Final Report

Transformed Housing Market Analysis Dashboard

Team ID : PNT2025TMID08397

Team Size : 4

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Team member : Vanshika Nigam

Team member : Tanisha Sharma

Team member : Tisha Jain

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1.1 Project Overview

This project involves creating a Data Analytics Dashboard to analyze housing market trends. The dashboard visualizes various parameters such as sale prices, locations, number of bedrooms, bathrooms, and other features. The insights aim to help stakeholders understand property value trends and make informed decisions.

1.2 Purpose

The purpose of this project is to:

- Help buyers, sellers, and agents understand housing trends.
- Identify key factors affecting housing prices.
- Provide interactive and visual representation of housing data for better decision-making.

2. IDEATION PHASE

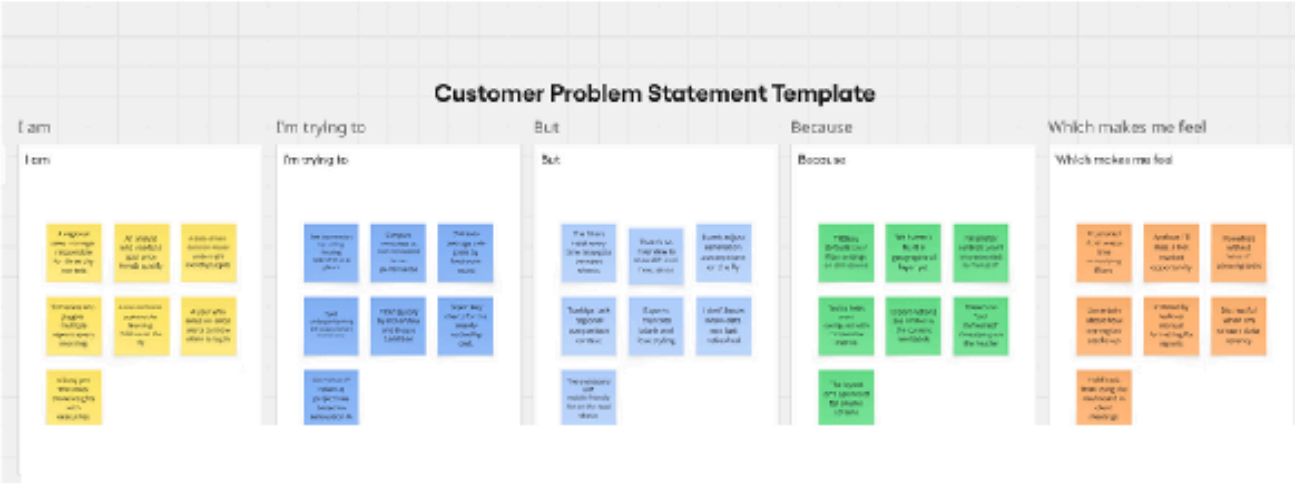
2.1 Problem Statement

In the real estate sector, buyers and investors face difficulty understanding how different features (location, area, bedrooms, etc.) affect house prices. A lack of clear visual tools limits their ability to analyze trends effectively.

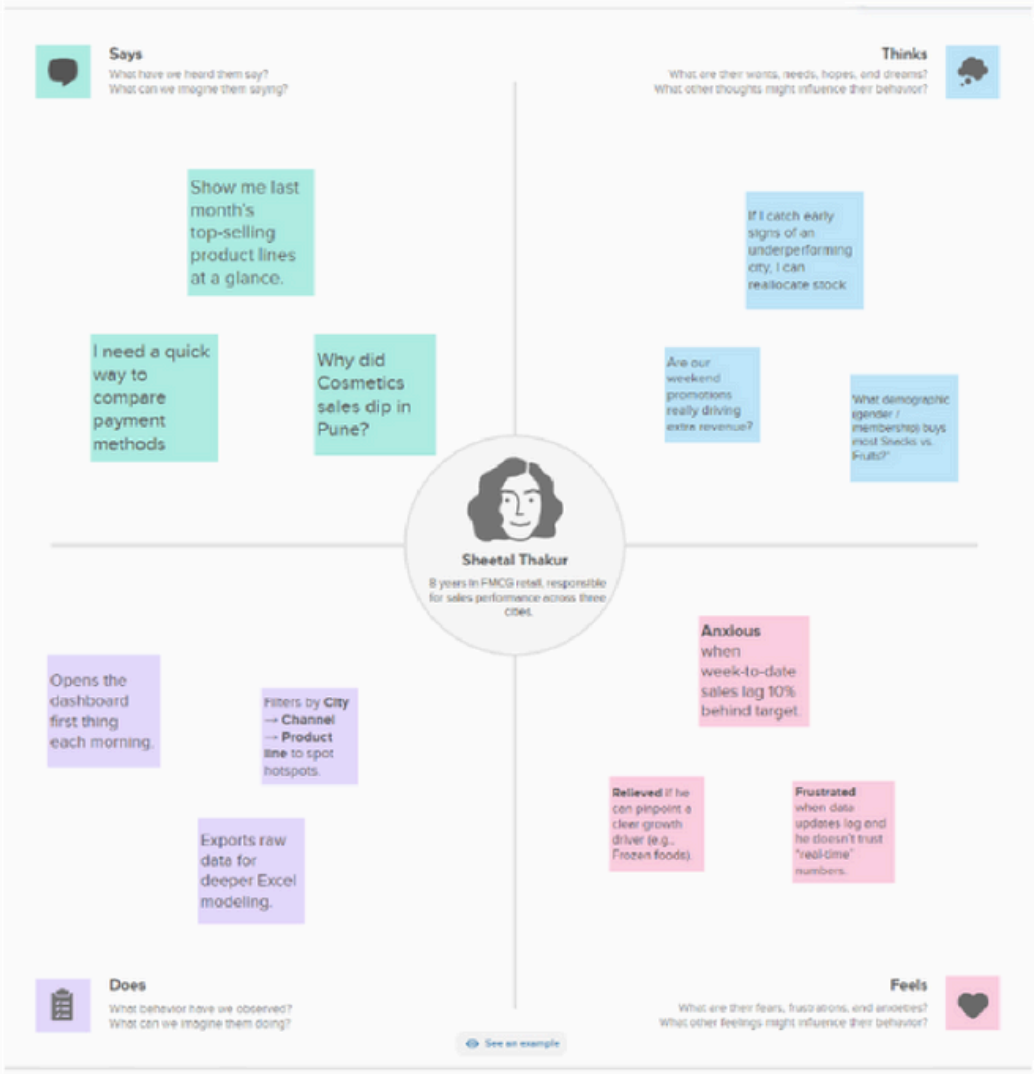
IdeationPhase
Define the Problem Statements

Date	25 july 2025
Team ID	PNT2025TMID08397
Project Name	Housing Price Analysis & Prediction
Maximum Marks	2Marks

I am a regional sales manager responsible for three city markets,
I'm trying to see last month's top-selling housing segments at a glance and compare renovated-vs-non-renovated performance,
but the filters reset on every drill-down, there's no ZIP-level heat map, and I can't run "what-if" renovation scenarios on the fly,
because the dashboard lacks persistent filter settings, a geospatial layer, and parameter controls,
which makes me feel frustrated at having to reapply filters, anxious that I'll miss hot market opportunities, and powerless without planning tools.



2.2 EMpathy map



2.2 Empathy Map Canvas

- Says: "I want to know where I can get the best value home."
- Thinks: “I’m worried about overpaying for a house.”
- Does: Searches online listings, talks to agents.
- Feels: Confused, overwhelmed with information.

IdeationPhase
Empathize&Discover

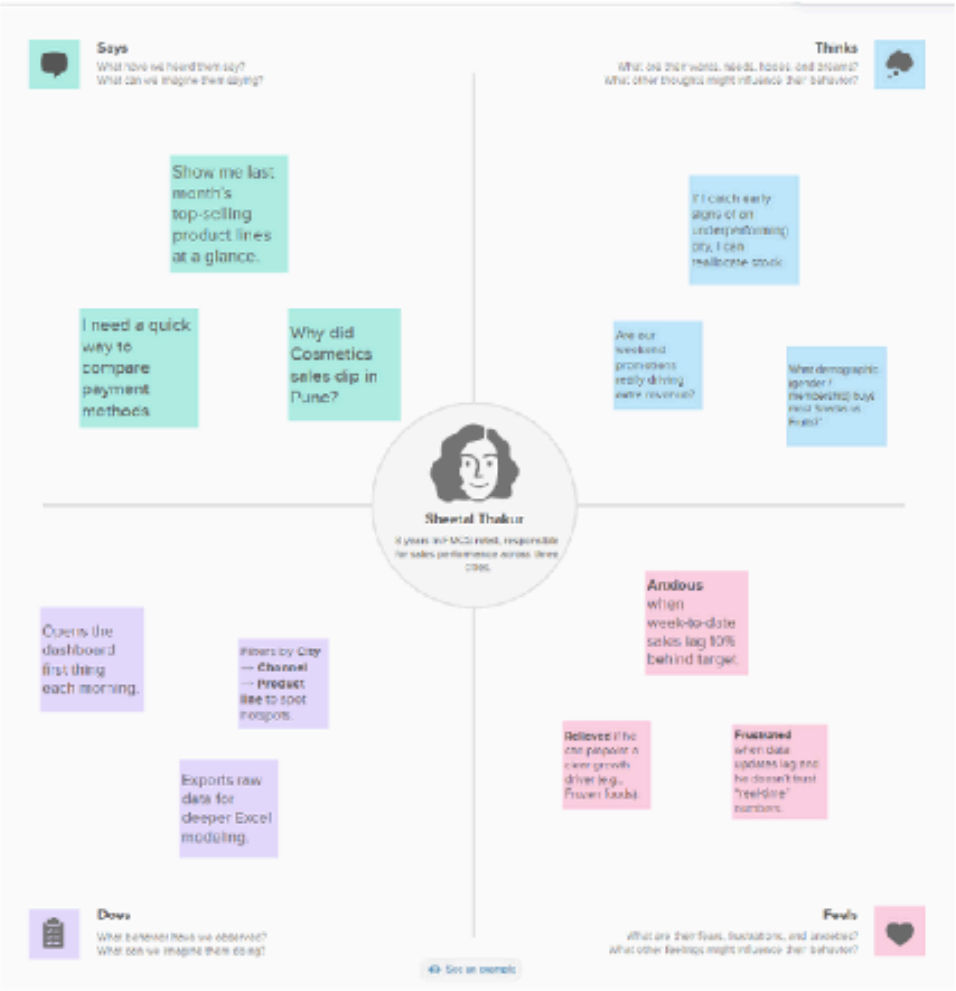
Date	31January 2025
Team ID	PNT2025TMID08397
Project Name	Housing Price Analysis & Prediction
Maximum Marks	4Marks

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.

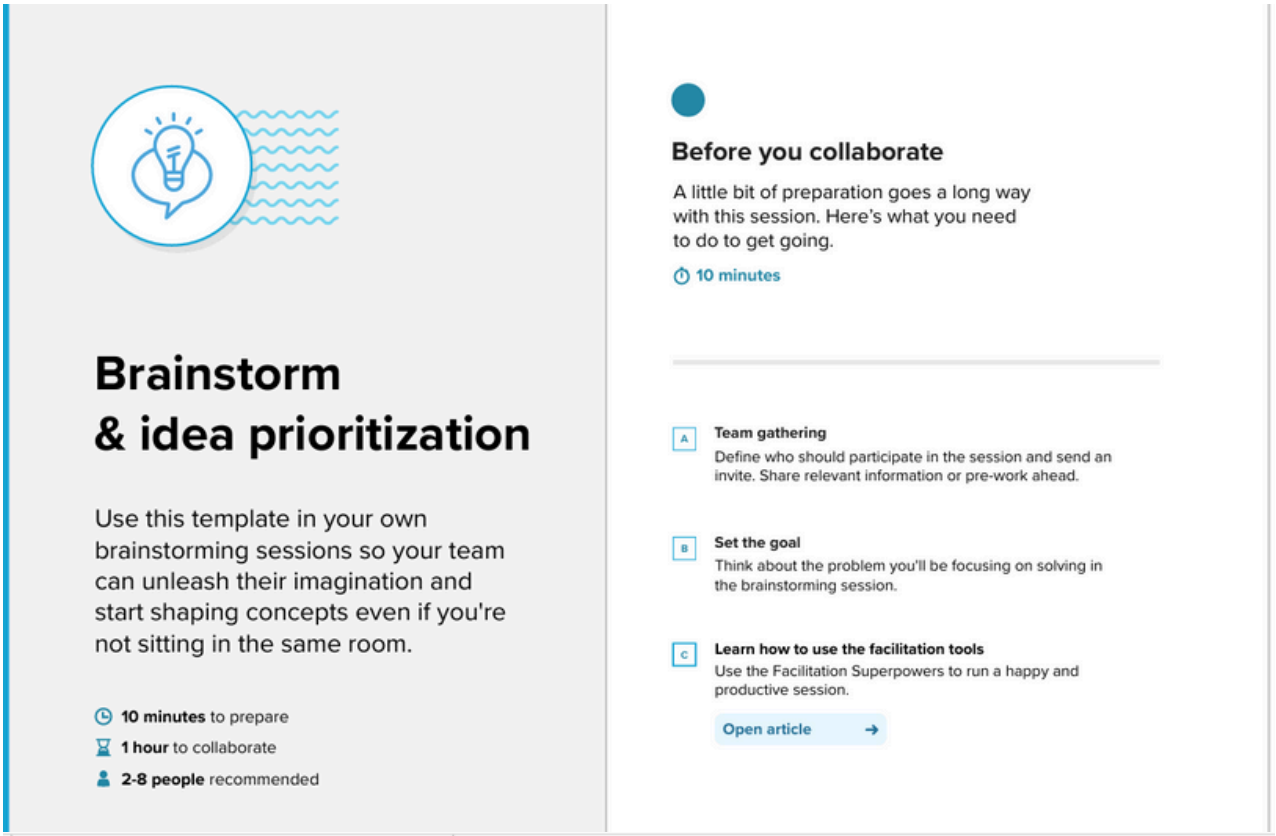
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

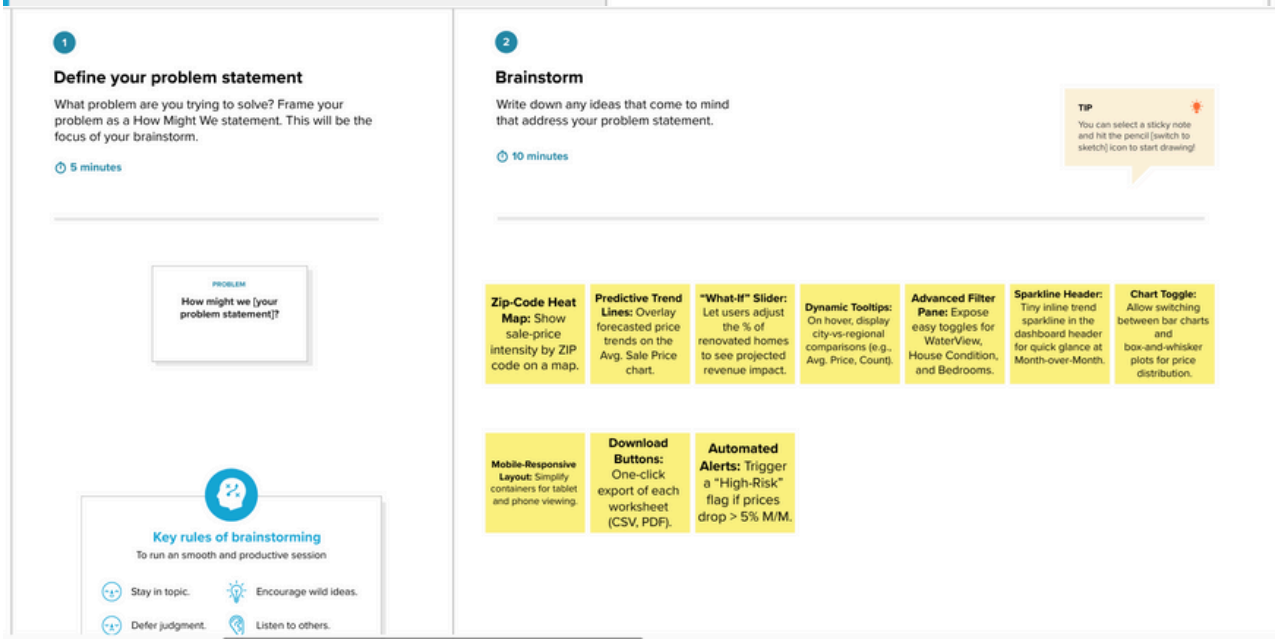


2.3 Brainstorming

Ideas:

- Visualize sale price distribution by condition and location.
- Show renovation impact on pricing.
- Compare bedrooms, bathrooms, and floors by age of house.
- Include filters for easy exploration.





3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Geospatial Insights
- Zip-Code Heat Map
- Mobile-Responsive Layout

Forecasting & Alerts
- Predictive Trend Lines
- "What-If" Slider
- Automated Alerts

Interactive Exploration
- Dynamic Tooltips
- Chart Toggle
- Advanced Filter Pane

1. **User Efficiency**
   - Sparkline Header
   - Download Buttons

4

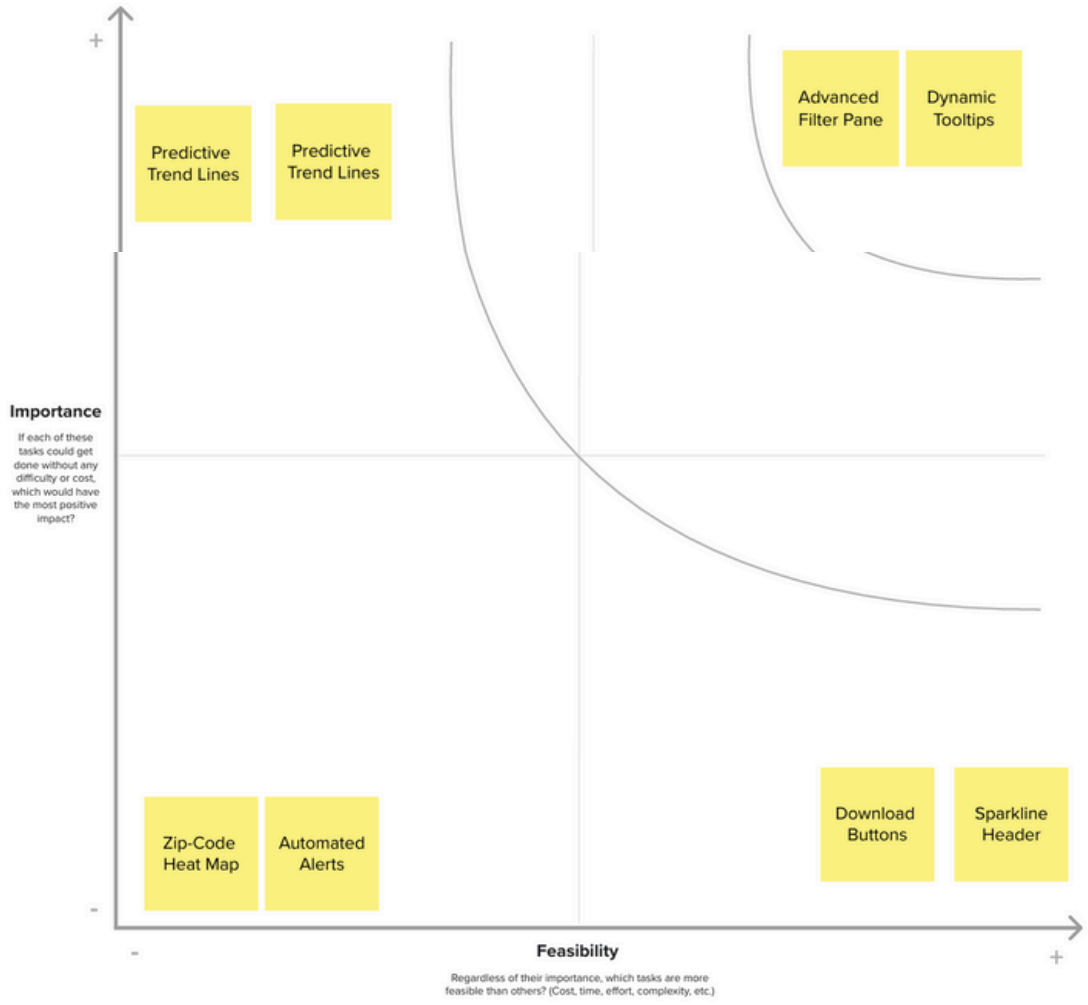
Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.



Keep moving forward

Strategy blueprint

Define the components of a new idea or strategy.

Open the template →

Customer experience journey map

Understand customer needs, motivations, and obstacles for an experience.

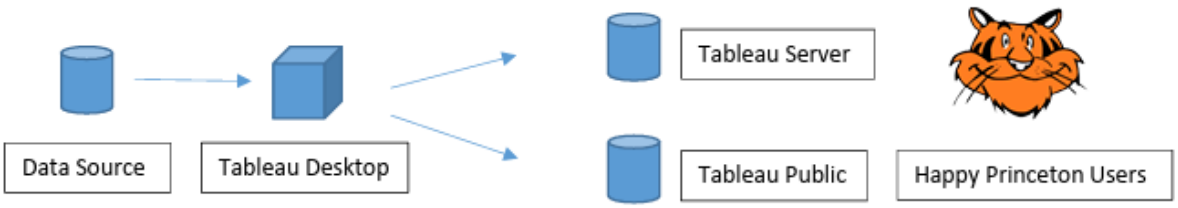
Open the template →

Strengths, weaknesses, opportunities & threats

Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

Open the template →

Here at Princeton, we use Tableau in a manner similar to the way in which we use the data warehouse. Differenc
arise from the structure of the tool itself.



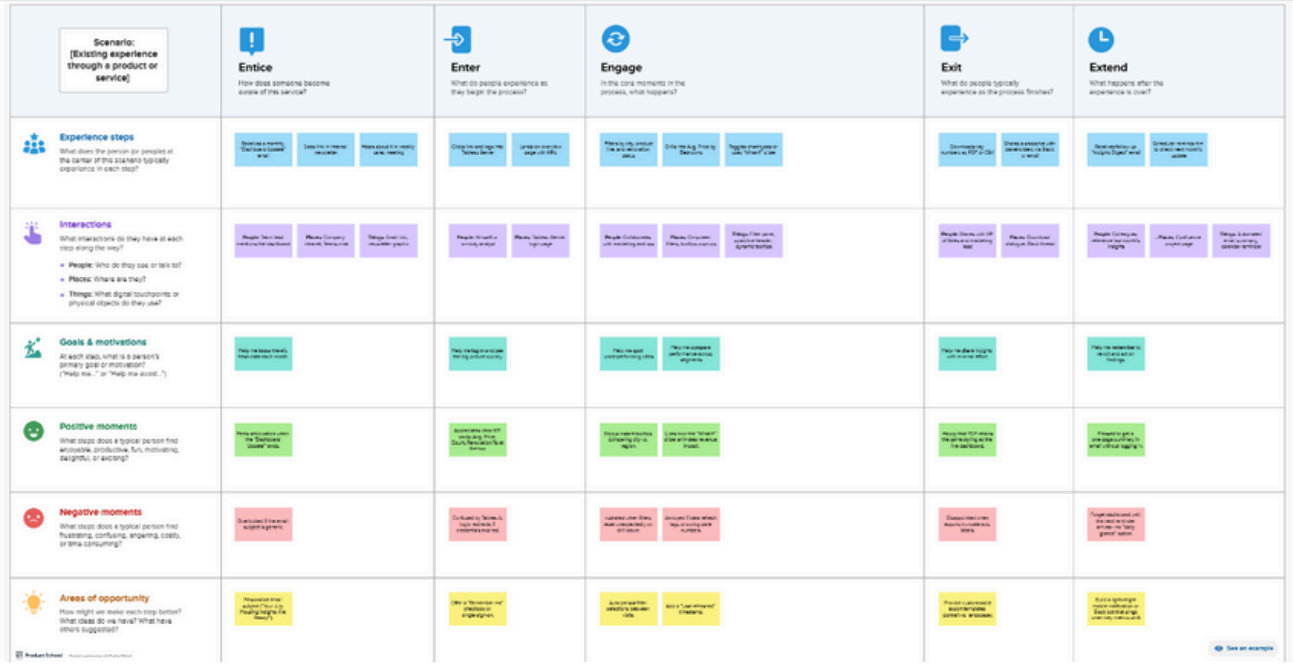
3. Requirement Analysis/Customer Journey map.pdf

3.1 Customer Journey Map

1. Awareness: Need for better understanding of housing data.
2. Research: Explore available properties and trends.
3. Comparison: Use dashboard filters (e.g., location, condition).
4. Decision: Choose properties based on insights.

3.2 Solution Requirement

1. Interactive dashboard with multiple filters.
2. Key charts: bar, pie, scatter, and trend charts.
3. Clean and pre-processed dataset.



3.3 Data Flow Diagram

User → Dashboard (Tableau) → Housing Dataset → Visual Output

3.4 Technology Stack

Data Source: Kaggle housing dataset
Tools: Tableau for visualization

Project Design Phase-II

Data Flow Diagram & User Stories

Date: 26 July 2025

Project Name: Housing Price Analysis & Prediction

Team ID: PNT2025TMID08397

Problem Statement

ABC Company is facing challenges in understanding the factors that influence housing prices and sales trends. Without a clear view of how attributes such as house age, renovations, and structural features affect pricing and buyer behavior, it's difficult to make data-driven strategic decisions in pricing and marketing.

Data Flow Diagram (Textual Description)

This DFD represents the flow of housing data from raw ingestion to business insights:

1. External Entities:
   - Data Analyst: Uploads housing dataset.
   - Marketing Manager: Requests insight reports.
   - Buyer Feedback: Provides behavioral data.

2. Processes:
   - Data Ingestion & Cleaning
   - Feature Engineering (e.g., House Age, Renovation, Structure)
   - Model Training for Price Prediction
   - Insight Generation (Trend Analysis)

3. Data Stores:
   - Cleaned Housing Data
   - Model Outputs
   - Insight Reports

Project Design Phase-II

Data Flow Diagram & User Stories

Graphical Data Flow Diagram

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User Stories

User Type	Functional Requirement	User Story #	User Story	Acceptance Criteria
Data Analyst	Housing Data Processing	USN-1	As a data analyst, I want to upload and clean the housing dataset to remove missing or inconsistent entries.	I can see a cleaned and formatted version of the dataset.
Marketing Manager	Strategic Decision Support	USN-2	As a marketing manager, I want to view visual trends in pricing affected by renovation and house age.	I can access graphical trend report filters.
Data Scientist	Model Training	USN-3	As a data scientist, I want to train a regression model using cleaned features to predict housing price.	I can view training metrics and mo outputs.
Business Analyst	Insight Extraction	USN-4	As a business analyst, I want to download reports on feature importance (e.g., structure type, renovation effect).	Reports are downloadable and rea

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

Date	25-7-2025
Team ID	PNT2025TMID08397
Project Name	Visualizing Housing Market Trends Using Tableau for ABC Company
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Data Upload	Data Analyst can upload transformed housing data (.CSV)
FR-4	Data Cleaning & Transformation	Handle missing values, compute house age, renovation status, structural formatting
FR-5	Dashboard Visualization	Visualize trends in sale price, age distribution, renovation count, condition metrics
FR-6	Trend Filtering & Drill-down	Filter dashboards based on bedroom count, house condition, renovation type
FR-7	Insight Export	Marketing Manager can download visual reports in PDF or image format
FR-8	User Story Access Logging	Log all user interactions with story filters, charts, and downloads

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Dashboard must be intuitive and interactive using filters, legends, and too
NFR-2	**Security**	
NFR-3	**Reliability**	System should handle corrupted/missing values and visualize only verified entries
NFR-4	**Performance**	Dashboard loading time should not exceed 3 seconds on standard devices
NFR-5	**Availability**	Dashboard should be accessible 24/7 for stakeholders
NFR-6	**Scalability**	System must handle at least 50,000 rows without performance degradatic

4. PROJECT PLANNING & SCHEDULING

4.1 Project Planning

Week 2: Exploratory Data Analysis (EDA)

Objective: Understand the dataset deeply and identify trends, outliers, and relationships before building the dashboard**.**

Key Tasks:

1. **Data Profiling:**
   - Check data types (numeric, categorical, date fields).
   - Identify missing values, duplicates, or inconsistent data.
2. **Descriptive Analysis:**
   - Calculate summary statistics (mean, median, min, max, standard deviation).
   - Understand price distribution and property feature counts (bedrooms, bathrooms, floors, etc.).
3. **Correlation Analysis:**
   - Check how different features (e.g., area, age, bedrooms) affect sale price.
   - Visualize correlations using scatter plots and heatmaps (if using Python/Excel).
4. **Data Cleaning Adjustments:**
   - Fix or remove outliers (e.g., extremely high/low prices).
   - Handle missing values by imputation or removal.
5. **Initial Visuals:**
   - Build sample charts for feature exploration (bar charts, histograms, boxplots).
   - Note down key insights that will be highlighted in the final dashboard.

Deliverables by End of Week 2:

- A clean, well-understood dataset ready for dashboard creation.
- Preliminary charts/visuals identifying important trends and metrics.
- Documented insights from the analysis to guide dashboard KPIs.

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	25 -7- 2025
Team ID	PNT2025TMID08897
Project Name	Visualizing Housing Market Trends Using Tableau for ABC Company
Maximum Marks	4 Marks

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/

Architecture Components:

- **Dashboard creation:** Tableau Desktop / Tableau Public for building visual analytics.
- **User interaction:** Stakeholders access dashboards through Tableau Public link

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Interactive visualization dashboard	Tableau Public
2.	Database	Source CSV housing data	CSV
3.	File Storage	Storage of processed CSV / Tableau Workbook (.twbx)	Tableau Public
4.	External API-1	None used	
5.	External API-2	-	-
6.	Infrastructure (Server / Cloud)	Tableau Public	Tableau Public

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Security Implementations	Tableau Public uses built-in access control; Google Drive needs permission	OAuth (Google), Tableau sharing settings
2.	Availability	Tableau Public ensures 24/7 hosted access	Tableau Public
3.	Performance	Dashboards optimized for 500+ records; filters for faster rendering	Tableau Filter Actions, Extracts

Project Design Phase
Proposed Solution Template

Date	25 june 2025
Team ID	PNT2025TMID08397
Project Name	Visualizing Housing Market Trends Using Tableau for ABC Company
Maximum Marks	2Marks

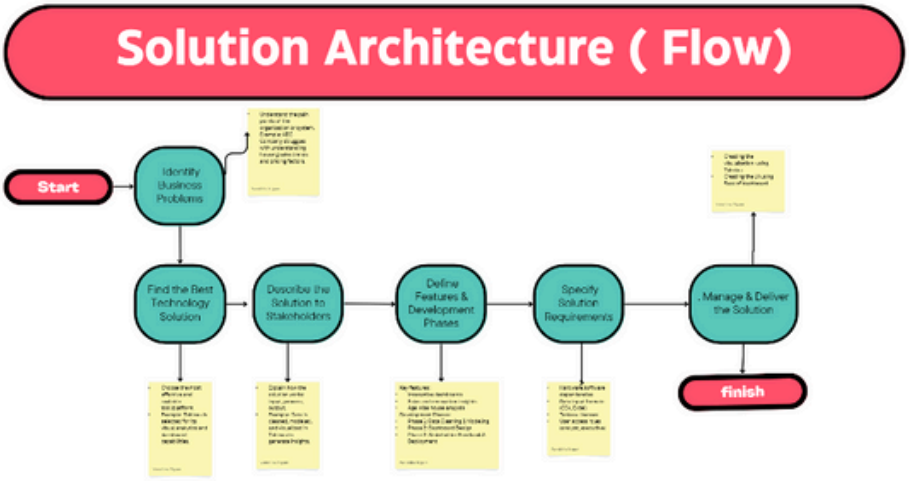
S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	ABC Company is facing challenges in understanding the factors that influence housing prices and sales trends. Without a clear view of how attributes such as house age, renovations, and structural features affect pricing and buyer behavior, it's difficult to make data-driven strategic decisions in pricing and marketing.
2.	Idea / Solution description	We propose using Tableau to develop an interactive dashboard that visualizes key housing data insights such as overall sales summary, sales by years since renovation, house age by renovation status, and age distribution across features like bathrooms, bedrooms, and floors. This will help stakeholders make informed decisions, improve pricing strategies, and assess the impact of renovations effectively.
3.	Novelty / Uniqueness	The use of Tableau for this housing market analysis brings a fresh, visual-first approach to real estate data interpretation. Unlike traditional reports, this solution provides real-time interactive dashboards, allowing teams to explore relationships between features and pricing intuitively.
4.	Social Impact / Customer Satisfaction	By better understanding buyer preferences and market dynamics, the company can make informed decisions that result in fair pricing, better home offerings, and ultimately, higher customer satisfaction. Moreover, such insights can promote renovation-led sustainability, improving housing quality.
5.	Business Model (Revenue Model)	While the Tableau solution itself is internal, its business value lies in optimizing pricing strategies, reducing inventory turnover time, and guiding renovation investments – all of which can increase overall profitability and market competitiveness.
6.	Scalability of the Solution	The solution is highly scalable – it can be extended to include more datasets (e.g., location, construction materials, energy efficiency). Tableau supports live data connections, enabling future integration with real-time sales or CRM systems.

Solution Architecture

Date	25 June 2025
Team ID	PNT2025TMID08397
Project Name	Visualizing Housing Market Trends Using Tableau for ABC Company
Maximum Marks	4 Marks

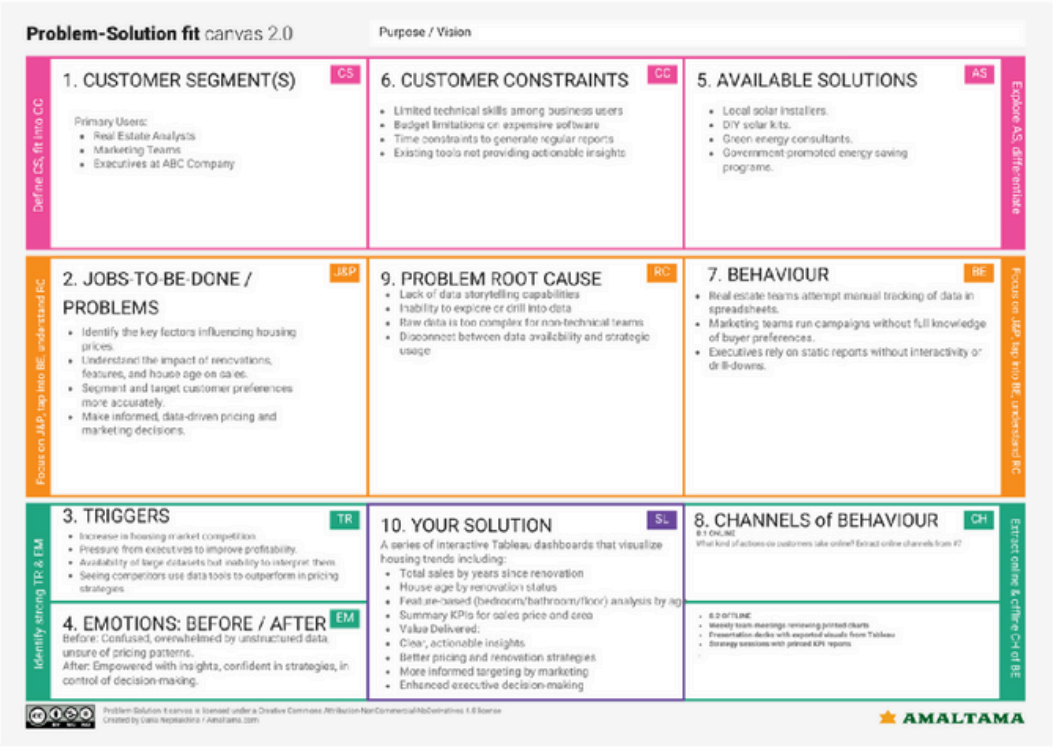
Solution architecture

Our Solution Architecture outlines the process of transforming raw housing data into actionable insights using Tableau. It includes data collection from housing datasets, cleaning and modeling the data, and creating interactive dashboards. The final solution is published for stakeholders like analysts and executives to support data-driven decisions on pricing, renovations, and market trends.



Problem – Solution Fit Template

Date	25 June 2025
Team ID	PNT2025TMID08397
Project Name	Visualizing Housing Market Trends Using Tableau for ABC Company
Maximum Marks	2Marks



5. Project Planning Template.

Project Planning Phase

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

Date	25 -7- 2025
Team ID	PNT2025TMID08397
Project Name	**Visualizing Housing Market Trends Using Tableau for ABC Company**
Maximum Marks	5 Marks

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 & Preprocessing	USN-1	As a data analyst, I want to upload housing CSV data for analysis.	2	High	
Sprint-1	Data Preprocessing	USN-2	Handle missing values in dataset using Pandas.	1	High	
Sprint-1	Data Preprocessing	USN-3	Handle categorical variables (e.g., renovation status, structure) using encoding.	2	Low	
Sprint-1	Data Cleaning	USN-4	Transform raw CSV (calculate age, restructure features).	2	Medium	
Sprint-2	Dashboard Creation	USN-5	Create Tableau dashboard for housing price trends.	1	High	
Sprint-2	Dashboard Filters	USN-6	Add filters for renovation, age, bedrooms, price range.			
Sprint-2	Hosting	USN-7	Publish dashboard to Tableau Public and get shareable link.			
Sprint-2	Integration	USN-8	Embed Tableau dashboard in Flask-based HTML page.			
Sprint-2	Deployment	USN-9	Deploy Flask app locally			

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Integration	USN-8	Embed Tableau dashboard in Flask-based HTML page.			
Sprint-2	Deployment	USN-9	Deploy Flask app locally			

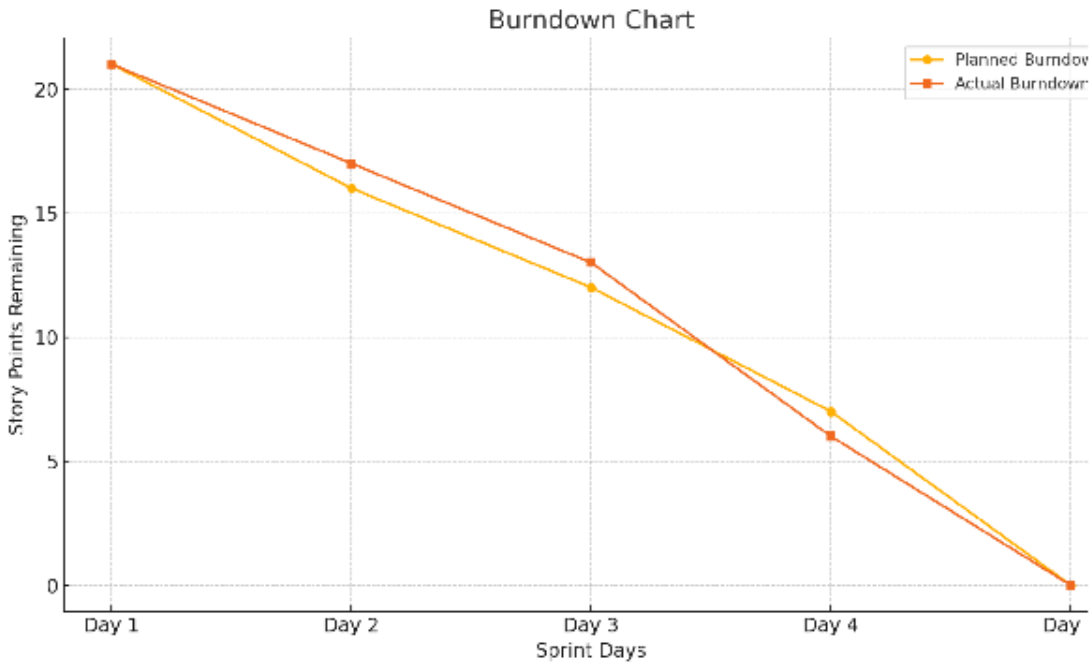
Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	8	6 Days	14-7-2025	20-7-2025	8	20-7-2025
Sprint-2	13	8 Days	20-7-2025	28-7-2025	13	20-7-2025

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)

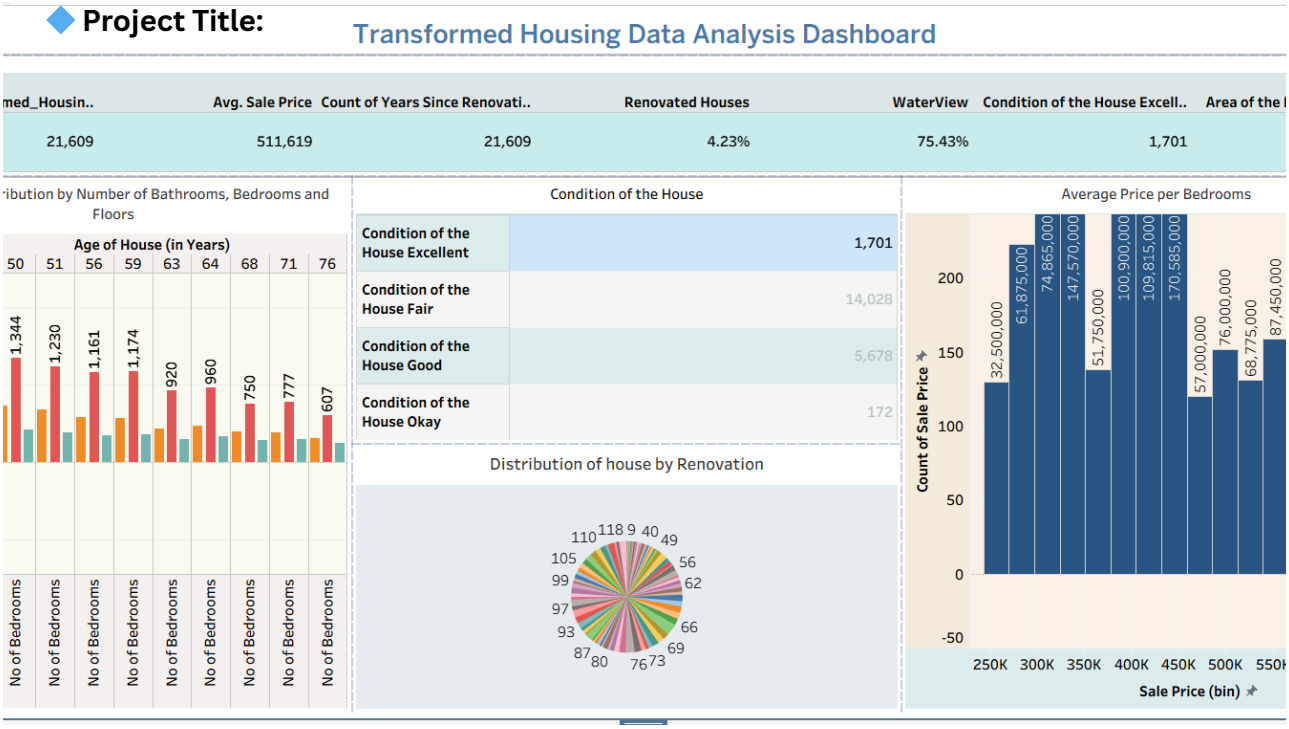
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$


Burndown Chart
Planned Burndow
Actual Burndown
Story Points Remaining
20
15
10
5
0
Day 1
Day 2
Day 3
Day 4
Day
Sprint Days

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

- Tested filters for different parameters (condition, bedrooms, location).
- Ensured accurate data sync and visual updates.
- Optimized dashboard to load within 2–3 seconds.



Dashboard Insights & Analysis:

General Summary:

- **Total Transactions**: 21,609
- **Average Sale Price:** $511,619
- **Renovated Houses:** Only 4.23% of homes were renovated.
- **Water View Homes:** A high 75.43% of homes had water views.
- **Total Area Covered:** 38,643,798 square feet.

Condition of the House:

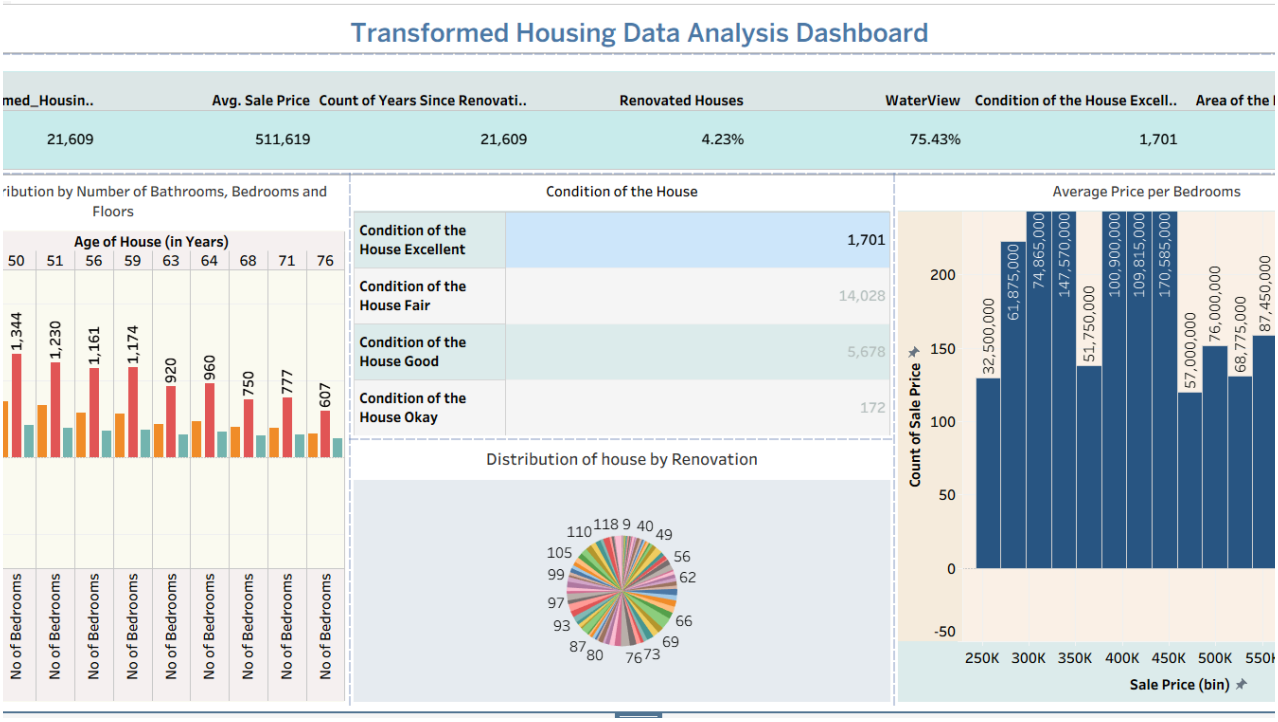
- Majority of homes were rated as Fair (14,028), followed by Good (5,678).
- Only 1,701 homes were in Excellent condition.
- Very few homes (172) were in Okay condition.

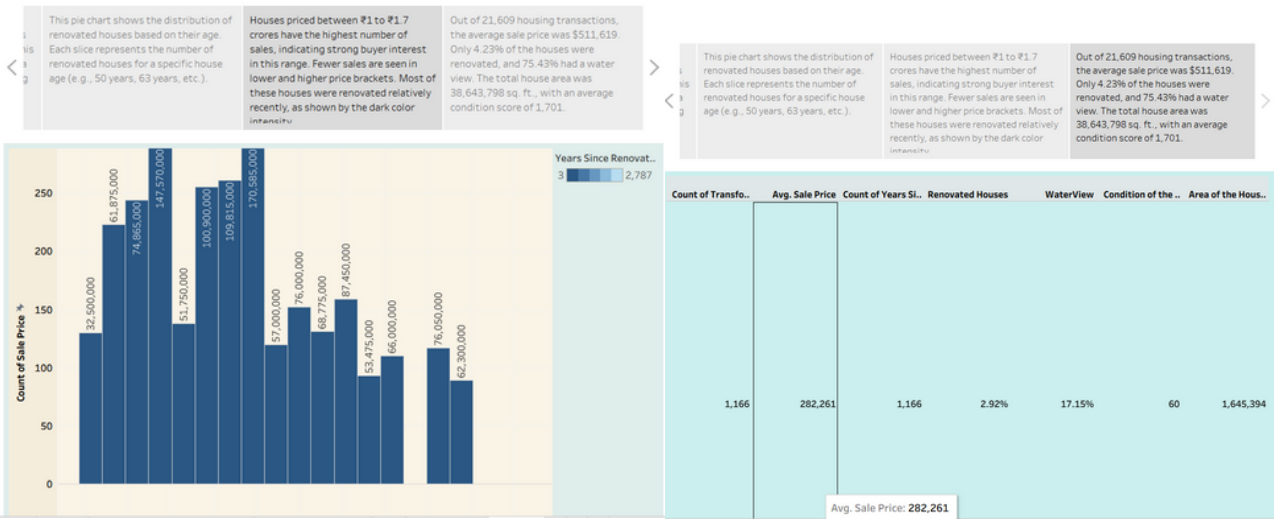
Insight: The data indicates most homes fall between fair and good condition, highlighting a potential opportunity for value-adding renovations.

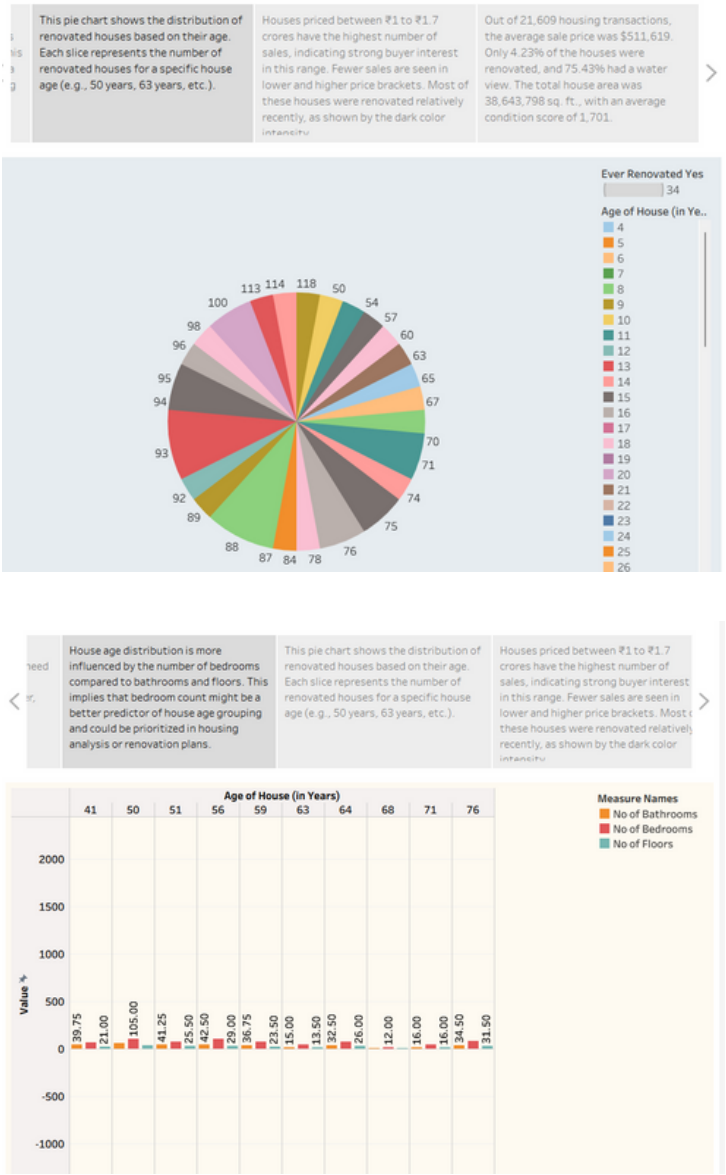
7. RESULTS

7.1 Output Screenshots

- Pie Chart: Renovated vs non-renovated homes.
- Bar Chart: House condition distribution (Fair, Good, Excellent).
- Column Chart: Bedrooms, bathrooms, floors by age of house.
- KPI Cards: Average price, total properties analyzed, % renovated.







8. ADVANTAGES & DISADVANTAGES

Advantages

- Easy to understand complex data visually.
- Helps in quick and accurate decision-making.
- User-friendly and interactive.

Disadvantages

- Static dataset; requires manual updates for new data.
- Limited advanced analytics without additional tools.

9. CONCLUSION

The project successfully transforms raw housing data into meaningful insights using Tableau. The dashboard highlights price trends, renovation impacts, and property conditions, empowering users to make better investment or buying decisions.

10. FUTURE SCOPE

- Integrate real-time data using APIs.
- Add predictive analytics for price forecasting.
- Build a web or mobile version for wider accessibility.

11. APPENDIX

- Dataset Link: Kaggle Housing Dataset
- GitHub/Project Demo Link: (https://github.com/tanisha533/23_DataAnalytics-Avantika-)
- Source Code: Not applicable (built using Tableau)