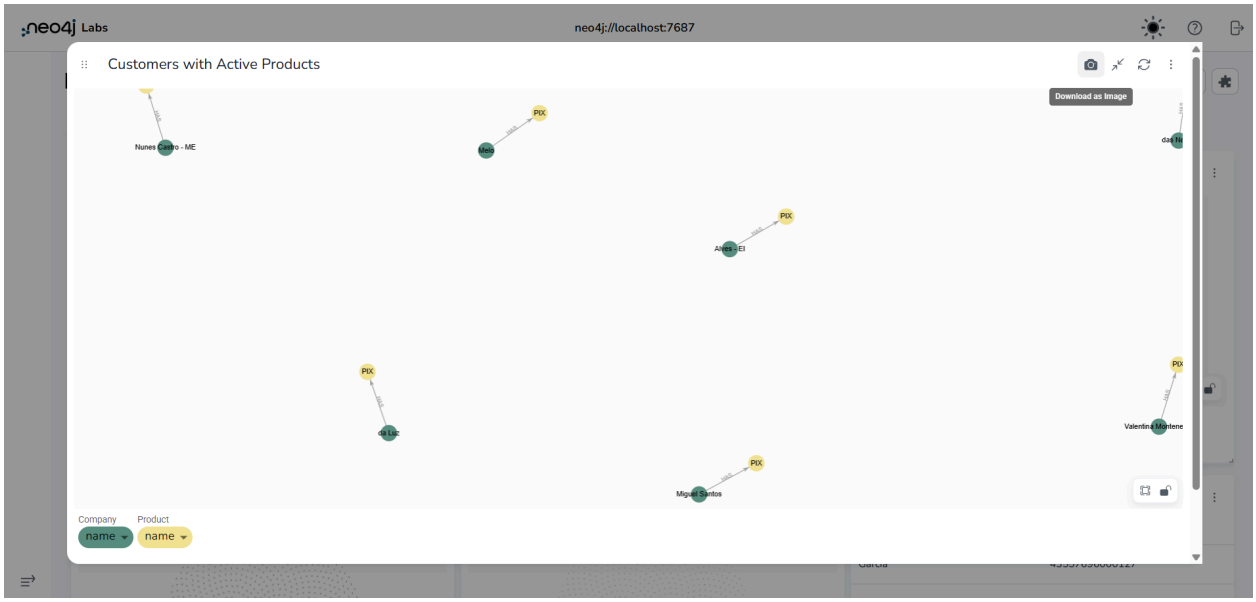

Figure 25: Chart with options to refresh, close view, or export image.

6.9. User Testing

6.10. Interview with the Support Team

During Sprint 4, the initial focus was on conducting an interview that included our faculty advisor and one of the project's key user profiles: the support team. The goal was to gain a deeper understanding of their workflow and to map out the tools, routines, and challenges they face in their daily operations.

The interview provided valuable insights into how the support process is structured across different levels:

- **Level 1 (L1)** – The first point of contact with the customer. The team handles the initial request using predefined scripts and basic tools to try to identify and resolve the issue. If they are unable to resolve it, the case is escalated to the next level.
- **Level 2 (L2)** – A more advanced support team with access to tools such as databases, admin portals, Datadog, Metabase, Grafana, and other monitoring

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and diagnostic systems. Additionally, Salesforce serves as the central repository for tracking and managing cases. If the problem still cannot be resolved, the ticket is escalated to the development team.

- **Level 3 (L3)** – Composed of the development teams responsible for the products related to the reported issue. At this stage, the team can address the problem with a more technical and targeted approach, ensuring that critical issues are solved at the system's core.

An important point raised during the interview was the diversity of backgrounds within the support team. Not all members have a technical background, which makes tool usability crucial and requires the learning curve to be constantly revisited. This challenge is compounded by the fact that both workflows and tools are frequently updated as new products are launched or existing ones evolve. As a result, team members must adapt quickly and relearn processes whenever changes are introduced.

Another key topic discussed was the definition of **SLAs (Service Level Agreements)**. Each case has a response time that varies depending on the customer tier. This directly impacts prioritization, as deadlines may differ and require greater agility when dealing with strategic or critical clients.

From this interview, we were able to understand not only the technical flow of problem resolution but also the human context surrounding the support team's work: the pressure of deadlines, the constant need to adapt to new tools, and the importance of having clear processes to ensure a positive customer experience. These insights will serve as a foundation for aligning the dashboards and tools proposed in the project, ensuring they truly meet the users' real needs.

6.11. User Testing - Neo4j and NeoDash

To evaluate the usability of the tools used in the project, practical tests were conducted with two members of the support team, referred to here as Support 1 and Support 2. The goal was to understand how these users interact with the Neo4j

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database (via Cypher queries) and with NeoDash dashboards, while identifying strengths and difficulties in the process of visualizing and filtering graph data.

The session was held remotely via Microsoft Teams, allowing participants to access the preconfigured on-premise environments.

Support 1

The first participant showed greater familiarity with the Neo4j database. During testing, they were able to run existing queries and also build new ones independently, applying filters such as payment ID and customer Tax ID without major issues.

However, they reported difficulties when debugging queries with syntax errors, as the native Neo4j dashboard does not provide clear and detailed error messages. This limitation caused frustration during query troubleshooting.

When using NeoDash, Support 1 was able to edit existing charts with ease but raised important concerns about the visual experience:

- Dense graph relationships made it difficult to interpret the data;
- The zoom functionality for navigating between nodes was not considered intuitive;
- Graph colors could be varied by entity or relationship type to improve visual differentiation and make interpretation easier.

Support 2

The second participant faced more challenges using Neo4j, mainly due to limited familiarity with databases and being relatively new to the team. Still, they were able to run some queries with support and emphasized that the learning curve is an important factor for less technical users.

Like Support 1, they also noted that dense graph visualizations reduced clarity. However, they highlighted several positive aspects of NeoDash, including:

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- The ability to refresh charts with a single click;
- The option to export charts as images (PNG), making it easier to share insights;
- The availability of overview charts that help contextualize the customer in relation to other system elements.

Conclusion

The tests highlighted that Neo4j is a powerful tool for graph data exploration, but its usability still relies on prior technical knowledge of Cypher queries, which can be a barrier for less experienced users. NeoDash, on the other hand, was positively evaluated for its practicality and additional features such as chart refresh and export, though challenges remain in terms of readability of dense graphs and visual customization.

Overall, the results reinforced the importance of balancing functionality and accessibility: designing dashboards that allow advanced exploration for technical users, while also ensuring clarity and simplicity for those with less database experience. These insights will guide adjustments in upcoming iterations to ensure the proposed solutions align with the real needs of the support team.

This combination of data architecture and API design not only supports analytical objectives, but also lays a solid foundation for future innovation, enabling smarter systems that evolve in response to user behavior and business needs.

6.12. NeoDash Adjustments and Metabase Development

During Sprint 5, the focus was on improving the data visualization tools used by the support team, with an emphasis on enhancing usability and expanding data accessibility.

Following the user testing phase, several adjustments were implemented in NeoDash to improve visualization and make navigation more intuitive. Based on user feedback, the main priorities were reducing graph density and improving zoom responsiveness. These updates aimed to enhance readability and ensure that

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support analysts could more easily interpret the connections between clients, payments, and intentions within the graph database.

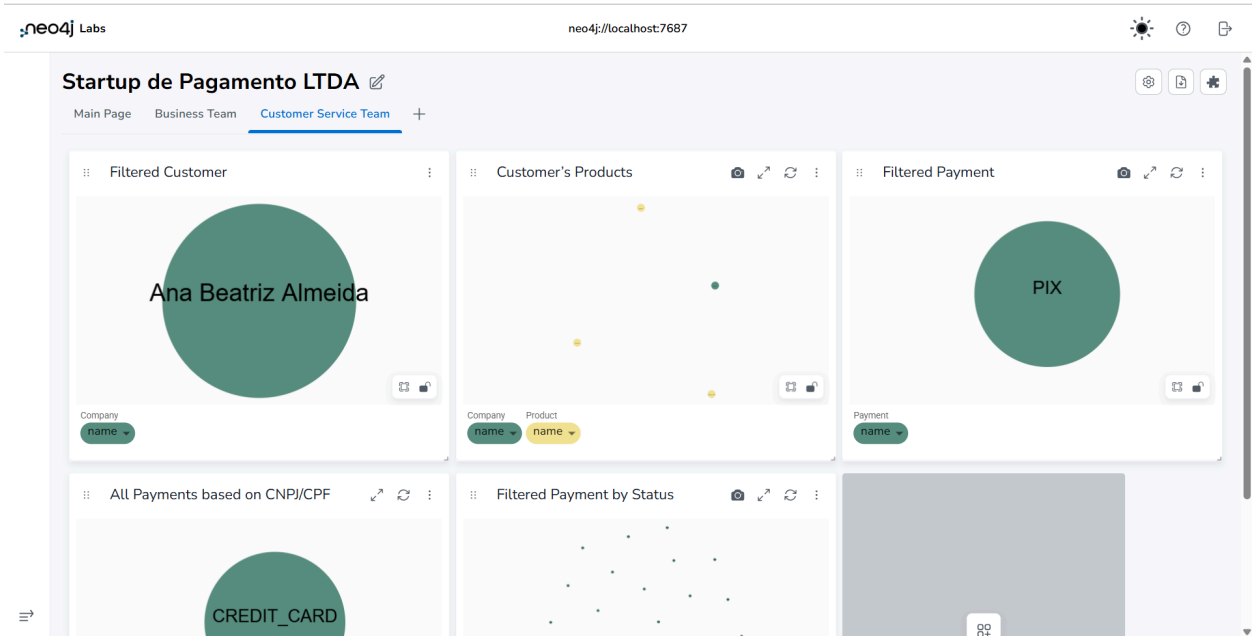

Figure 26: Dashboard adjusted.

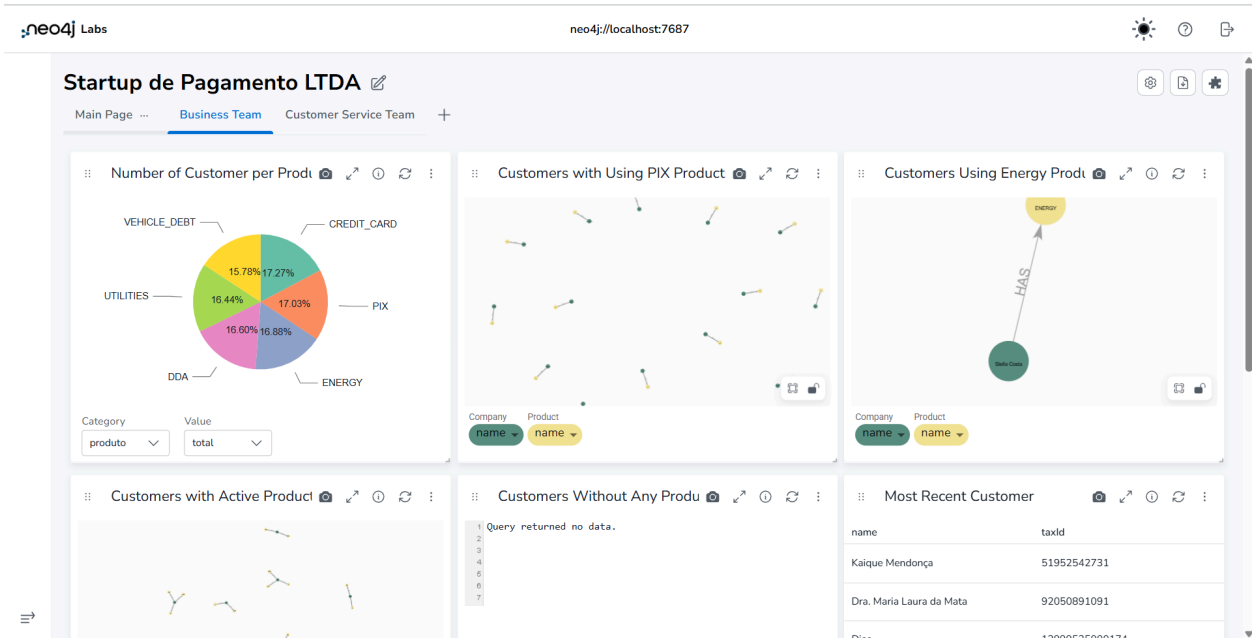

Figure 27: New graphs with limits.

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In parallel, a Metabase dashboard was developed to provide a complementary and more accessible environment for data exploration. While NeoDash serves as an advanced tool for visualizing relationships in Neo4j, Metabase was designed to support day-to-day operational analysis, focusing on filtering and tracking customer intentions in a simpler, table-oriented interface.

The new dashboard allows users to:

- View all intentions created per client, linked by CPF/CNPJ;
- Filter intentions by creation date, enabling quick access to daily activity metrics;
- Monitor trends in the volume of intentions over time, facilitating the identification of behavioral or operational patterns;
- Export filtered data for reporting or further analysis.

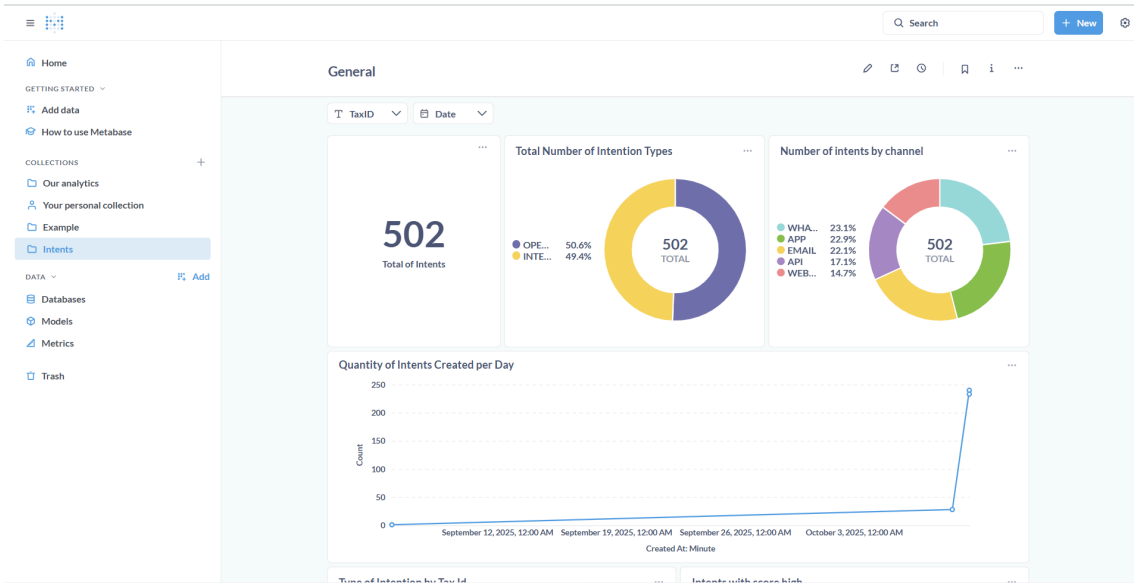

Figure 28: Dashboard of intents at Metabase.

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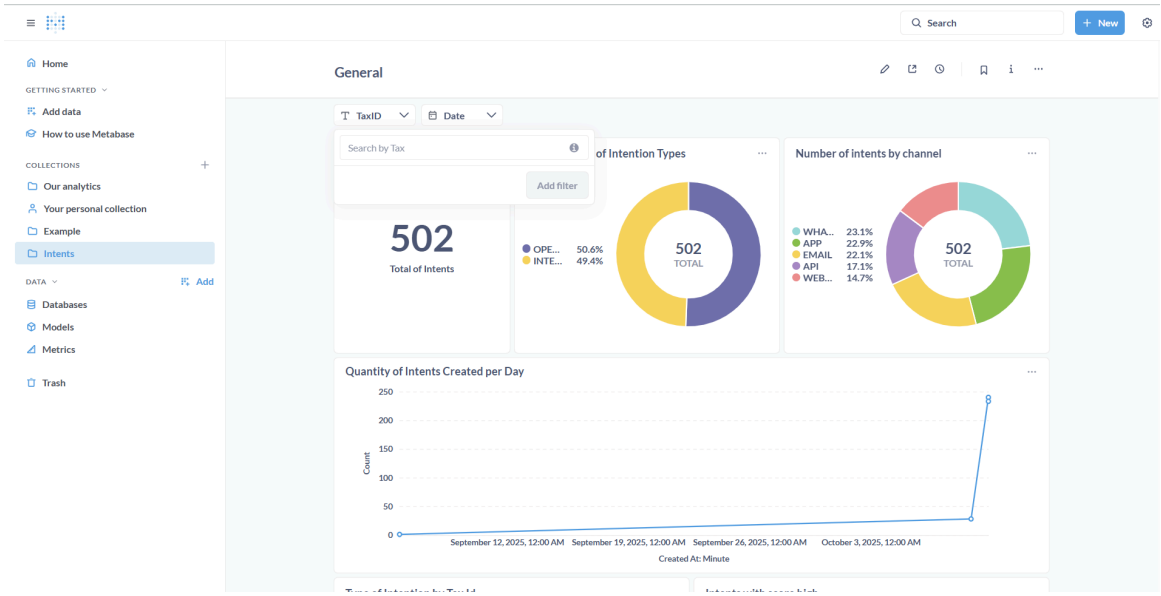

Figure 29: Filters of intents at Metabase.

These additions proved especially valuable for team members with less technical experience in Cypher or graph databases. The intuitive filtering and visualization features of Metabase reduce the learning curve and make insights more accessible to both the support and business teams.

Together, NeoDash and Metabase now form a balanced analytical ecosystem — combining the depth and relational power of graph-based analysis with the accessibility and agility of traditional dashboards. This integration reinforces the project's goal of delivering tools that not only empower technical users but also support non-technical profiles in making informed, data-driven decisions.

7. Conclusion

The project successfully delivered an integrated system for visualizing and analyzing data, bringing together customer actions, payments, and user information in a clear and accessible way. By combining **NeoDash** and **Metabase**, both technical and non-technical users can explore insights through intuitive dashboards, monitor customer intentions daily, and better understand complex relationships within the data.

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Equally important, feedback from the support team through interviews and usability tests played a key role in shaping the final tools. This ensured that the solution truly meets users' needs while improving operational efficiency, supporting informed decision-making, and laying a strong foundation for future enhancements.

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