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Education, Management and Innovation: A Case Study of Enhancing Innovation Programs through a Platform Developed by Academics

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Abstract

Data management in institutions is a unique issue, with challenges and obstacles proportional to the segment and size of the organizations. In the education sector, this concept holds true, even more so in a group of universities with more than 18 institutions and dozens of campuses across Brazil, with almost 400,000 students enrolled. This article demonstrates a case where a data management platform was developed and implemented by faculty and students. The software was applied to project management within the Ânima HUB innovation program, where more than 80,000 students have already had opportunities to participate in various initiatives. The project began its implementation in 2023 and continues to this day. Initially, it managed 225 projects and currently manages 1274, a scalability of over 460%. In addition to project data management, the platform has evolved as a software as a service, providing web tools for generating SWOT matrices, 5W2H, Canvas, and other project management tools. These capabilities consolidate the agility and optimization of academic project processes focused on technological innovation, in an agile manner, based on a project created, implemented, and managed by academic staff and students.

Keywords: Entrepreneurship, Ânima HUB, Data Management, Innovation, Process Optimization

1 Introduction

Academic training, with the purpose of transforming knowledge into relevant products and services with significant impact, is a challenge for the contemporary educational system (Zamazii et al., 2026). Successful projects, student engagement, and strong connections

between teachers and students are always challenges in the sector. Accordingly, university education demands that students have access to teaching and experimentation with elements such as innovation, entrepreneurship, and development of solutions that contribute effectively to business and societal problems (Snyder et al., 2016; Ockerby et al., 2026).

Innovation and entrepreneurship programs are fostered in academia. More specifically, in Brazil, they are not only fostered, but there are studies on the need for these initiatives to continue. In a preliminary analysis, a survey of 286 Brazilian higher education institutions reveals that 87.8% of institutions are concerned with entrepreneurship in their curriculum (ABMES, 2023).

This research focuses on the Brazilian education group Ânima Educação. Ânima Educação is a large educational group in Brazil, with over 26 educational institutions (18 offering college degrees) and approximately 400,000 active students. Like most universities worldwide, Ânima Educação also aims for innovation as part of their student's learning path. To promote practical innovation experience for students, lecturers, and staff, Ânima Educação runs the Ânima Hub program. Ânima HUB is a program focused on project incubation to promote innovation from their academics to beyond Ânima campuses. The proprietary methodology engages lecturers/faculty, students, and enthusiasts through frameworks, mentoring, and exhibitions, with the solid purpose of granting visibility and success to all new ideas. In addition, the methodology employs a robust applied research component for the scientific foundation of the proposed solutions.

It describes an educational company's data management solution development, focused on offering frameworks and management to lectures, students, and management staff, from the ideation phase to a platform in production (Leal et al., 2023; Souza et al., 2024). In parallel, process management has always been a challenge in any company, regardless of its size. Information control, access availability, and optimizing activity sequences and resource availability have always been a latent and highly relevant issue (Burlton, 2001; Kirchmer, 2017; Rodzvilla, 2024). A company in the education sector is no exception to this demand (Elahi & Bilal, 2025; Ashraf & Ahmed, 2022).

Given the scenario described, a question becomes the guiding principle of this research: How did the management platform developed by academics and students impact the operational capacity, process efficiency, and scalability of the Ânima HUB innovation program, compared to the pre-implementation period? This leads to the hypothesis that a structured software project, conducted by students and professors, can effectively optimize the production process of a nationwide program like Ânima Hub. This research focuses on describing a case study of the development of a data management solution in an education company, Ânima Educação, through the Ânima HUB program. This platform, generated by teachers and students, experienced the development, implementation, scaling process, and challenges that are comparable to market products, bringing plausible results of a product development with a high degree of maturity. As specific objectives, this study aims to demonstrate: the process of forming the development team, the solution development process, and its impact on the company, from its implementation to its application at scale.

This case study is justified by the relevance of scientifically publicizing that the internal entrepreneurship of a company has enhanced its own innovation program, and has reflected not only on the project management capacity of an organization that owns 18 higher education institutions, but has also enabled the Ânima HUB innovation program to become so scalable that it currently manages more than 1270 innovation projects (squads) throughout Brazil. It is relevant that the company in focus is from the academic sector, proving that it can benefit from results that come from the teaching it provides to its students, through its professors, with

results surpassing tests and assignments, reaching robust products, with scalability, with real demand management.

2 Material and Methods

The theoretical frameworks employed in this research are transversal to the processes that serve as resources for the management of educational institutions, as well as methodologies applied to the development of academic projects with an entrepreneurial and innovative focus. In accordance with the above, the Ânima HUB program, which has its own methodology for attracting, enabling, and connecting projects, is used as the basis for this research.

2.1 Research Design: Longitudinal and Comparative Case Study

This research adopts a longitudinal and comparative case study design, focused on the internal entrepreneurship initiative that resulted in the development of the Ânima HUB program management platform (Bartlett & Vavrus, 2016). The longitudinal scope covers the evaluation period of the operational optimization process from August 2021 to 2026, allowing for the analysis of the system's changes and consolidation. The comparative component is fundamental to validating the hypothesis and answering the Research Question (RC), establishing the measurement of the impact of the management platform through the contrast of the program's performance at two points in time:

- **Intervention Point and Cutoff Line**: the Cutoff Point for the comparative evaluation is established between semesters 2023.1 and 2023.2.
- **Pre-Intervention Period (Baseline - 2023.1)**: the program operated primarily with manual processes, using free information consolidation tools such as Google Forms® and spreadsheets.
- **Post-Intervention Period (from 2023.2 onwards)**: marks the beginning of the system's operation, which was made available in its first version in August 2023, impacting the academic environment and taking over project registration in November 2023.1.

This research employs a mixed-methods approach, extracting quantitative data for scalability and qualitative data for process efficiency, both documented in internal Ânima HUB reports. The focus on Scalability (quantitative data) on the program's operational capacity is measured by the following KPIs, comparing baseline performance (2023.1) with the post-intervention period (As shown in Table 1):

Table 1: KPI versus Baseline Evaluation Proposal

Key Performance Indicator (KPI)	Baseline (2023.1)	Post-Intervention (2025.2)	Comparative Impact
Managed Projects	Projects number in 2023.1	Projects number in 2025.2	Increasing measures (projects)
Participating Students in squads	Students in projects number in 2023.1	Students in projects in 2025.2	Increasing measures (Students in projects)

Source: (Authors)

The second comparison focus in operational efficiency (Qualitative Data): the impact on efficiency is assessed by the reduction in time spent on administrative processes, as detailed:

- **Project Registration:** The average time for project registration and validation (including professor data).
- **Certificate Issuance:** The management and validation of certificates;

The scientific rigor of the case study will be reinforced by data triangulation, which combines the exponential increase in scalability KPIs with the measurable optimization of operational processes, demonstrating verifiable procedural and numerical gains: internal triangulation (comparison of different datasets or methods within the same study, focused on finding inconsistencies or validating findings) and external triangulation (comparison of study results with external sources, such as theoretical research, field data, different locations, or other types of participants to ensure validity and generalizability) are two concepts to be employed in this study (Ghrayeb et al., 2011). In this research, Internal Triangulation is employed to validate the usability and effective adoption of the platform by users (students and teachers), using the KPI "Average access per month". External Triangulation focuses on economic and technical gains and uses technical and financial data from the software project to quantify the "real and measurable gain" of the intervention, going beyond operational improvements. This analysis validates the success of the IT architecture redesign. Even with such rigor, the potential limitations of the research will be analyzed.

2.2 Process Management

Project management is a reference where institutions manage the activities, resources, deadlines, and other elements that underpin productive events. This definition is appropriate for any sector, including education (Rodzvilla, 2024; Elahi & Bilal, 2025; Ashraf & Ahmed, 2022; García-Vidal et al., 2025).

Education has unique challenges in its processes, such as the management of student and teacher data. In a focused analysis, the efficient management of university projects and their participants represents a relevant challenge for the administration. It should be noted that, if in just one institution there is a latent challenge of controlling project data, in addition to its resources, deliverables, and other issues, this challenge is extremely amplified when it comes to organizations that are the maintainers of two or more institutions (Ashraf & Ahmed, 2022).

Solutions to support those demands are generally proprietary, requiring a considerable financial investment from institutions. Thus, a pertinent question arises: what if the solution to this demand is generated within the universities themselves? This question can be reinforced by the ongoing challenge in the academic sector: how to harmoniously connect market skills with the academic concepts used in the classroom? One answer to these desires is the promotion of innovation and entrepreneurship programs that originate in these colleges. Their focus is to enhance the work developed with academic contents, until it reaches the level of maturity to meet real demands (ABMES, 2023).

2.3 Innovation and Entrepreneurship

Ockerby et al. (2026) cite Schumpeter's 1934 concept of innovation as: "*Schumpeter defines innovation as a separate activity through which inventions are carried out in the market for a commercial purpose*." In their research, Ockerby et al. (2026) conclude that service innovation can be described as: "service innovation has become an imprecise and dispersed theoretical concept but remains important for explaining the service sector's growth." According to Swidan & Kishk (2026), entrepreneurship can be considered as:

> "*Entrepreneurship is an activity that involves the discovery of new venture ideas, evaluations, and the exploitation of opportunities. It is crucial to drive economic growth, to create employment opportunities, to foster innovation, and plays a crucial role in the development of society by addressing social issues*."

As already mentioned, a survey on innovation and entrepreneurship programs in Brazil was conducted by ABMES (Brazilian Association of Higher Education Institutions) in 2023, where

286 higher education institutions were evaluated and 87.8% have entrepreneurship as a subject in their university courses, but 50% of them do not have an internal entrepreneurship center or office. Of the 50% that have this entrepreneurship center, 31.8% of the projects have professors and students actively involved as co-participants and owners of the solution, and 26.3% have students in their projects (ABMES, 2023).

Innovation in the academic sector is something that already has experiments presented in the literature, such as the case of Hasanefendic et al. (2016), where the research focused on how universities manage innovation through technology transfer offices (TTOs) and incubators, allowing student projects to become real platforms adopted by the institution itself or by the market. This study contextualizes the shift to applied innovation, where student-led development is integrated into the university's market strategy, creating a feedback loop between teaching and technical application.

Dollinger & Lodge (2020) propose a model where the student ceases to be merely the "customer" or "end user" and becomes a partner in institutional design. This directly impacts the development of academic software and services driven by student demands. As in the research in this article, the university administration and IT department decided on the tools without consulting the student journey. The contribution here is the legitimization of user-led development, in this case teachers and students, ensuring that the technology solves real pain points in the university's daily life.

Another example is from Cidral et al. (2020). This study analyzes the success factors in the adoption of learning management systems (LMS). Unlike previous systems (the "file repositories" of the 2000s), the research focuses on the quality of the system and information as triggers for user satisfaction. Previously, innovation was measured by the simple "availability" of the system. This article contributes by showing that innovation today lies in interactivity and support, transforming the platform from a data silo into a collaborative environment.

With this analysis, the following hypothesis was raised: what if the organization Ânima Educação, which promotes a program with an entrepreneurship and innovation focus, the Ânima HUB, were to undertake the construction of a project to manage the Ânima HUB itself? This premise would connect classroom teaching concepts and development program theories with the demands of a real company. An even more significant result would be the possibility of not only boosting Ânima HUB, but also the projects it manages.

This case study has the following development:

- **Optimized process operation period:** evaluation of the optimization of an operating process from August 2021 to 2026;
- **Optimization period:** From March 2023 to April 2026 (still in operation).
- **Data and information source:** The process takes place in the Ânima Hub technology-based innovation program, which is enabled by the Ânima Ecosystem in 18 Brazilian universities throughout the national territory.
- **Relevant comparison points for the Ânima institution and the Ânima Hub program:** The comparisons that became relevant for the program are the management capabilities in terms of the number of projects, the number of students in the projects, as well as registrations and optimized processes. Comparisons are made with the cutoff point of 2023/1, where the transition of processes without the system still operate, and from 2023/2, when the system is implemented and impacts the academic environment of Ânima Hub.

- **Governance/Privacy/Ethics/Data and Risks:** the optimization process assumes that the system must be under shared governance between the development team, Ânima Hub, and Ânima Educação. This is reflected in the practices regarding ethical principles and the risks of managing them. The project must comply with the information security premises of Ânima Educação and must protect and preserve the confidential data of Ânima Hub, and be managed by the team, aligned with the perspectives and premises of Ânima Educação.

The scalability of a technological solution in a large educational ecosystem (such as Ânima Educação, with 18 HEIs and 400,000 students) critically depends on a clear and robust IT Governance structure. In Higher Education Institutions (HEIs), IT Governance transcends mere operational management, being crucial to ensure the strategic alignment of technology with the academic mission, the management of risks inherent in handling data on a large scale, and the optimization of IT resources. Effective governance establishes the structure of responsibility, accountability, and decision-making that allows the use of information systems to support and extend the organization's strategies and objectives. The complexity of IT Governance in HEIs is detailed by Juiz et al. (2022), who define the responsibilities and roles in their research. This study is particularly relevant because it catalogs 212 specific practices extracted from current IT governance standards.

This practical detail provides a robust academic foundation for the need for formal structures that guarantee the control and direction of Information Systems (IS), validating the importance of robust governance in the context of large-scale IS management. In the context of this research, the sustainability of internally (academically) developed software for a corporate demand is ensured by a shared governance model. This control structure allowed the project, born in academia, to be implemented and maintained in production, guaranteeing its institutional seriousness and its capacity to handle a universe of 400,000 students. The shared governance between the development team, Ânima Hub, and Ânima Educação encompasses compliance with information security premises, the preservation of confidential data, and reflection on practices regarding ethical principles and data management risks, ensuring the essential strategic alignment postulated by the IT governance literature (Bianchi & Sousa, 2016).

2.4 Ânima HUB Methods

According to Leal et al (2023):

> *Ânima HUB is organized by thematic Laboratories (Lab). A Lab is a structure organized by campuses to promote technological innovation projects in a thematic area: Health Lab, Engineering Lab, etc., which are developed by multidisciplinary research groups of students led by professors (these groups are called Squads).*

The process is described in Figure 1 and explained in Table 2, where it is possible to visualize, from the moment a project opportunity is understood to its execution during the academic semesters. The management, carried out by the Ânima HUB team, opens opportunities for all 18 universities throughout Brazil.

The structure of Ânima HUB program performs a proprietary methodology for connecting people and projects, forming squads. It serves as the theoretical and practical framework for how squads may operate. Despite being a methodological reference for activities, from team formation to project activities, there was no centralized system, integrated with the program's issues, to manage the projects and the people participating in them.

Table 2: Table description Ânima HUB Process

Step	Objective	Description
1	Proposal submission notice	Professors, students, those responsible for Ânima's areas of knowledge and companies indicate projects via notice.
2	Curation of proposals	The Ânima HUB team receives the proposals and curates them.
3	Approval of proposals	The Ânima HUB team approves the proposals with the directors and managers of the areas. After 2023.2, students are allowed to submit their own projects.
4	Development	Agile methodologies are used for project development. An adaptation of these methodologies was necessary to fit the needs of the HUB. After approval of the proposals, there is an announcement for the entry of students and advisors who will be part of the team of each project (squad). A squad is an organizational model formed by a multidisciplinary team responsible for a mission. Each team has 3 important moments during the development of projects: discovery, so that everyone has the same view of the problem; sprint 1, for the team to make a partial delivery of what was developed; sprint 2, for the team to make the final delivery for the semester. Projects that deliver value have the chance to present their project to influential people in IT and compete for an award for the best project
5	Shark HUB	A competition to encourage team engagement. In it, four main categories would receive the 40 best squads (10 for each of the categories: Agro & Health; Engineering, Design & Quantum; Legal & Business; Humanities, Social, Communication & Fashion)
6	Feedback and Certification	The participation of students and professors is proven with participation certifications, with assignment of workloads for participation in extension and research projects

Source: (Authors)

A proposal for a squad, which would be designated to serve Ânima HUB itself, meaning the program would utilize the results of its own methodology. This demand can be justified by the fact that Ânima HUB has been operating since 2021, with a proven expansion process that will be better described below.



Figure 1: Ânima Hub project definition process
Source: (Leal et al., 2023)

2.5 Team Selection, Structures and System Development

Based on the squad formation guidelines described in the previous topic, in March 2023 a squad was proposed by Professor Jean Paul Lopes, starting with an initial team of 3 students (each one in a different Brazilian state, operating in remote work positions). These students had no previous experience in professional software development.

As a software development process, FDD (Feature Driven Development) was selected, according to Palmer & Felsing (2001): to delegate small isolated features for development. This procedure proved to be more efficient for team coordination efforts. This approach could be possible to provide an relevant application from a MVP (minimal viable product), adding new features as required. A challenge was figured: every deliverable must be enclosed within an academic semester. In the academic calendar, there are two semesters per year; for example, in 2023 there are semesters 2023.1 and 2023.2. The first academic semesters of the Ânima HUB program (e.g.,2023.1) begin in March and end in June. The second semesters begin in September and finish in December.

Based on the team's calendar and distance challenges, a resulting software architecture was proposed, of the Serverless type (a cloud computing model where the developer focuses only on the application code, while the cloud provider - such as AWS, Google Cloud, or Azure - automatically manages all the infrastructure needed to support it) (Shafiei et al., 2022). Thus, a squad focused on only creating a robust frontend application, with all logics, using an application platform (such as Google Firebase®) as infrastructure.

This choice was made based both on the professor's experience in projects of the same size (over 25 years of experience) and the opportunity to learn new issues. For graphical interfaces application development, the Vue.JS framework was selected, and for data management, the Firebase Realtime® Database (Hanchett & Listwon, 2018; Moroney, 2017). Thus, the project was initiated, as already mentioned, in 2023.2, and its resulting structure, deployment, and growth and scalability process are demonstrated below (Section 3).

3 Results

After the squad formation and the development tools were selected, three major processes were conducted for the project's development: first, the structure that the system should have was defined; then, the implementation process in the Ânima HUB program, which was already in operation; and finally, the scaling of the system until March 2026 was presented.

3.1 System Structure

The Ânima HUB program manages data from all participants in the innovation program. Therefore, in the first semester of 2023, the development team was challenged to develop a system with the following capabilities:

- **Squad data management:** store, control, and make available data from students, teachers, and projects that make up the squads for the current and previous semesters.
- **Consolidation of the approval and disapproval process:** After the semester conclusion, each teacher should have access to the functionality to approve and disapprove the students who participated in their squad. In addition, approval (or disapproval) should be available to both.
- **Certificate issuance capability:** both teachers and students should be able to issue a certificate of participation each semester.

In addition to these capabilities, the system is presented as described in the following diagram, in Figure 2. It is possible to describe that both students and teachers should have access to the platform. As they use it, the platform should consolidate, in its database, all records of their activities. Regarding the academic aspect, the team's learning challenge can be reported. In addition to understanding the entire process of the Ânima HUB innovation program, the squad had the challenge of learning, in detail, how to professionally construct a solution that would serve a student innovation and entrepreneurship program, already in effect since 2021. The students, with guidance from the responsible professor, had the following learning process:

- **In-depth study of programming structures:** as already mentioned, only the professor had mastery of all the theoretical knowledge about systems development, which generally far exceeds the content taught in a regular university classroom. Thus, weekly guidance meetings were necessary to raise the level of knowledge of programming and other technology subjects that are necessary to build a system. Since 2023.2, the team has met at this frequency for regular studies and theoretical and practical research for constructions and improvements.
- **Professional-level study of the rules of the Ânima HUB program:** academic and practical knowledge of languages and computational resources was very important, but a crucial requirement was necessary: the study of project management. Based on these concepts, studies were carried out on the operational process of Ânima HUB, since the management processes for the innovation program should be reflected in the system. Then, project management knowledge was conducted focusing on the processes of Ânima HUB and, finally, translated into platform coding.
- **Enhanced learning about project processes:** even though the system was built, a project is not limited to just the running software. Therefore, studies and practices on deployment, maintenance, optimization, and other concepts became frequent within the development team.

With this, it is possible to point out that not only was a project developed, but in-depth study routines, guided by the advisor, were carried out, but with a real challenge as the focus. Research, studies, and real market challenges were conducted in unison.

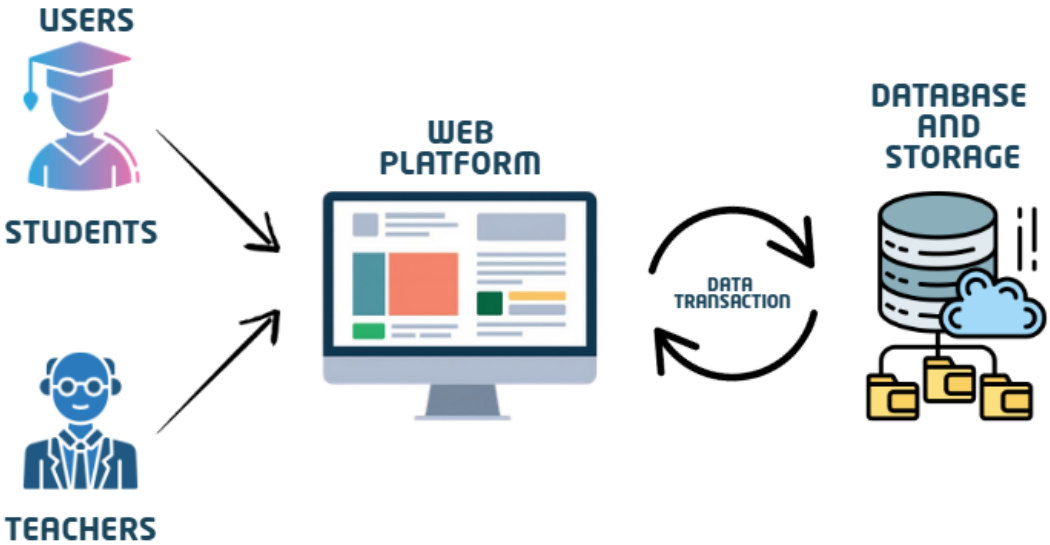


Figure 2: Flow of the system structure
Source: (Authors)

One of the most important focuses is the validation of the implementation process, as will be demonstrated in the following chapter, since the software will handle demands from a

company in the academic sector, with almost 400,000 students, working on a real program, with some of these students working on other real projects. In addition, as already mentioned, the platform should bring real improvements to the processes of a consolidated program, such as Ânima HUB, which has been in operation for approximately 5 years.

3.2 Ânima HUB's Management Process Implementation

The platform's development didn't just happen in one semester; it has continued through development and optimization cycles to this day. However, its first version was already available in August 2023.

The implementation process had the following points to consider:

Existing process: the proposed platform was to begin operating in an innovation and entrepreneurship program that had been running for over two years (2021-2023), working in 18 colleges, which operated using free tools such as Google Forms® for information consolidation, spreadsheets for data control and management, and documents and certificates issued with free tools. Some processes, such as student certification, consumed one week of work from two program employees.

Implementation: there was no possibility of stopping the innovation program to conduct validation and implementation tests. Thus, the implementation process took place with a gradual migration of processes, appearing as a phased change, so that the teachers and students enrolled in the program would not be negatively affected by the transition. Furthermore, the Ânima HUB program management team itself would need training and process optimization.

Process optimizations: with its own system, Ânima HUB management should experience process improvements and new management capabilities, with the minimization (or even replacement) of activities in view of the new possibilities that the system would bring.

Challenges: no project is conducted without potential risks. Issues such as lack of resources, delivery times, the need to obtain or create knowledge that was not present in the original project. Thus, obstacles were identified, overcome, or addressed.

Table 3 shows some examples of results over the years of platform development.

Table 3: Sample results

Question	Definition	Treatment and results
Analysis of the current process	Defining which data is relevant for system management.	Initially, it was defined that data on teachers, students, the origin of the project, and a description of the project type and objective were the primary needs. The first version already addressed this requirement.
Analysis of the current process	Definition of processes that should be implemented in the system.	All processes, such as registering a new project; enrolling students in the current project; evaluating student performance; and others, needed to be entered into the system. However, there was not enough time to enter all the current processes into the system. Therefore, processes such as project registration and student registration in semester projects were the initial implementations.
Analysis of the current process	Processes that would have to remain unchanged until the system was able to replace them.	Due to time constraints, the certification process could not be fully implemented in 2023.2. Therefore, part of the certification process remained manual until 2024.1.
Implantation	Definition of the	The system, which in August 2023 already had its first web-accessible

Question	Definition	Treatment and results
	initial semester of system operation.	version, was capable of handling the projects. It began its squad management process and took over project (squad) registrations in November 2023. Thus, the projects were migrated, followed by the teachers and students, along with their data.
Implantation	Training for the management and operations team at Ânima HUB.	The Ânima HUB management and operations team, consisting of 1 manager, 1 coordinator, 1 analyst, and 8 supervising professors, began their training on the platform in August 2023, prior to the migration process.
Optimizations Achieved	Centralized registration data	From 2023.2 onwards, the data had a unified reference point. Data on teachers, projects, students, approvals, and failures were centralized and had the capacity for expansion. Finding: The average time for registering and validating a project, along with teacher data, was 1 to 2 weeks, with the involvement of the coordinator and a support teacher. The automated process was reduced to 30 to 40 seconds.
Optimizations Achieved	Availability of approval and rejection results	Similar to the data centralization results, approval required documentation that the professor responsible for the squad had to fill out. In addition, there was validation by the Ânima HUB management team, adding up to 1-2 weeks of activity time. With the current platform, in 2023.2, the process was reduced to 40-60 seconds.
Optimizations Achieved	Availability of certificates	Similar to the data centralization results, approval required documentation that the professor responsible for the squad had to fill out. In addition, there was validation by the Ânima HUB management team, adding up to 2-3 weeks of activity time. With the current platform, in 2023.2, the process was reduced to 40-60 seconds. Specifically, the automated certification process began in 2023.2 and was consolidated in 2024.1.
Challenges	Streamlining changes, in accordance with the demands of the Ânima HUB program.	Ânima HUB, being an innovation and entrepreneurship program, needs constant updates that respect the market and technological or research innovations. Thus, the constant study of Ânima HUB processes and how to implement the dynamics on the platform was a challenge for the team.
Challenges	Management of end-of-semester championships	As already mentioned, Ânima HUB has a funding competition, called Shark Hub, to engage the projects carried out. In 2024.1, the platform was already able to provide a module for managing votes and judges for the competition, which was extremely well received by the judges and administrative team.

Source: (Authors)

These results represent deliverables that optimized the management of Ânima HUB. Conceptually, the deliverables optimized processes, significantly reducing costs and even generating savings equivalent to weeks of work for one or more teaching professionals. Having achieved these optimizations, the next section will provide a numerical evaluation of the scalability achieved in the innovation program.

3.3 Scalability Process

The platform was developed in 2023.1, put into operation in 2023.2, and is still in use. In numerical terms, the scalability achieved by the Ânima HUB program can be visualized. It is worth remembering that the innovation program is embedded in a context of approximately 400,000 students and 18 universities throughout Brazil. This analysis focuses on demonstrating how complex the scenario in which the platform operates is. In addition, the impact of the

software is extremely valuable due to the exponential increase in projects and students involved.

The following KPI metrics were listed for the analysis and management of the project:

- **Number of projects managed**: Volume of Technical-Scientific Production - Measures the density of innovation activity and the installed capacity for project incubation in the institution.
- **Number of students in projects**: Reach Rate and Student Participation - Reflects the system's reach in democratizing access to research and outreach.
- **Management capacity**: Operational Efficiency and Governance Scalability - The system's ability to maintain administrative integrity under a high load of multi-center coordination (professor-student).
- **Average access per month**: Intensity of Use and Digital Engagement - Analyzed from the perspective of Technology Acceptance Theory (TAM), indicating the perceived usefulness and ease of use of the system.

Figure 3 shows the number of squads, that is, projects that Ânima HUB manages over approximately 5 years. Figure 4 shows the students involved in these projects. A numerical analysis becomes relevant.

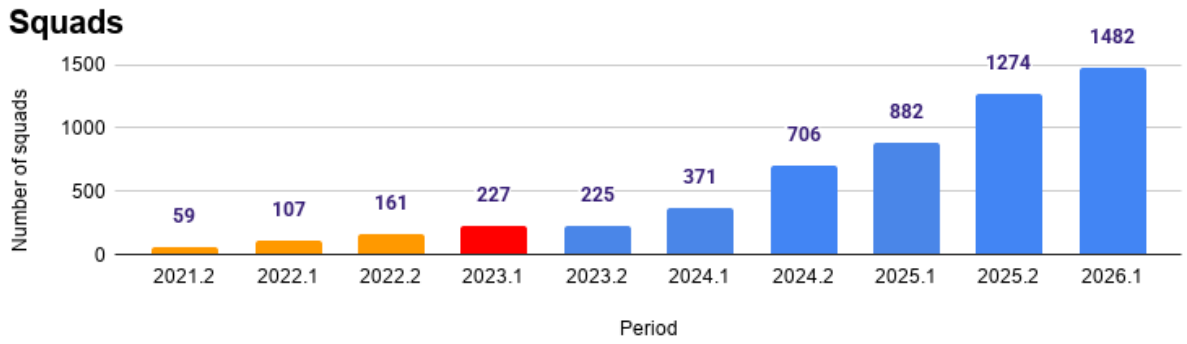


Figure 3: Number of Ânima HUB squads over the years.
Source: (Authors)

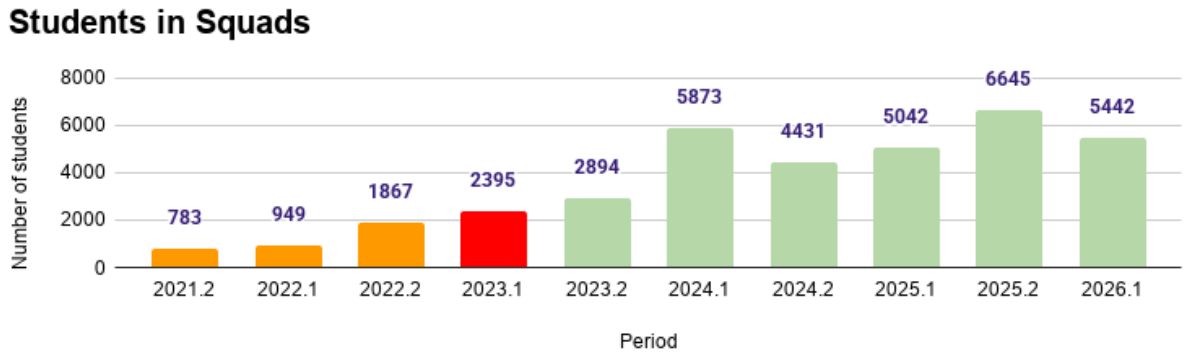


Figure 4: Number of students participating in Ânima HUB squads over the years.
Source: (Authors)

After consolidation in 2023.2, the platform enabled the management of more than 1274 projects in 2025.2, representing an increase of approximately 460% in terms of Ânima HUB's management capacity. The platform is still in effect. Although 2026.1 is still underway, the 1345 projects in operation can already be considered, which already represents a 497% increase compared to 2023.2 in 2026.1. Evaluating the students, in 2023.1, with 2395 students, the platform was not operational. However, compared to 2023.1, 2025.2 shows a 177% increasing. 2026.1 is still receiving the registration process, with 4205 students enrolled and

with the possibility of exceeding 2025.2. In terms of impact, the tool numerically manages approximately 1.5% of the 400,000 Ânima students active in projects managed by the platform.

The platform was not limited to simply managing the data of the squads and their teams working in the Ânima HUB program. Furthermore, a module was developed, focused on providing an online framework, based on quality tools (e.g., 5W2H, Kanban, SWOT Matrix), as well as workflow diagrams, was developed, as shown in Figure 5. In addition to the above, other functionalities were added such as dashboards, BI (Business Intelligence) modules, people management, lab management, among others. Finally, it is worth noting that this project, born as an academic project, with students researching the literature and implementing it in market demands, all coordinated by a supervising professor, demonstrates a transcendence of classroom content to market demands.

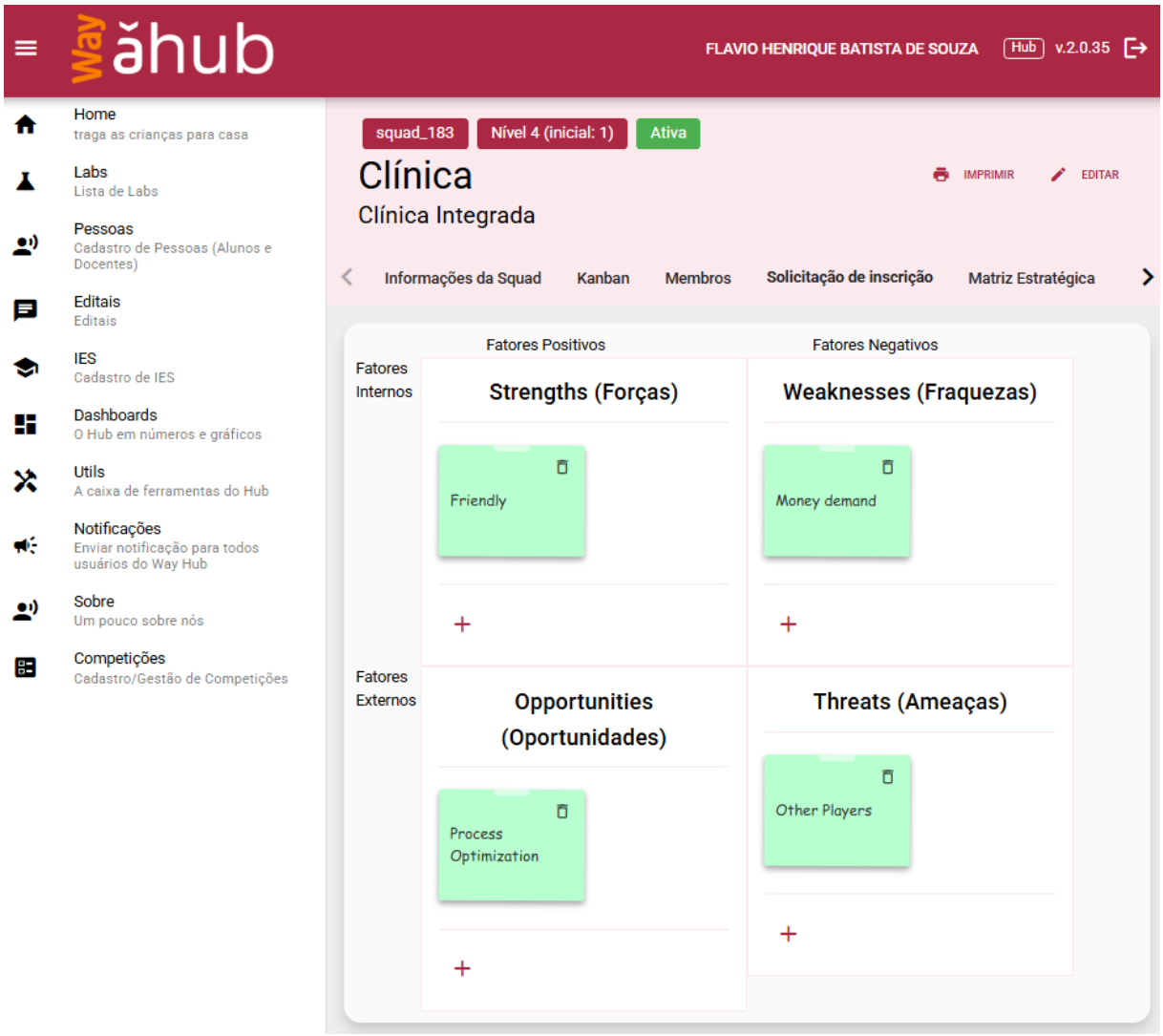


Figure 5: Internal Activities Module of the Platform - Example of a SWOT Matrix
Source: (Authors)

Key evaluation points are: more than 60,000 accesses in 2025/2 alone, over 37,000 registrations during 3 years of operation, an average of 12,000 accesses per month in 2025/1, Apdex (Application Performance Index) 0.999.

3.4 Technical Challenges and Optimizations

The growth and scale driven by the application led to an invisible technical problem: eager data loading and badly designed data refresh proved suboptimal after one year of data storing. At 2024.1 Ânima HUB had an outlier number of students in the enrollment process. After 2 days from student enrollment initialization, the database costs increased to over US$ 1.000,00 and there were only 19 days left. An application interruption was established to a optimization process. A complete redesign was necessary to develop these new service structure. An intermediary solution was delivered as a temporary measure. A parallel platform was rebuild from scratch. This new solution was based in classic Client-Server architecture, with a Vue.JS® frontend and an Express.JS® backend, using a Relation Database Management System (Oracle Autonomous Database). All these changes were build in 2024.1 and the new 2.0 version was completed and delivered for 2024.2. From 2025.1 to 2025.2 period, the platform had more than 12.000 accesses per month.

This redesign brought stability to the platform in multiple aspects: operational cost was reduced to near US$ 20,00 per month, the application became 40% faster than the previous version, memory consumption had 70% reduction, and new features had a shorter implementation time (50% less). After 5 semesters, over 25 students have been involved in the platform development team, many of them for more than one semester, students from many distinct courses (computer science, software engineering, design, pedagogy, psychology) who brought different experiences, backgrounds and points of view to the process. Actually, the platform offers more than support for Ânima HUB's process, it offers a suite of project/business/idea management tools (Kanban board, Project Model Canvas, Product Canvas, 5W2H, SWOT matrix, Strategic matrix, Mind Map, a web hot site generator). These tools give an opportunity to learn a sort of concepts - project management, business planning, design thinking - to team members (from students to lectures).

In 2026.1 the squad is composed by 6 students and professor Jean Paul Lopes as tech leader and product owner. All challenges compose a relevant and real experience for students, who faced significant technical challenges.

This article not only consolidates the findings of Hasanefendic et al. (2016), Dollinger & Lodge (2020), and Cidral et al. (2020), but also demonstrates a practical process of large-scale implementation of a management system, built, deployed, and used by an educational ecosystem of approximately 400,000 students.

To evaluate the results and compare them with the research design, firstly the evaluations regarding the established baselines, comparing them with the proposed KPIs. Table 4 shows this consolidated data.

Table 4: KPI versus Baseline Evaluation Results

Key Performance Indicator (KPI)	Baseline (2023.1)	Post-Intervention (2025.2)	Comparative Impact
Managed Projects	225 projects	1274 projects	460% increase.
Participating Students in squads	2395 students	6645 Students	177% growth. Demonstration of the platform's installed capacity to support user base growth

Source: (Authors)

Furthermore, we have the following findings:

- **Project Registration**: the average time for project registration and validation (including professor data), which required 1 to 2 weeks of manual work, was reduced to 30 to 40 seconds with the automated process.
- **Certificate Issuance:** the management and validation of certificates, which consumed 2 to 3 weeks of work from the management team, was reduced to 40-60 seconds after the consolidation of automation in 2024.1.

The proposed triangulation resulted in the following composition:

Internal Triangulation: is used to validate the usability and effective adoption of the platform by users (students and teachers), using the KPI "Average access per month". This indicator serves as a predictor of "Use" and "User Satisfaction", according to the structure of the Technology Acceptance Model (TAM). Example and Evidence: The average of 12,000 accesses per month in the period from 2025.1 to 2025.2, totaling more than 60,000 accesses, is usage data that confirms that the high acceptance of the system is an underlying factor in the scalability of the Ânima HUB program (460% increase in projects).

This quantitative evidence of use validates the premise that the software, being user-led (developed by students and professors), met the real needs of daily academic and administrative activities.However, some limitations can be noted: the scope of the study is restricted to a single educational ecosystem (Ânima Educação); the potential bias of internal development (students/teachers of the institution) and the interruption and complete redesign of the architecture (from Serverless to Client-Server) that occurred during 2024.1, breaking the continuity of the design and requiring a restructuring of services.

External Triangulation: External Triangulation uses technical and financial data from the software project to quantify the "real and measurable gain" of the intervention, going beyond operational improvements:

- Evidence 1: Reduction of Operational Costs. A formal comparison is made between the software architectures used: Serverless Architecture (2024.1): The operational infrastructure cost peaked at over US$1,000.00 per month; Client-Server Architecture (2024.2 onwards): After redesigning to a Client-Server architecture (Vue.JS®/Express.JS®/Oracle Autonomous Database), the cost was drastically reduced to approximately US$20.00 per month.
- Evidence 2: Performance Gains. The architectural optimization that generated the cost reduction is triangulated with performance improvements. The redesign resulted in a 40% faster application and a 70% reduction in memory consumption.

Despite the methodological rigor employed, which includes internal and external data triangulation, the study presents limitations inherent to its nature and context that deserve discussion. These limitations directly impact the validity and generalizability of the results obtained.

- **Scope Restriction to a Single Educational Ecosystem:** The scope of the study is restricted to a single educational ecosystem (Ânima Educação). Although this environment comprises 18 institutions and approximately 400,000 students, limiting the study to a single organization may result in a lack of external validity. The scalability (460% increase in projects) and efficiency of the processes are contextual and may be inseparable from the specific organizational culture of Ânima Educação, its proprietary methodology, and the shared governance structure adopted by the project. Thus, replicating the solution or processes in Higher Education Institutions (HEIs) with different governance structures or technological maturity may not generate the same positive results.

- **Potential Development Bias and Internal Confirmation Bias:** The platform was developed internally by students and professors from the institution itself. While this is presented as a strength because it ensured the solution met real needs, it introduces a potential confirmation bias. The authors/developers are intrinsically linked to and invested in the reported success of the system. Although triangulation of external data (cost and technical performance) and user acceptance (12,000 accesses per month) mitigate this risk, primary evidence of process optimization (such as reducing registration time from 1-2 weeks to 30-40 seconds) depends on internal evaluations. It is suggested that future studies incorporate validation by external auditors or independent user satisfaction surveys for greater objectivity and neutrality.
- **Methodological Interruption due to Architectural Redesign:** The occurrence of the interruption and the subsequent complete redesign of the architecture (from Serverless to Client-Server) during the 2024.1 semester constitutes a significant interruption in the methodological continuity of the longitudinal design. This transition, motivated by a technical crisis (operating costs of the Serverless database reaching over US$1,000.00 per month), required the reconstruction of a parallel platform from scratch, delivered only in 2024.2. This means that the reported longitudinal success (scalability and stability) is not a linear result of the solution initially implemented in 2023.2, but rather of two distinct technological interventions. This discontinuity makes it difficult to attribute causality to long-term impacts and should be considered when interpreting the robustness of the original design.

4 Conclusion

The demand for management is transversal to all sectors, including education. In parallel, in classrooms and university programs, valuable content is taught and it's valuable to the market. The case study presented here demonstrates how the academy itself developed a solution, with a high degree of maturity, to meet its own demands, considering a universe of almost 400,000 students and 18 institutions.

It can be seen that the process of building the project team, as well as the process of acquiring knowledge and skills, which are fundamental in academic life, were key pieces for the construction of the proposed solution. The impact of the project was verified, both procedurally and numerically, providing real and measurable gains, through a solution created and managed by teachers and students.

Finally, an innovation and entrepreneurship program innovated and undertook within its own reality. Plausible and tangible results were presented, tested, and validated.

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