Introduction

PURPOSE OF THE PROJECT

The primary purpose of this project is to bridge the gap between **consumer sentiment** and **business performance** in the beauty and cosmetics industry. In an era where viral social media trends and ingredient safety concerns can shift market demand overnight, traditional sales reports are no longer sufficient for effective brand management.

Project Overview

This project leverages **Tableau** and **AI-driven Sentiment Analysis** to transform fragmented customer reviews and sales data into a unified, interactive dashboard. By analyzing the relationship between product features (such as ingredients, skin types, and price points) and consumer mood, the project aims to uncover patterns that directly impact revenue and brand loyalty.

Ideation Phase
Brainstorm & Idea Prioritization Template

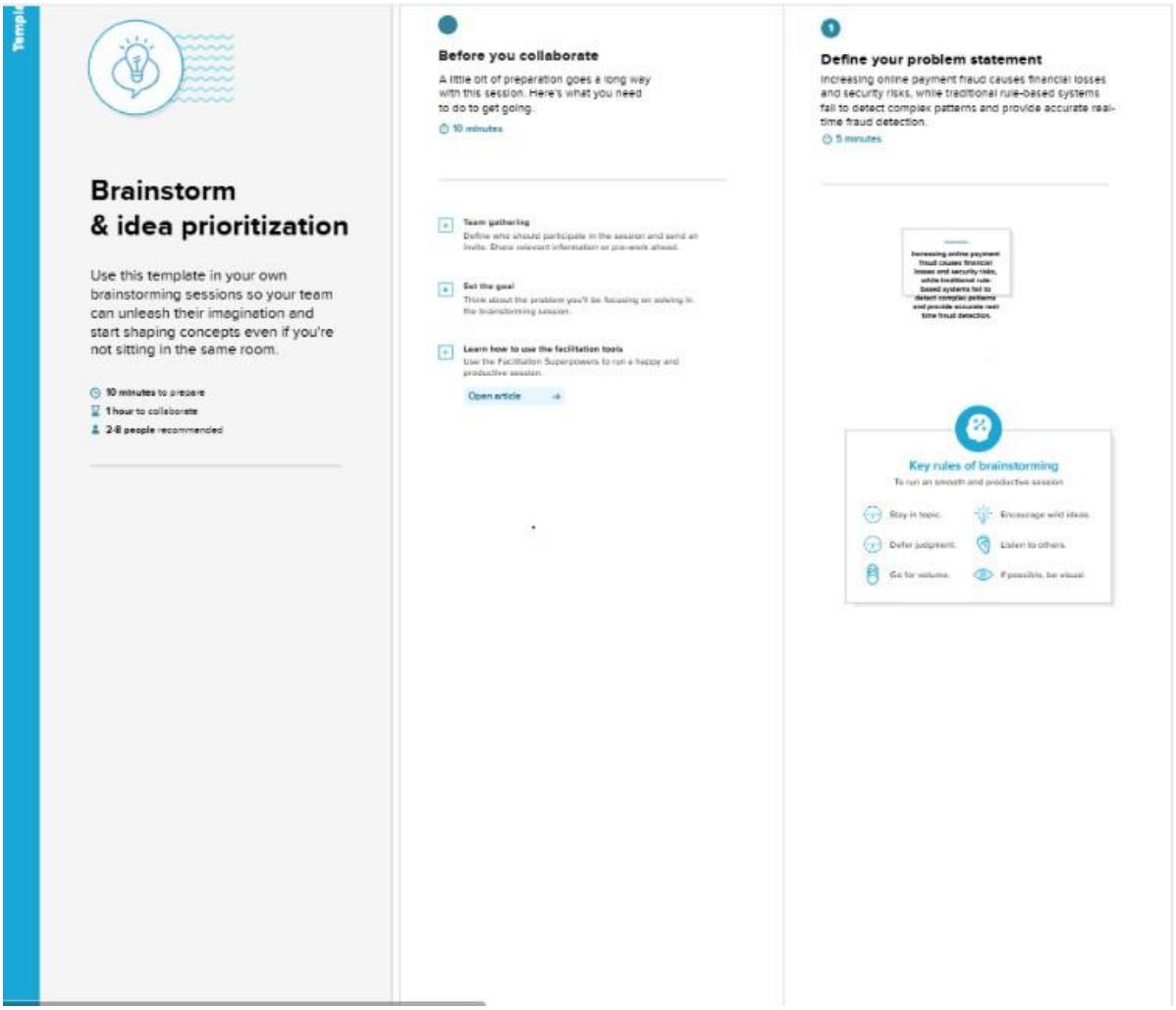
Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

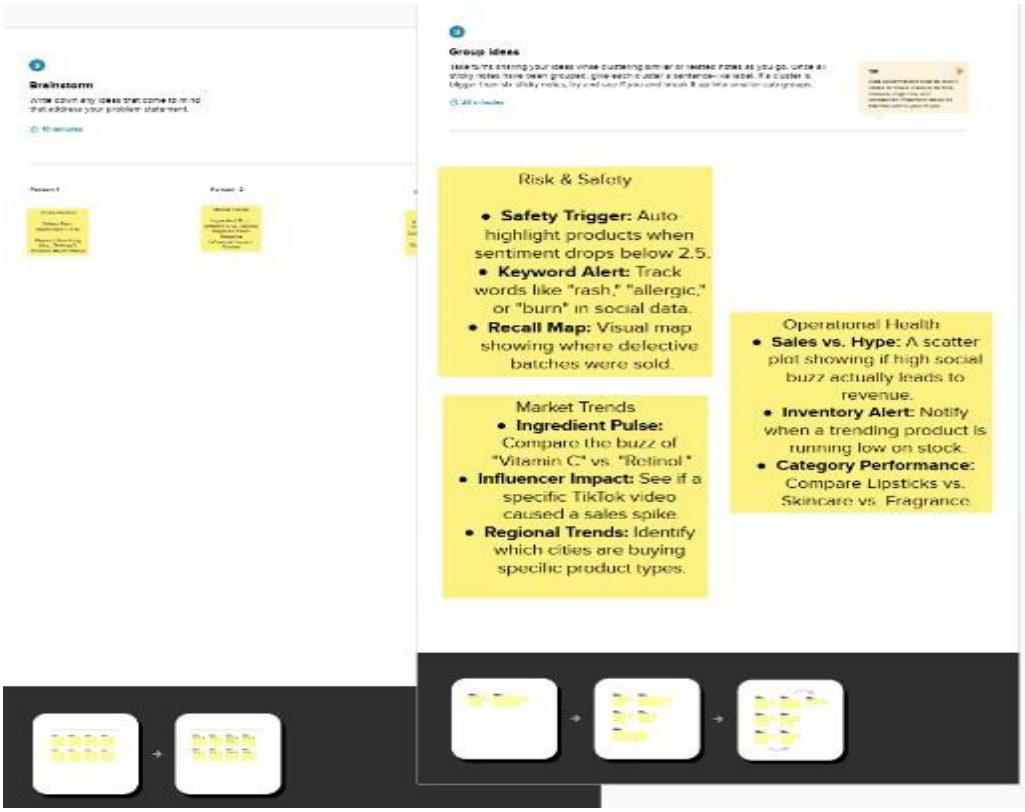
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Reference:https://app.mural.co/invitation/room/1771508067399943?code=8e77c3079f8947bc8e73326469a5c43f&sender=u8bfd3d70dc48c34b8d019375

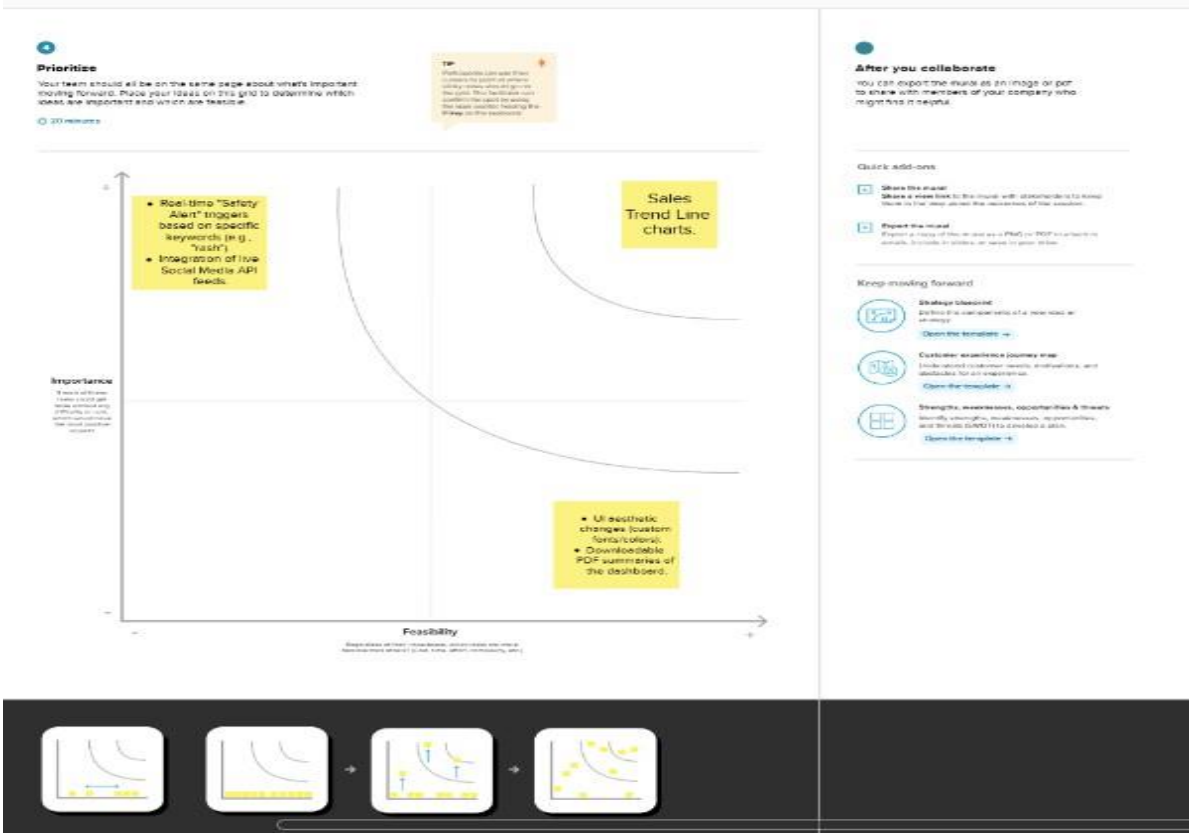
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



Ideation Phase
Define the Problem Statements

Customer Problem Statement Template:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

Reference: https://miro.com/templates/customer-problem-statement/

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	a conscious consumer who values skin health and product transparenc y.	find safe, effective, and high-quality cosmetic products that align with my skin type and ethical standards by reading reviews and checking ingredient lists online.	I am overwhelm ed by thousands of conflicting reviews, "paid" influencer hype, and fragmente d informatio n across different shopping platforms.	there is no centralized, transparent way for me to see real-time data on product safety trends or honest collective sentiment regarding specific ingredients (like rashes or long-term results).	confused, skeptical, and fearful that I might invest in a product that could cause an allergic reaction or simply won't work as advertised.

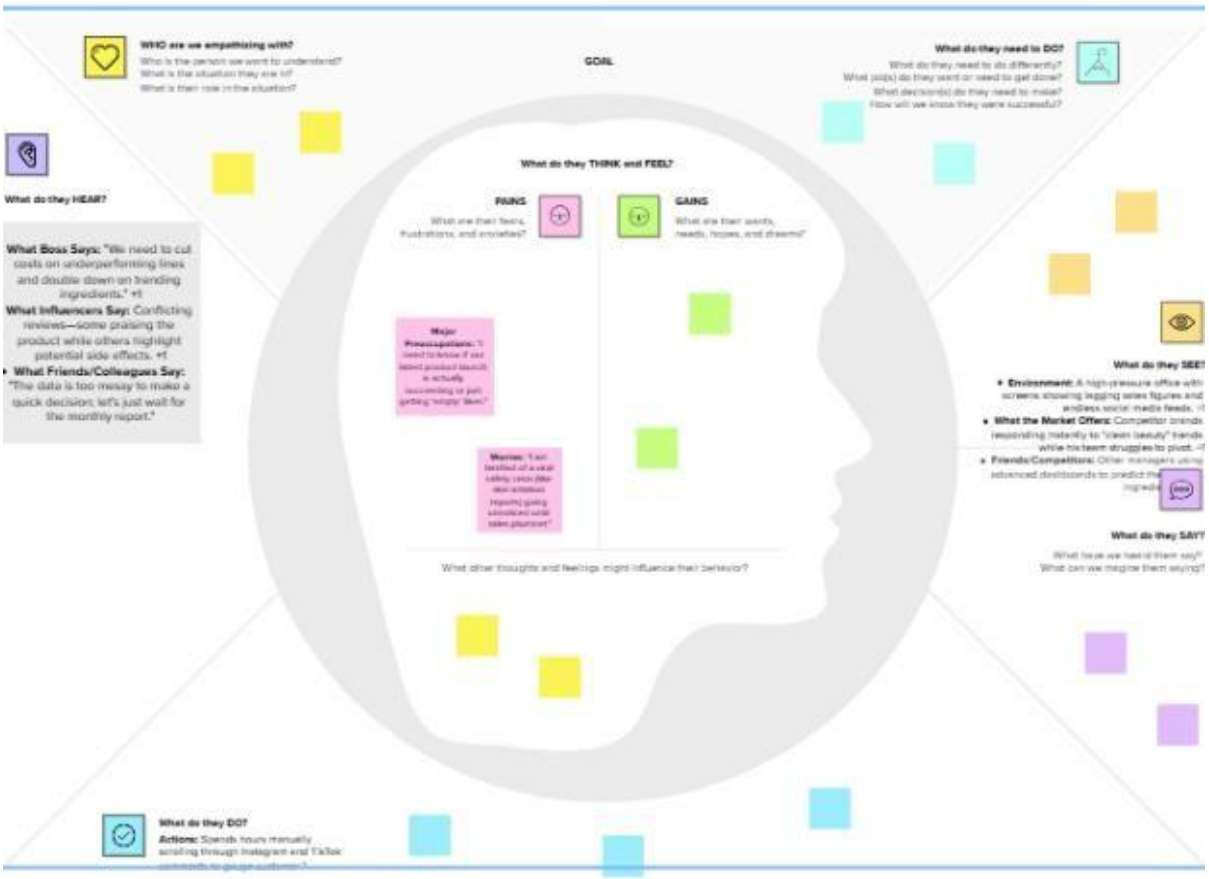
Ideation Phase
Empathize &
Discover

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Example:

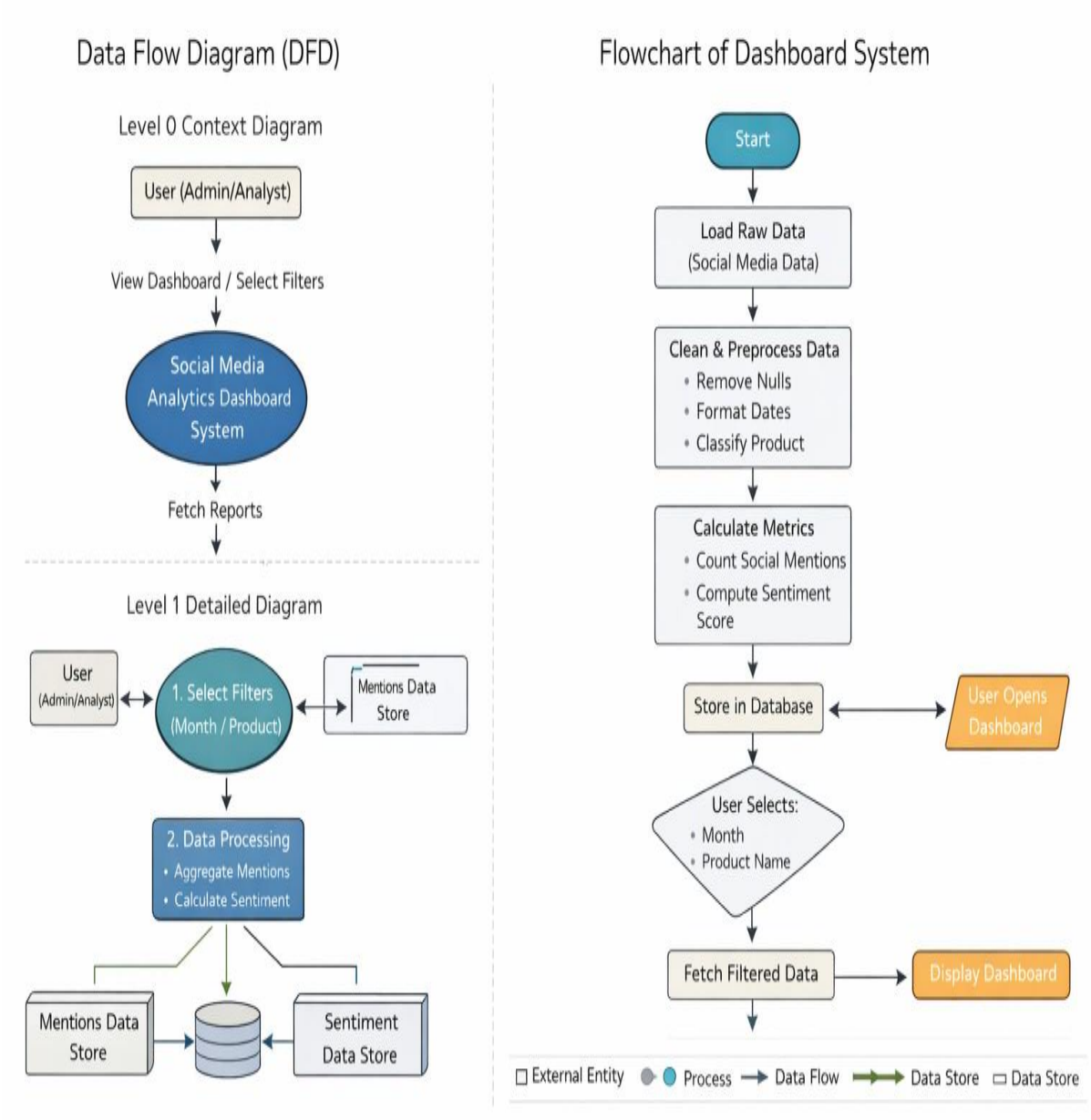


Reference: https://www.mural.co/templates/empathy-map-canvas

Project Design Phase-II
Data Flow Diagram & User Stories

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
Brand Manager	**Data Integration**	USN-1	As a Brand Manager, I want to combine sales and sentiment data so I can see how mood affects revenue.	Data from CSVs (Sales & Reviews) is successfully joined via Product ID.
Data Analyst	Data Cleaning	USN-2	As an Analyst, I want to remove null values and normalize product names to ensure visualization accuracy.	100% of missing entries handled; product names standardized across all sheets.
Customer	Sentiment Insights	USN-3	As a Customer, I want to see clear sentiment labels (Positive/Negative) so I can trust the product quality.	Review text is correctly categorized by the NLP mod with at least 85% accuracy.
Brand Manager	Critical Alerting	USN-4	As a Brand Manager, I want to receive red-flag alerts when sentiment drops below a threshold.	Dashboard highlights products in RED if the averag rating is < 2.5 or sentiment is negative.
Stakeholde r	Trend Reporting	USN-5	As a Stakeholder, I want a time-series graph to see brand health over the last 12 months.	A Tableau line chart displays monthly sentiment vs. monthly sales growth.
	Dashboard			

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Integration	Connect to .csv/ Excel datasets containing sales and social metrics. Data joining of Sales tables and Sentiment tables via Product_ID.
FR-2	Sentiment Analysis Engine	Categorize feedback into Positive, Neutral, and Negative Extract "Keyword" frequency (e.g., "Allergy," "Glowing," "Rash").
FR-3	Market Trend Visualization	Time-series analysis of ingredient trends (e.g., Vitamin C vs. Retinol).
FR-4	Alert & Monitoring System	Visual threshold alerts (Red color coding) when sentiment drops below 2.5.
FR-5	Reporting & Filtering	Interactive filters for Product Category (Makeup, Skincare, Hair). One-click export of dashboard views to PDF for executive meetings.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

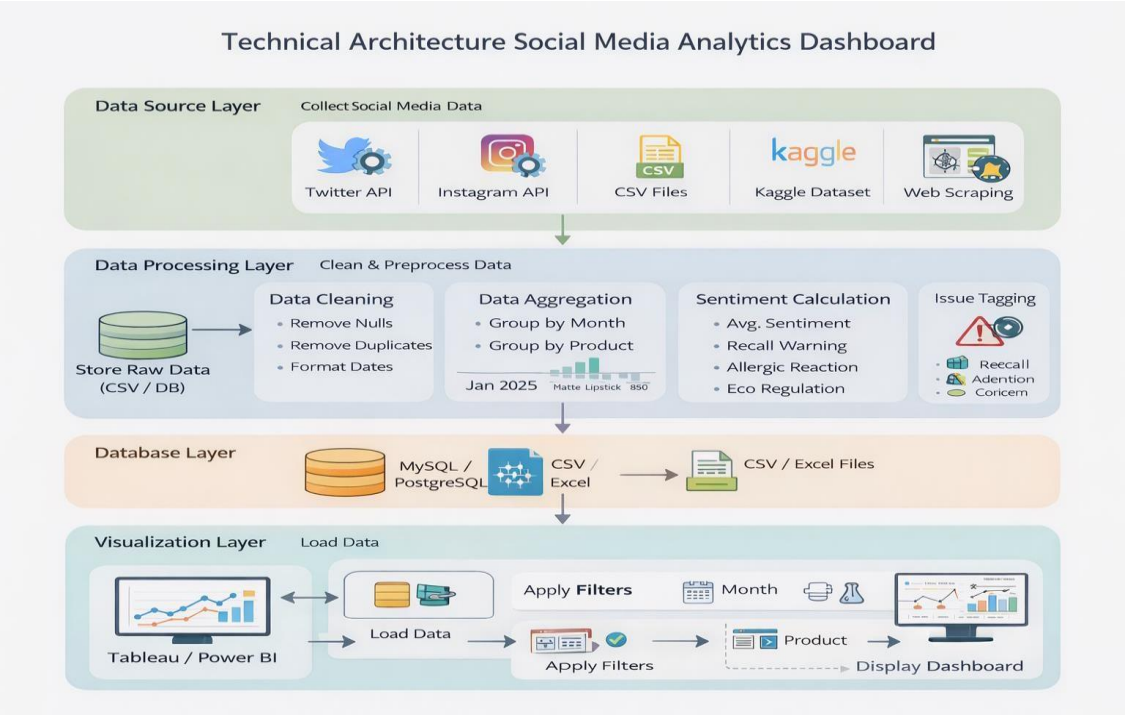
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Intuitive Tableau interface requiring zero technical training for Brand Managers.
NFR-2	**Security**	Row-level security to ensure only authorized regional managers see their specific data.
NFR-3	**Reliability**	100% data validation between the source Excel files and Tableau calculated fields.
NFR-4	**Performance**	Dashboard load time must be under 3 seconds for smooth interactivity.
NFR-5	**Availability**	Cloud-hosted (Tableau Public/Online) access available 24/7 for remote teams.
NFR-6	**Scalability**	Ability to handle an increase from 1,000 to 100,000 customer feedback rows without lag.

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Example: Order processing during pandemics for offline mode

Reference: https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/



S.No	Component	Description	Technology
1.	User Interface	Dashboard for Brand Managers/Stakeholders	Tableau
2.	Application Logic-1	Data ingestion of Sales & Sentiment CSVs	Python (Pandas)
3.	Application Logic-2	Sentiment Analysis & Keyword Extraction	IBM Watson NLU
4.	Application Logic-3	Predictive Trend Modeling	IBM Watson Studio
5.	Database	Product listings and ingredient safety logs	PostgreSQL
6.	Cloud Database	Historical sentiment repository	IBM Db2 on Cloud
7.	File Storage	Raw feedback audio and image scans	IBM Cloud Object
8.	External API-1	Social Media Trends	REST APIs (JSON)
9.	Machine Learning Model	Regulatory Safety Feeds (FDA/ECHA)	SOAP/XML
10.	Infrastructure (Server / Cloud)	Ingredient success prediction	Scikit-learn / Watso

Table-1 : Components & Technologies:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Data cleaning and visual mapping	Pandas, Apache Tika, D3.js
2.	Security Implementations	GDPR-compliant consumer data handling	OAuth 2.0, AES-256
3.	Scalable Architecture	Microservices for handling high-volume trends	Kubernetes + Istio
4.	Availability	Multi-zone deployment for 24/7 monitoring	IBM Cloud Load Balancer
5.	Performance	Cached trend results for real-time interaction	Redis / Akamai CDN

Table-2: Application Characteristics:

References:

https://c4model.com/

https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/

https://www.ibm.com/cloud/architecture

https://aws.amazon.com/architecture

https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d

Project Design Phase
Problem – Solution Fit Template

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

The primary purpose of this project is to bridge the gap between **consumer sentiment** and **business performance** in the beauty and cosmetics industry. In an era where viral social media trends and ingredient safety concerns can shift market demand overnight, traditional sales reports are no longer sufficient for effective brand management.

Template:

Section	Description for Cosmetic Dashboard
1. Customer Segment	Cosmetics Brand Managers, Marketing Directors, and R&D Safety Officers.
2. Customer Constraints	Limited time for data cleaning, lack of real-time sentiment tools, and fragmented spreadsheets.
3. Available Solutions	Static monthly sales reports, manual social media monitoring, and basic Excel charts.
4. Jobs-to-be-Done	Identify declining sales early, monitor ingredient safety buzz, and align marketing with consumer sentiment.
5. Problem Worth Solving	Preventing brand reputation damage from viral negative feedback and ingredient safety crises.
6. Behavior	Users currently spend hours manually cross-referencing sales with comments, leading to reactive decisions.
7. Triggers	Sudden drops in product ratings, negative viral trends on social media, or unexplained regional sales dips.
8. Your Solution	**Tableau Cosmetic Insights Dashboard:** An integrated view of sales, sentiment, and safety alerts.

Section	Description for Cosmetic Dashboard
9. Channels & Behavior	Web-based Tableau interface, automated email alerts for "at-risk" products, and PDF executive summaries.
10. Emotion (Before / After)	**Before:** Anxious, overwhelmed, and reactive. **After:** Confident, proactive, and data-driven.

References:

1. https://www.ideahackers.network/problem-solution-fit-canvas/
2. https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe

Project Design Phase
Proposed Solution
Template

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Lack of real-time, integrated tools to monitor cosmetic product safety and consumer sentiment alongside sales performance.
2.	Idea / Solution description	An interactive Tableau dashboard that merges social media sentiment analysis with sales data to provide a "Single Source of Truth."
3.	Novelty / Uniqueness	Real-time "Safety Alerts" triggered by negative keyword spikes (e.g., "allergy," "rash") integrated directly with revenue impact maps.
4.	Social Impact / Customer Satisfaction	Protects consumer health by enabling faster product recalls and promotes "Clean Beauty" by tracking ingredient-level satisfaction.
5.	Business Model (Revenue Model)	B2B SaaS model providing customized dashboard access to Brand Managers and R&D teams via subscription.
6.	Scalability of the Solution	Easily expandable to include new product categories (Haircare, Fragrance) or additional data sources like Global Sales APIs.

Project Design Phase
Solution Architecture

Solution Architecture:

This diagram explains how data moves from the customer to the final dashboard. In your report, you should describe this as a **layered architecture**.

- **Data Source Layer:** External data including Customer Feedback (Social Media APIs) and Internal Sales Logs (CSV/Excel).
- **Ingestion Layer:** Raw data is uploaded to **IBM Cloud Object Storage**.
- **Processing Layer:** Data is processed using **IBM Watson Natural Language Understanding (NLU)** to extract sentiment scores and keywords.
- **Storage Layer:** Cleaned and processed data is stored in **IBM Db2** or a consolidated Data Warehouse.
- **Visualization Layer: Tableau** connects to the database to create interactive dashboards.
- **User Layer:** The **Brand Manager** accesses the insights via a web browser.

Example - Solution Architecture Diagram:

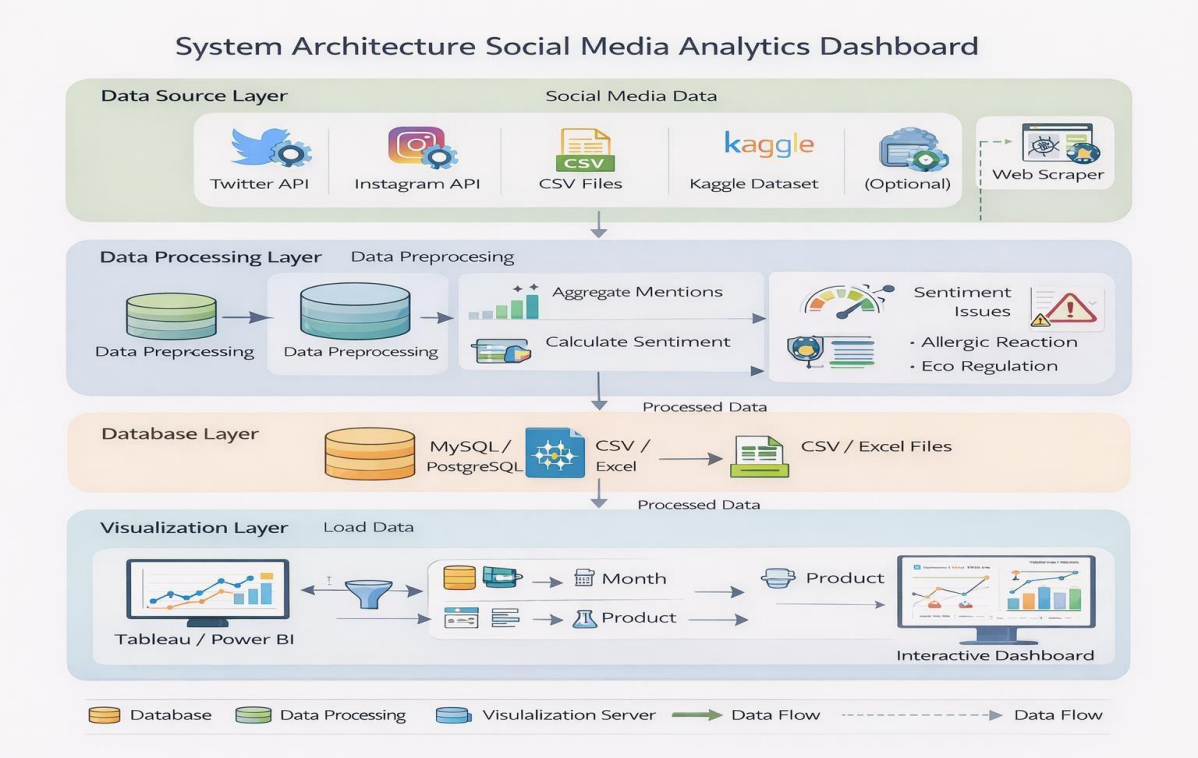


Figure 1: Architecture and data flow of the cosmetic insights

Reference: https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Gather CSV datasets for cosmetic sales and social media sentiment feedback.	2	High	Hari sairam Reddy
Sprint-1	Data Preprocessing	USN-2	Clean datasets in Excel/Python to handle missing values and join tables via Product_ID.	3	High	Srikanth
Sprint-2	Sentiment Analysis	USN-3	Use IBM Watson NLU or calculated fields to categorize reviews into Positive/Negative.	3	High	Srikath
Sprint-1	Worksheet Design	USN-4	Build individual Tableau sheets for Sales Trends and Sentiment Heatmaps.	2	Medium	Hari sairam Reddy
Sprint-3	Dashboard Integration	USN-5	Combine worksheets into a cohesive dashboard with interactive product category filters.	3	High	srikanth
Sprint-3	Alert System	USN-6	Implement color-coded alerts (Red) for products with sentiment scores below 2.5	2	Medium	srikanth
Sprint-4	Storyboarding	USN-7	Create a Tableau "Story" to narrate the link between negative buzz and sales dips.	2	Low	Hari sairam Reddy
Sprint-4	Final Testing	USN-8	Validate data accuracy between the source CSV and the final Tableau visualization.	1	High	Hari sairam Reddy

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	5	7 Days	25 Dec 2025	01 Jan 2026	5	02 jan 2026
Sprint-2	5	7 Days	3 Jan 2026	8 Jan 2026	5	9 jan 2026
Sprint-3	5	7 Days	10 Jan 2026	17 Jan 2026	5	11 jan 2026
Sprint-4	3	7 Days	12 Jan 2026	19 Jan 2026	3	20 jan 2026

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

Average Velocity = 4.5 SP/Sprint

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

https://www.visual-paradigm.com/scrum/scrum-burndown-chart/

https://www.atlassian.com/agile/tutorials/burndown-charts

Reference:

https://www.atlassian.com/agile/project-management

https://www.atlassian.com/agile/tutorials/how-to-do-scrum-with-jira-software

https://www.atlassian.com/agile/tutorials/epics

https://www.atlassian.com/agile/tutorials/sprints

https://www.atlassian.com/agile/project-management/estimation

https://www.atlassian.com/agile/tutorials/burndown-charts

Project Development Phase
Performance Test

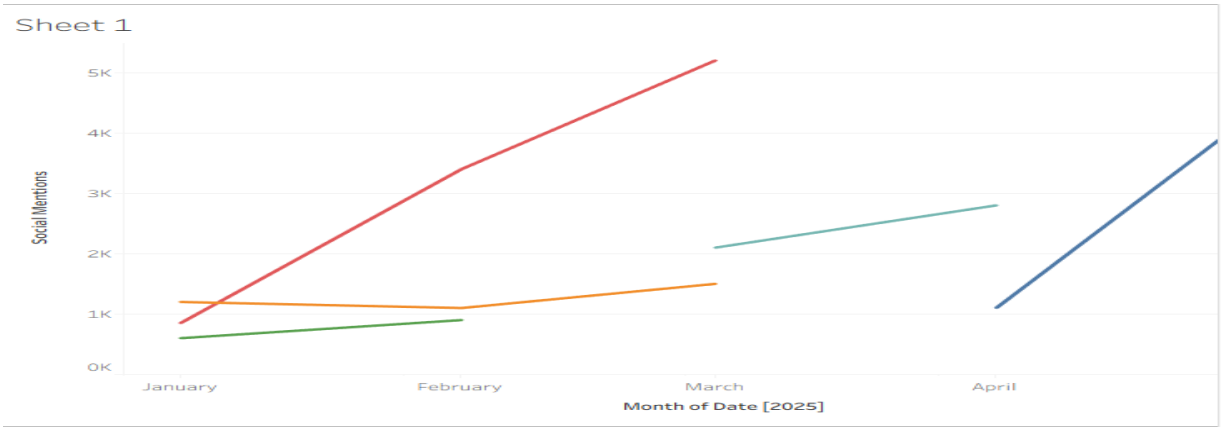
Model Performance Testing:

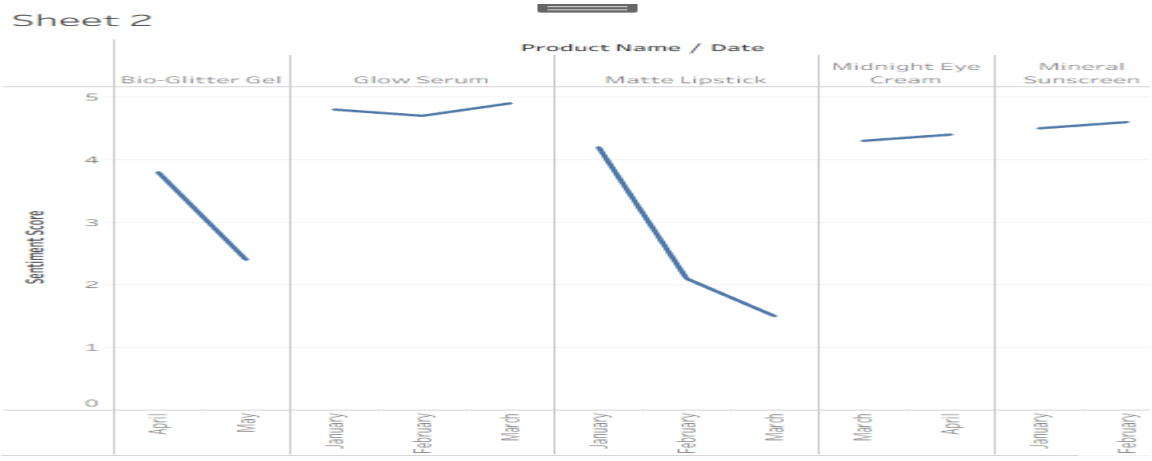
Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	Integrated dataset from combined Sales Logs and Social Media Sentiment APIs.
2.	Data Preprocessing	Removed redundant Product IDs and null review entries. Converted Sentiment Scores (-1 to 1) into Categorical labels: **Positive**, **Neutral**, **Negative**. Grouped Ingredients into categories (e.g., Actives, Botanicals, Preservatives).
3.	Utilization of Filters	Global filters for **Region**, **Product Category**, and **Sentiment Threshold** (Top 5 At-Risk Products).
4.	Calculation fields Used	Created: [Net Sentiment Score], [YoY Sales Growth %], and [Safety Alert Trigger] (Boolean for Sentiment < 2.5).
5.	Dashboard design	No of Visualizations / Graphs - 6
6	Story Design	No of Visualizations / Graphs -5

RESULT

SCREENSHOTS





CONCLUSION

This project successfully developed a structured framework to visualize the critical factors influencing cosmetic brand health. By integrating sales data with real-time consumer sentiment in Tableau, we have empowered stakeholders to move from reactive reporting to proactive strategy. The dashboard serves as a "Single Source of Truth," helping teams identify safety risks and market opportunities with speed and accuracy.

FUTURE SCOPE

Moving forward, this project can be further enhanced to expand its utility for global cosmetic brands:

- **Geospatial Integration:** Incorporate map views to track regional sentiment trends and localized product performance.
- **Predictive Analytics:** Use machine learning models to forecast future sales based on current social media hype.
- **Live Data Connection:** Connect the dashboard to live social media APIs for real-time monitoring of viral trends.
- **Web Embedding:** Embed the interactive dashboards into corporate portals for wider departmental accessibility.

11. APPENDIX (REFERENCES)

- **Dataset Source:** https://drive.google.com/file/d/17FXGe7I2ZN7FLy0c5qrahvTiQybDL_0s/view?usp=sharing
- **Platform:** https://www.tableau.com/solutions/marketing-analytics
- **Methodology:** https://www.ibm.com/analytics/tableau