TECHNOLOGY CONSULTING
IN THE GLOBAL COMMUNITY

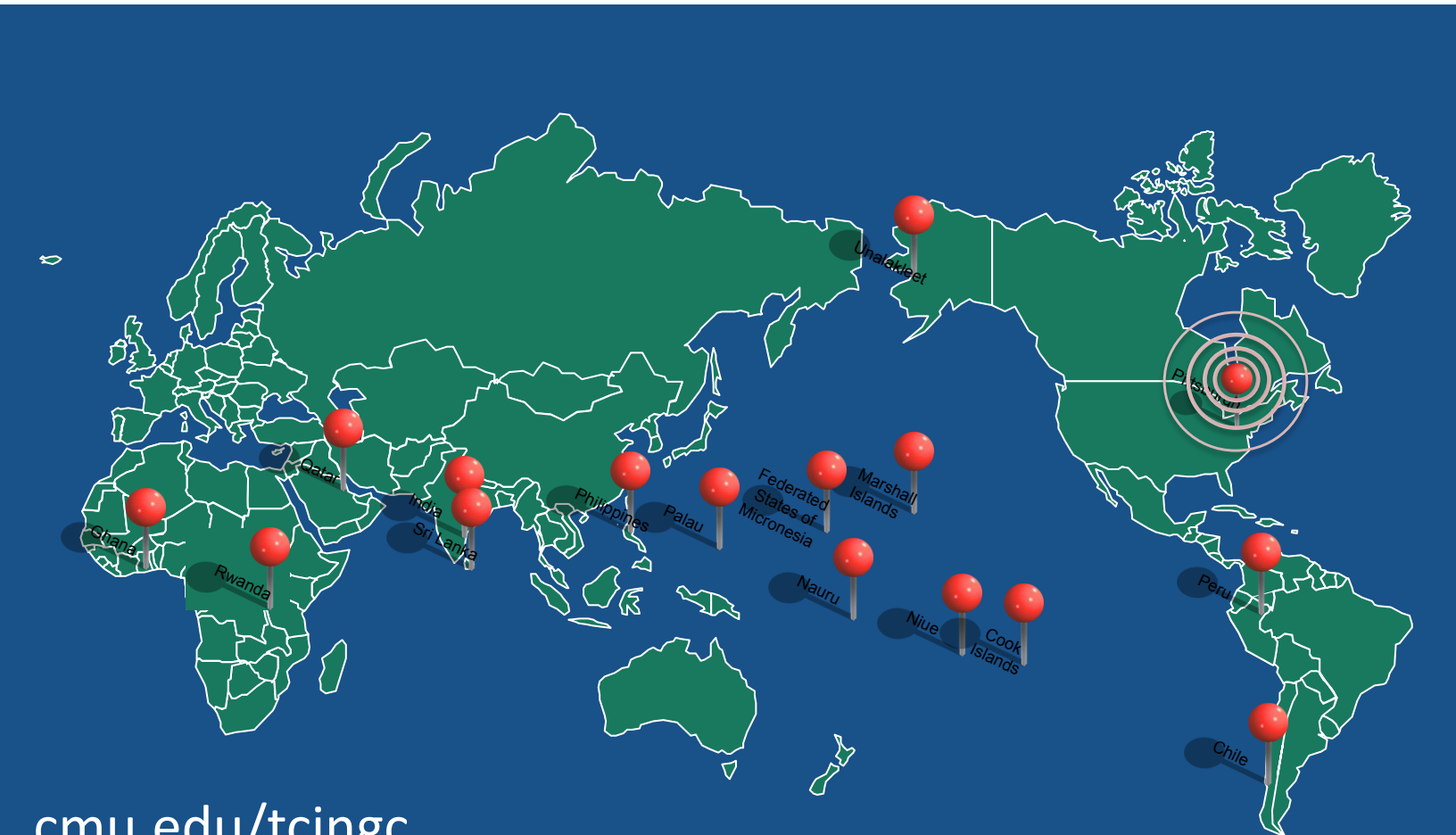
Final Consulting Report

Peru SENATI

Alondra Robles

August 2025

Carnegie Mellon University



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Executive Summary

Student Consultant, Alondra Robles
Community Partner, Arnaldo Stalin Ramírez Fernández and Ricardo Rubén Angulo León

I. About the Organization

The National Training Service for Industrial Work (*Servicio Nacional de Adiestramiento en Trabajo Industrial*), also known as SENATI, was established in 1961 by Peru's National Society of Industries. SENATI is a non-profit vocational school offering over 75 in-person and online programs, serving over 130,000 students across 64 campuses nationwide.

SENATI's mission is:

> *"To train innovative and highly productive technical professionals" (Formar profesionales técnicos innovadores y altamente productivos)*

The organization's headquarters and main campus are located in Lima, Peru. The headquarters houses eight key functional management offices, as well as the National Executive Office. In addition to these departments, SENATI's governance structure includes a National Board, Regional Boards, National Advisory Commissions, and Regional Management, all of which play a vital role in supporting and advancing its mission.

II. Enhancing Access to Enrollment Data for Financial Insight and Management

As a vocational school, student tuition is one of SENATI's key sources of income, understanding enrollment and dropout trends is essential to the Finance department's role in maintaining the institution's financial health. However, this data was not easily accessible or aligned with financial decision-making needs. To address this, a Power BI dashboard was developed, allowing the Finance team to track trends over time, compare categories such as *Pagantes* and *No Pagantes*, and analyze year-over-year totals.

Outputs & Outcomes:

- Power BI Dashboard visualizing enrollment trends, dropout rates, and financial categorization (*Pagantes* vs. Not *Pagantes)*.
- Improved financial forecasting through data-driven insight.
- Enhanced visibility into yearly enrollment changes.

Risks to Sustainability:

- Dependency on Group ID and Period Key: If SENATI changes how it tracks enrollment periods, the current data model may break.
- Incomplete Dropout Tracking: Students who stop attending without formally dropping out are not captured, limiting insight into true dropout trends.

Recommendation:

- Develop a method for tracking unofficial dropouts to improve data completeness and accuracy.

III Automate the Data-to-Insight Process: Transition from Excel to Power BI

The Finance Department at SENATI relies on monthly reports from multiple sub-departments, but the lack of a standardized reporting structure in Excel has led to inefficient, time-consuming data consolidation. To address this, the goal was to automate and standardize the data-to-insight process by transitioning from Excel to Power BI. This shift enables faster data processing, reduces manual effort, and allows the Finance team to focus on analysis and strategic decision-making rather than repetitive reporting tasks.

Outputs & Outcomes:

- Power BI dashboard for the Budget area, visualizing key financial metrics such as income by category, costs, operating results, and net operating cost.
- Improved financial forecasting and planning through automated, near real-time insights.
- Enhanced consistency and accuracy of monthly financial reporting.

Risks to Sustainability:

- Dependence on manual uploads: Without full integration, the process still requires periodic human input, limiting scalability.

Recommendation:

- Expand the automation pipeline to additional sub-departments and integrate ETL processes to enhance workflows.

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Alondra is a rising senior in Information Systems. She will return to CMU in the fall for her final year

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I. About the Organization

Organization

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SENATI is a major organization, requiring the use of many resources. As with many major organizations, information management and communication streams could be improved. SENATI could also better leverage the use of information systems to improve data informed decision making.

Facilities

SENATI's 64 campuses span across 13 zones that range all across Peru. Campus size and facilities at each location vary. Five of SENATI's 64 campuses feature Centers of Excellence—facilities developed in collaboration with industry partners to provide students with additional tools and laboratories that support hands-on learning. The development of the Centers of Excellence was led by SENATI's Development office, in collaboration with national and international partners. Each campus is structured to foster practical, skills-based education in a professional environment.

SENATI's headquarters is located on its main campus in Lima. The eight-story building houses the national executive office and functional management offices. All staff located in SENATI's headquarters are provided a desk, filing cabinet, desktop, and additional office supplies. Each

floor includes bathroom facilities and a small break room with beverages like water, coffee, and tea. Every floor also has a designated janitorial staff member that maintains the space.

SENATI maintains a high level of security. SENATI's Lima campus' perimeter is entirely fenced off. Every car entering campus must be let in by security personnel. Upon exiting SENATI's premise security will check your car. Inside SENATI's headquarters added security measures exist. You must check-in with the front desk attendant and to enter any functional management office you need fingerprint access or be let in by someone who does.

Programs

SENATI offers over 75 vocational training programs. In addition to SENATI's core training programs, students can participate in various workshops and webinars. SENATI also offers fully online training programs, to meet the needs of every type of student. Each program requires students to use various technological tools such as computers, software platforms, heavy machinery, and many more.

SENATI attributes its success to a robust educational model that combines foundational knowledge with practical experience. The program begins with technical vocational training, which includes general studies and basic technical instruction during the first year and a half. In the second half of the program, students enter a dual training phase, where they apply what they've learned in real-world settings through partnerships with external organizations and businesses. In addition to its core programs, SENATI offers ongoing training for technicians and operators through qualification programs, technology updates, and competency certifications. SENATI's educational model and resources offer a comprehensive learning experience that prepares students for success as technical professionals.

Staff

SENATI is a major organization supporting the academic development of more than 130,000 students across Peru. This scale requires a large, coordinated team and a wide range of departments to successfully carry out its mission. At the top of SENATI's organizational structure is the National Board, which oversees all institutional operations and strategic decision-making. Reporting to the board is the National Executive Office, led by National Director Mr. Gustavo Alva. Under his leadership are both functional management offices—responsible for specific institutional areas—and regional management teams that oversee local operations. Additionally, SENATI has National Advisory Commissions that ensure academic programs remain current and relevant, and Regional Boards that focus on the success of each region.

For this project, I am working primarily with the Finance Management Office, led by Mr. Ricardo Angulo. This office is composed of seven sub-departments: Accounting, Budgets, Treasury, Assets, Contribution Administration, and Payment Control. Each sub-department is led

by a designated coordinator. I will also be working closely with Mr. Arnaldo Ramirez, who is the head of analytics and data quality within the Information Technology Office.

To date, I've had the opportunity to speak with several finance department leads, including Mr. Juan José Vasquez (Budgets), Mrs. Rosario Pajuelo (Treasury), Mr. Abel Canol (Contribution Administration), and Mr. Miguel Urrutia from the Accounting team. My work will involve close collaboration with Mr. Ricardo and the heads of these sub-departments, as well as Mr. Arnaldo Ramirez, with Mr. Ricardo being the primary stakeholder impacted by the outcome of this project.

Staff members I've interacted with have been both supportive and receptive to the data-gathering process. Most staff use Excel regularly alongside other Microsoft tools such as Teams and Outlook. Additionally, the Finance Office makes extensive use of Oracle JD Edwards, which houses all core financial data and supports their operational workflows.

Technology Infrastructure

Type of Technology	Technology Description	Use and Availability of Technology at SENATI
Hardware & Peripherals	HP Computers	All staff members have access to and regularly use an HP computer.
	Desktop, Keyboards, Mice, Headsets, and landline phones	All staff members have access to and regularly utilize the peripherals listed to the left.
OSs/ Types of Software Programs	Windows 11	Most computers seem to be running on Windows 11.
	Microsoft Office 365 ● Word ● PowerPoint ● Excel ● Outlook ● Teams	All staff members regularly use Microsoft Office and are critical to almost all management offices information management and communication.
	Oracle JD Edwards	JD Edwards is mainly utilized by the Finance Management Office and is a database that holds all finance related information.
	Banner by Ellucian	Banner is a higher ED administrative system. This

		system consists of information like student, faculty, course, financial etc.
	Power BI	The IT department has developed numerous Power BI dashboards to support various administrative areas within SENATI. Power BI remains a key tool for visualizing KPIs and extracting valuable insights from critical data.

Technology Management

SENATI's technology management structure includes an Information Technology (IT) department responsible for overseeing all technology-related operations across the institution. The IT department is divided into three sub-departments: Operations, Development, and Analytics. The Operations team manages hardware, including the maintenance of administrative equipment and servers. The Development team is responsible for implementing and rolling out internal and external applications, as well as managing contracts with third-party application providers. The Analytics sub-department focuses on building dashboards, tracking key performance indicators (KPIs), and developing analytical models. Historically, their efforts have been concentrated on academic-related analytics.

To handle and resolve technical issues, SENATI's IT department uses a ticketing platform called CUSU (Centro Único de Soporte al Usuario / GLPi). The Operations team receives incoming tickets and assigns them to the appropriate sub-department within IT. Once a ticket is routed, the responsible team assesses the issue and may contact external support providers if needed. In addition to responding to reported issues, the Operations team also monitors all active computers to track usage and determine when updates or replacements are necessary.

Technology Planning

SENATI's Information Technology (IT) department operates under a three-year strategic plan aligned with the institution's overarching goals. This plan is developed collaboratively by the National Director, Mr. Gustavo, and the IT Manager, Mr. Willy Zamudio. While the strategic plan is officially revised every three years, it is reviewed annually to ensure it remains relevant and aligned with current priorities. The plan is communicated to the IT team through a set of defined objectives. For example, one objective might task the Analytics sub-department with generating a list of KPIs for a specific academic area. Additionally, the IT department receives an annual budget, which is allocated between operational needs and investments in development.

Communication

General information about SENATI is available on its official website: https://www.senati.edu.pe. Administrative and marketing materials can also be found on SENATI's Issuu page: https://issuu.com/senati1, which is updated annually with new marketing content. SENATI maintains an active presence on social media platforms such as LinkedIn and Instagram.

All staff are provided with SENATI-specific email accounts and have access to the internet. Internal communication within functional management departments primarily occurs through email, Microsoft Teams, and WhatsApp. In the Finance Department, Microsoft Teams is commonly used for file sharing, especially when file size limitations prevent attachments via email. Excel files and other resources are routinely shared across departments.

Most departmental updates are communicated to senior management and, when necessary, escalated to the National Director. All communication is handled electronically. However, staff noted that response times for information requests can sometimes be slower than ideal. To expedite the process, it is often useful to follow up or share requests with multiple contacts.

Information Management

Information management is highly hierarchical with little communication across different functional management departments. Departmental communication only seems to occur monthly, during meetings with the managers of each functional management department. Monthly managers of each functional management department prepare a presentation for the National Director. Generally, most information seems to be sent electronically. SENATI currently lacks a centralized database or unified information system that consolidates key organizational data across all departments.

Business Systems

SENATI's business systems such as accounting are overseen by departments including Finance, Human Resources, and the Legal department. These departments do seem to have a set stream of communication to ensure complete systems. The current systems in place appear to function effectively. The Finance Department undergoes annual audits, and there have been no reported issues.

II. Enhancing Access to Enrollment Data for Financial Insight and Management

Motivation

The Finance Department at SENATI plays a critical role in safeguarding the institution's financial health. While it manages key areas such as budgeting, accounting, treasury, and assets,

a significant challenge lies in the department's limited access to essential academic data. Information such as enrollment trends, dropout rates, and the proportion of paying students ("*pagantes*") is vital for accurate income forecasting and strategic financial planning. Currently, this data is managed by the Academic Department, and Finance must rely on periodic reports that require manual reformatting in Excel, an inefficient and time-consuming process.

This lack of timely and usable data hinders Finance's ability to obtain a clear picture of the factors influencing SENATI's financial health and to make forward-looking decisions. Since SENATI's mission includes providing accessible, high-quality technical education, aligning financial planning with academic realities is essential. Streamlining access to academic data and improving visualization tools present an opportunity to enhance financial agility and support the institution's long-term sustainability.

Outcomes

Activities and Outputs

To better understand which metrics were most important and how Finance needed this information presented, I conducted multiple meetings with the Head of Finance. Once the requirements were clarified, I met with the IT Department to explore what dashboards already existed and whether any could serve as a foundation. In collaboration with IT, we identified an existing dashboard as a launching point for Finances dashboard.

After identifying both the needs and the technical resources available, I created multiple paper-based dashboard mockups (see Appendix A) to explore the best way to visualize the required information. These designs, along with IT's existing dropout analysis dashboard, served as the foundation for the Finance Enrollment Dashboard.

To ensure the dashboard would be practical and valuable, I held regular review meetings with Finance to receive feedback and make improvements throughout the development process. The final result was a three-page dashboard::

- ***Informe de Matriculado y Retirados*** (Enrollment Summary and Withdrawals)
- ***Informe de Neto Matriculados Pagantes*** (Net Paying Students Report)
- ***Informe de Desrtores (Retirados y Hábiles)*** (Dropout Report: Official and Active Non-Attending Students)

Outcome and Indicators

This dashboard allows for Improved financial forecasting through data-driven insight, as well as enhanced visibility into yearly enrollment changes. The visualization and totals summary allow for a clearer view of the picture. Allowing you to look at the data from different angles and in a manner that supports decision making and obtaining insights from the visualizations. Due to time constraints these dashboards weren't fully published while I was actively at SENATI. However, I am confident that this process decreases manual efforts significantly. Power BI itself through indexing and other methods is able to filter and interact with this data at a speed much faster than excel.

Risk to Sustainability

Dependence on Group/Period Keys

The IT Department currently uses group and period keys to classify the year a student enrolled, rather than relying directly on enrollment dates. This requires an intermediary table in the data model to map keys to calendar years. If this structure changes, the dashboard may break. IT must either preserve this model or proactively update the dashboard to reflect any changes.

Incomplete Dropout Tracking

The current data does not capture students who stop attending without formally withdrawing, which limits the dashboard's ability to provide a full picture of dropout trends.

Recommendation

Develop a method for tracking unofficial dropouts to improve enrollment data completeness and accuracy.

Why this matters

Currently, students who stop attending without formally withdrawing are not recorded in the system until the end of the semester. This gap reduces the accuracy of enrollment and dropout figures, which are two key indicators used by Finance to forecast tuition income and assess institutional performance.

Improving the dropout tracking process would give the Finance Department a clearer picture of enrollment dynamics, allowing for better income prediction and risk analysis. It would also support SENATI's mission by identifying non-formal student withdrawals earlier and enabling interventions that could improve retention.

How to implement this

- Establish a cross-functional working group with representatives from IT and Academic departments.
- Review the current student monitoring process and identify signals that may indicate an unofficial dropout (e.g., prolonged absenteeism, inactive course participation).
- Define criteria for flagging potential unofficial dropouts and establish a follow-up protocol to confirm dropout status.
- Update the data model to include a "probable dropout" category that can be tracked and analyzed.
- Pilot the process for one academic term, then refine based on feedback and performance.

Resources needed

- Time and input from the IT and Academic teams to develop new reporting logic and procedures.
- Support from department leadership to ensure cooperation across units.

- A future TCinGC student consultant could take on this project to design and implement the tracking system.

III. Automate the Data-to-Insight Process: Transition from Excel to Power BI

Motivation

The Finance Department consists of several sub-departments, each of which communicates various pieces of information to Mr. Ricardo Angulo on a monthly basis. For each sub-department, the information shared with Mr. Angulo is recorded and compiled in an Excel workbook. However, the structure of these workbooks varies depending on the sub-department and the individual preparing the report.

For example, the head of budget has developed a comprehensive workbook that leverages Power Query, Power Pivot, and data visualizations, following the Extract, Transform, Load (ETL) framework. This approach has enabled him to create a relatively efficient process for managing the data he is responsible for. In contrast, many other sub-departments simply copy and paste data from CSV files downloaded from JD Edwards into their workbooks. Each Excel workbook presents information in different formats, which means Mr. Angulo must sift through these varied reports to extract the information he needs.

This lack of standardization leads to significant time consolidating data. Therefore, it is crucial to standardize this process to allow the Finance Department to spend less time on data processing and more on analysis, decision-making, and their core operational tasks. Since this process is repeated monthly, it often disrupts regular workflows.

Outcomes

Activities and Outputs

To make progress, I was given access to the Head of Budget's monthly report Excel workbook. This report is extensive and required significant time to understand how the data tables, calculations, and visualizations relate to each other, as well as what each number represents. Due to the complexity of the workbook, I conducted several meetings with the Budget team to identify which information was most important to display in the new budget dashboard. I then created paper-based dashboard mockups (see Appendix A) to explore the best way to visualize the required information.

Additional meetings were held to understand the various calculations used in the report. Many tables in the original Excel file were based on derived metrics that extended beyond the raw data. After analyzing and interpreting these calculations, I incorporated them into the Power BI data model. With this foundation in place, I began constructing the visualizations and dashboard pages. As with the enrollment dashboard, I set up regular meetings to review progress, gather

feedback, and make iterative changes. The result was a finalized dashboard consisting of five pages tailored to the Finance Department's needs. These pages are as follow:

- ***Informe Resultado Operativo*** (Operating Results Report (***Informe Resultado Operativo)***
- ***Informe de Ingresos y Gastos por Zonal y Rubro*** (Income and Expenses by Zone and Category)
- ***Informe Historico*** (Historical Report)
- ***Informe de EBITDA y Resultado Neto*** (EBITDA and Net Profit Report)
- ***Informe de*** **Evolución** ***de EBITDA y Resultado Neto*** (EBITDA and Net Income Trend Report)

Outcome and Indicators

The new budget dashboard improves financial forecasting and planning by providing automated, near real-time insights. It also enhances the consistency and accuracy of monthly financial reporting. Now, to generate the most updated dashboard, the Finance Department simply needs to upload the current month's data, streamlining what was previously a manual and time-consuming task. Additionally, filtering visualizations in Power BI now updates almost instantly after changing a slicer, whereas in the Excel workbook, this process took approximately 15 to 30 seconds.

Risk to Sustainability

Although the dashboard significantly reduces manual work, it still requires periodic human input. This input must be consistent and timely; otherwise, the dashboard may become outdated or provide misleading insights about SENATI's financial position. Ensuring staff follow a standard update process is critical to maintaining its reliability over time.

Recommendations

Expand the automation pipeline to additional sub-departments and integrate ETL (Extract, Transform, Load) processes to enhance workflows.

Why this matters

Due to time constraints, the transition from Excel to Power BI was only implemented for the Budget sub-department. However, other Finance sub-units (such as Accounting, Treasury, and Assets) currently rely on similar manual Excel workflows that are time-consuming and prone to inconsistencies.

Extending the automation process to these areas would create a standardized, efficient system across the Finance department. This would reduce time spent on manual reporting, improve data accuracy, and support faster, more informed decision-making—ultimately increasing the department's operational efficiency and alignment with SENATI's strategic goals.

How to implement this

- Identify priority sub-departments within Finance that rely heavily on Excel-based reporting (e.g., Treasury, Accounting).
- Conduct meetings with relevant staff to gather reporting requirements, key metrics, and pain points.
- Design dashboard mockups based on gathered requirements and existing Power BI practices.
- Build and test the dashboards, integrating ETL processes to automate data cleaning and updating.
- Iterate with staff feedback and finalize dashboards for each sub-department.

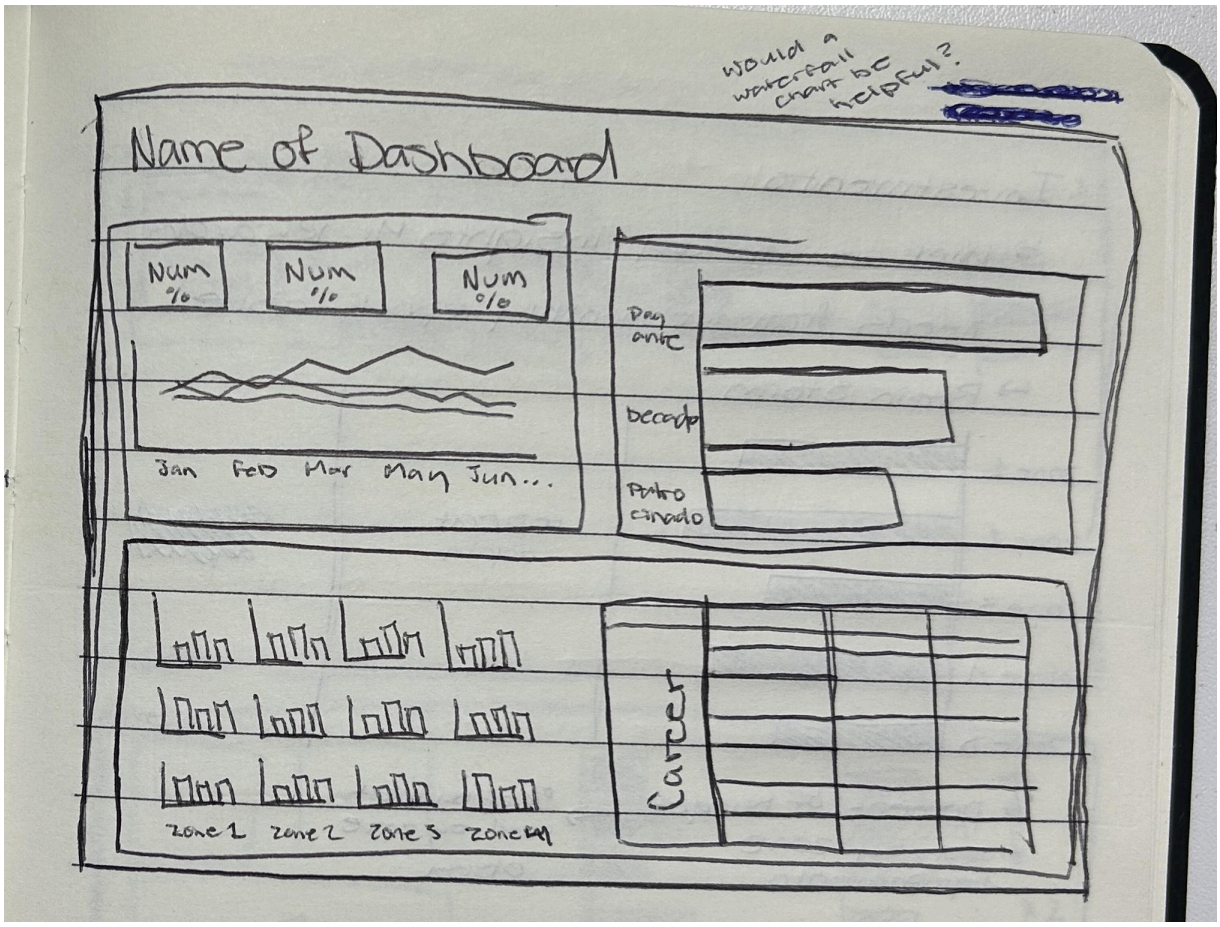
Resources needed

- Support from the IT Department, which has already expressed interest in continuing to build KPI dashboards for Finance.
- Power BI development skills, either through internal staff training or continued engagement with a TCinGC consultant.
- Access to sub-departmental data sources to enable automation and dashboard development.

About the Consultant

Alondra Robles is a junior majoring in Information Systems with a minor in Software Engineering at Carnegie Mellon University. She currently serves as president of Girls Who Code and as the Lead Coordinator for Partners Allied in Community Engagement (PACE) at CMU. Alondra enjoys transforming complex problems into practical, real-world solutions. She will return to Carnegie Mellon in the fall to complete her final year.

Appendix A.



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