Project Report

Team ID	PNT2025TMID10260
Project Name	visualizing housing market trends: an analysis of sale prices and features using tableau

1. INTRODUCTION

1.1 Project Overview

The project titled **"Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau"** aims to transform raw housing data into meaningful visual insights. It focuses on analyzing factors such as **years since renovation, house age, number of bathrooms, bedrooms, and floors**, and how these impact **house sale prices**.

Using **Tableau** and **Tableau Prep Builder**, this project cleans, processes, and visualizes the data through interactive dashboards and storytelling features. The result is a powerful tool that helps users **understand pricing trends**, observe **buyer behavior**, and **explore property feature patterns** through engaging, data-driven visuals.

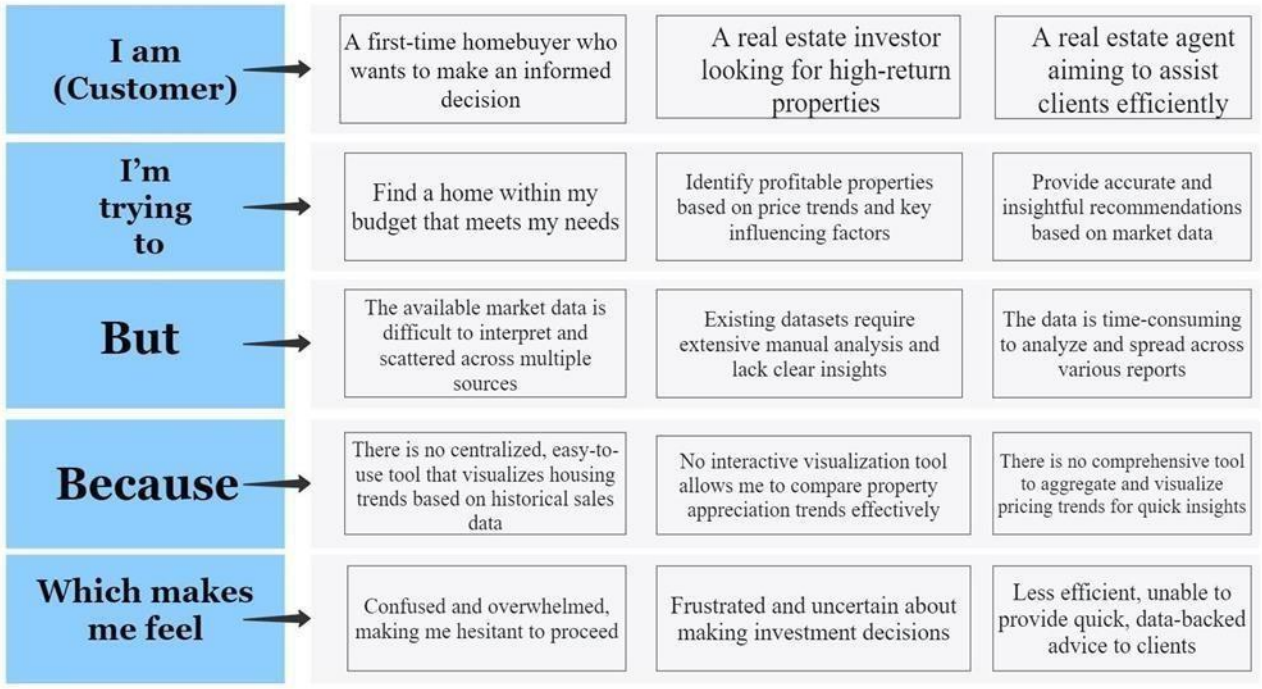
1.2 Purpose

The purpose of this project is to:

- Provide an **interactive platform** to explore housing market data.
- Identify and visualize how **specific features and renovations** influence house sale prices.
- Help users understand **sales distribution trends** based on age and renovations.
- Deliver **clear, visual narratives** for analytical insights using Tableau's storytelling capability.

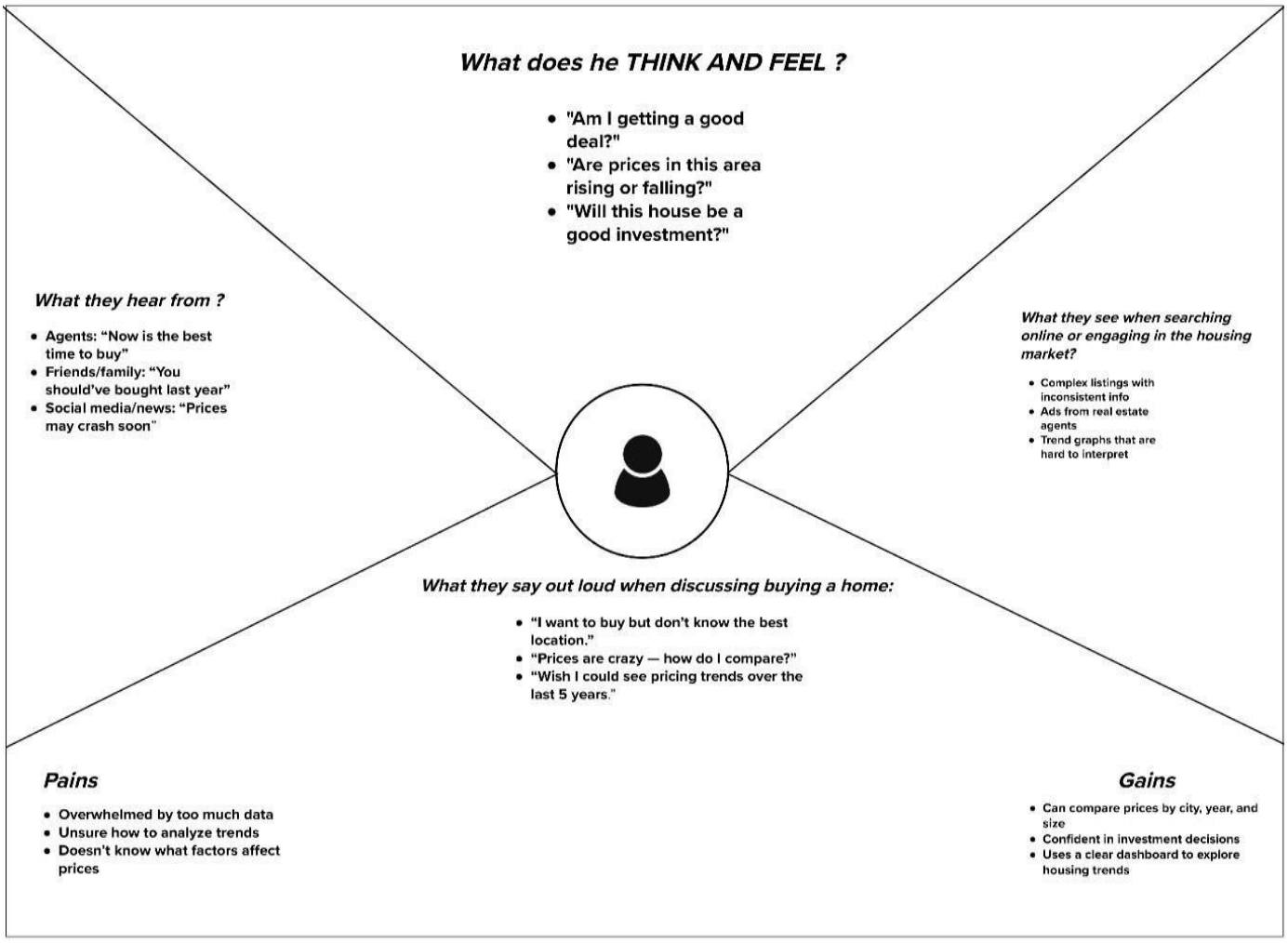
2. IDEATION PHASE

2.1 Problem Statement



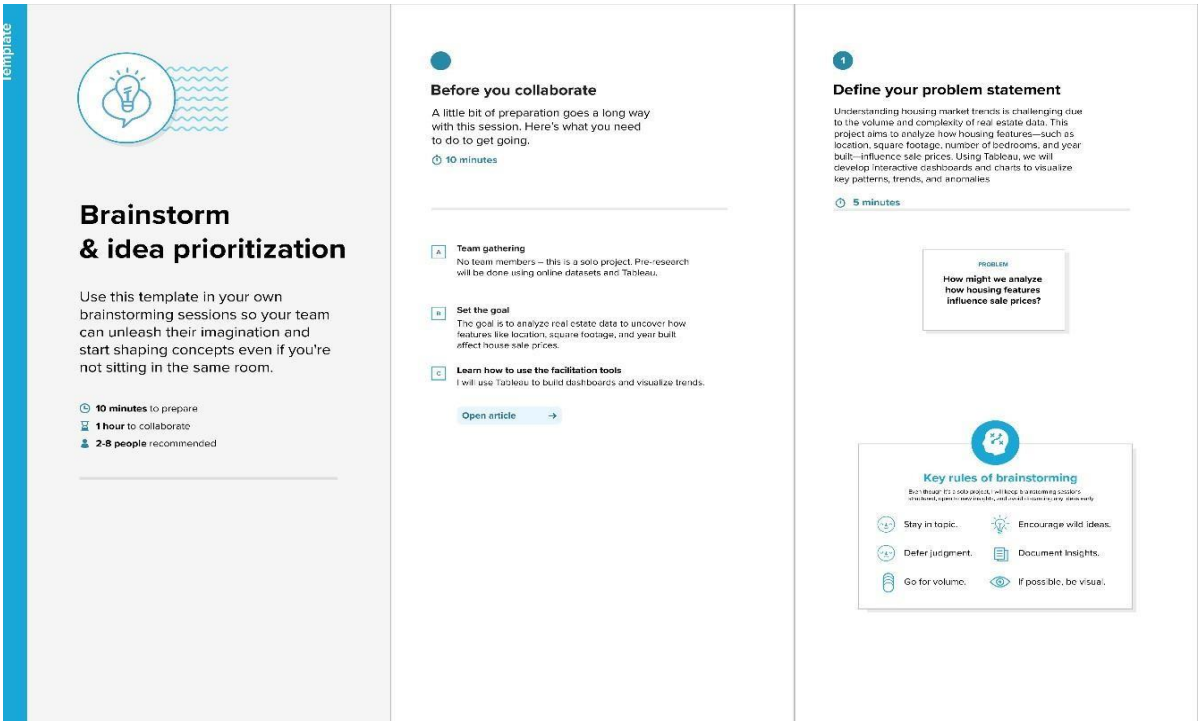
Problem Statement(PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Areal estate analyst	understand whatfeatures affect house prices	thedata is too complex and scattered	I don't have a singledashboard that shows clear trends	frustrated and unsure about my decisions
PS-2	Amarketing strategist	target the rightsegment of buyers	I don't knowwhat trends are	I can't link buyer behavior to house characteristics	ineffectiveand misaligned
			influencing sales		
PS-3	Acompany executive	makestrategic investment decisions	I can't clearly see performanc e patterns	current reports lack visual clarity and interactivity	hesitant and data-blind

2.2 Empathy Map Canvas

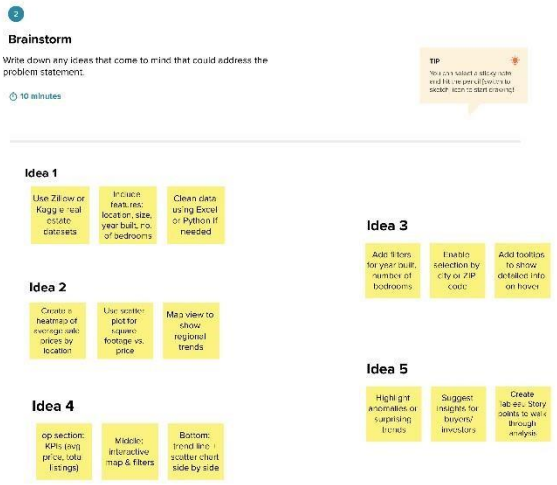


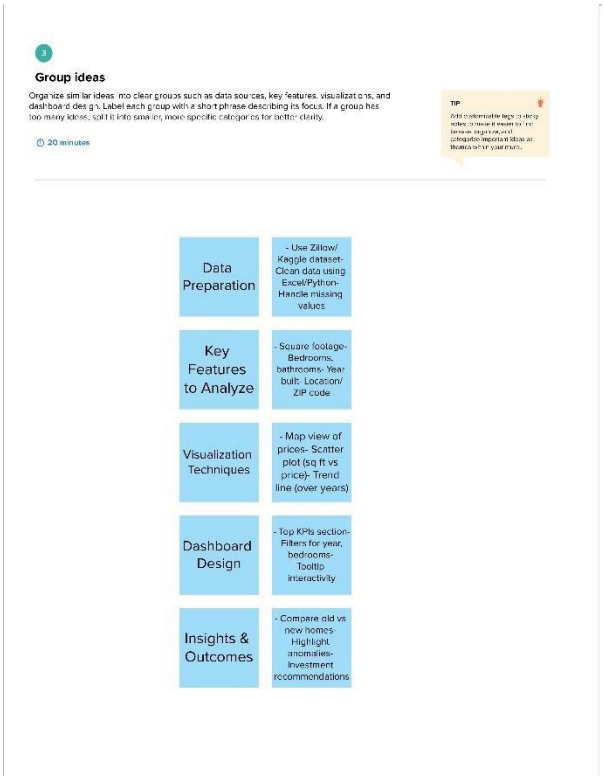
2.3 Brainstorming

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

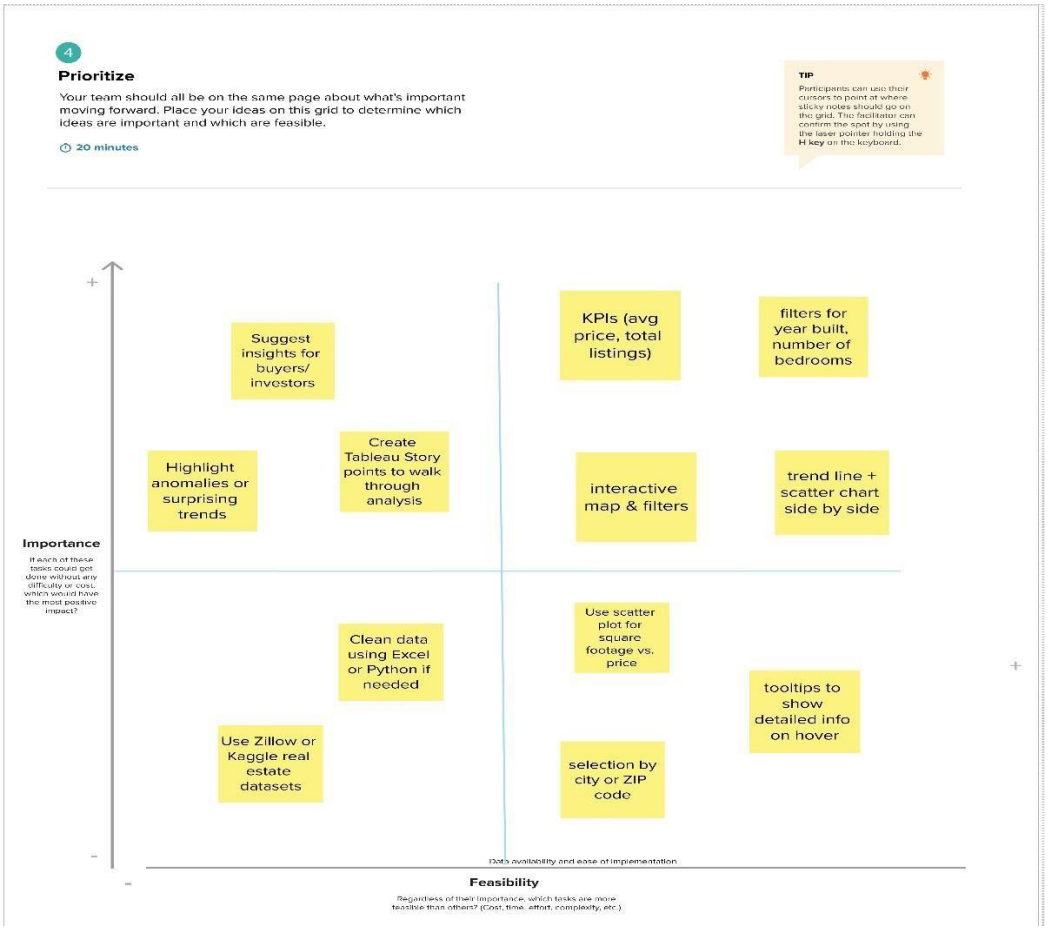


Step-2: Brainstorm, Idea Listing and Grouping





Step-3: Idea Prioritization



3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

CUSTOMER JOURNEY MAP | LAXMI ESTATE: VISUALIZING HOUSING MARKET TRENDS

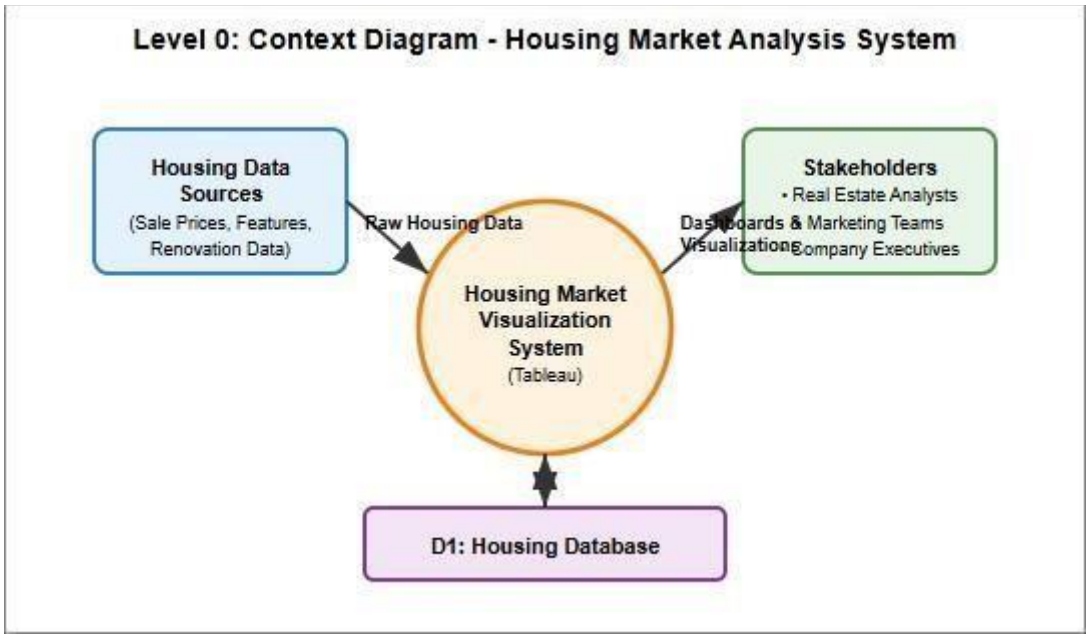
ENTER	ENTICE	ENGAGE	IDENTTF	EXTEND
Access Dashboard Initial access to the Tablean: housing market dechboard	**Overview Data** Reviewiking key housing market metrics	**Explore Renovation Impact** Analyzing a histogram of pric-distribution by years	**Identify Trends** Expiore line charts tracking median price changes over time	**Apply Findings** Use insights to guide sales, pricing, and forecesting
Steps	**View summary statis** tics, average prices and key figures	Use filters, hover toohips, and interactive controls	Use tima filters to spot-market strdegoic planning	Export reports or present findings-to stakeholders
Goals	Understand scope and scale of avai-bale housing data	Identify how renovations affect proparty prices	Recognize long-term price trends for strategic plarming	Turn data into actionable business strategies
Positive Experiences	Clear and concise overview builds confidence in thi data	Visualization reveals unexpected insights about renovation RDI	Clear timeline charts make frends easy to understand	Data-driven decisions improve competitive-ness imped faices
Negative	Complex charts may be harder for new users to interipet	Detailed visual analysis supports pricing strategies	Conflicting trends between charts may cause uncertainty	Translating insights into actions may face operational chal-

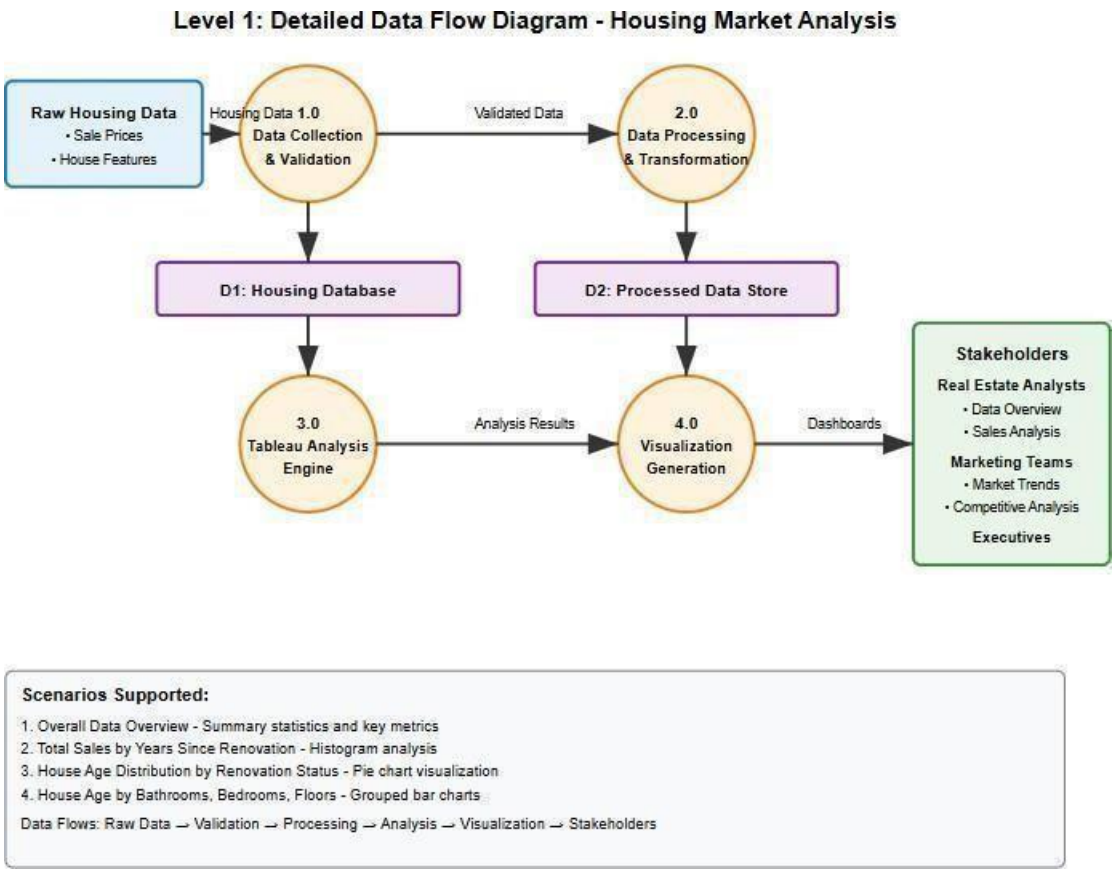
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Import and Processing	Import housing dataset into Tableau
		Data transformation and cleaning
		Validate data quality and completeness
FR-2	Interactive Dashboard Creation	Create overall data overview dashboard
		Develop sales by renovation years histogram
		Build house age distribution pie chart
		Design grouped bar chart for house features
FR-3	Data Visualization and Analytics	Generate average sales price calculations
		Calculate total area metrics
		Analyze renovation impact on pricing
		Create age-based distribution analytics
FR-4	Reporting and Export Functionality	Export visualizations as images/PDFs
		Generate summary reports
		Create stakeholder presentation materials

Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Dashboard should be intuitive and easy to navigate for real estate analysts, marketing teams, and executives with minimal training required
NFR-2	**Security**	Ensure data privacy and secure access to housing market data with appropriate user authentication and authorization controls
NFR-3	**Reliability**	System should provide consistent and accurate visualizations with 99.5% uptime and reliable data processing capabilities
NFR-4	**Performance**	Dashboard should load within 3 seconds and handle interactive filtering smoothly even with large datasets containing thousands of housing records
NFR-5	**Availability**	Tableau dashboard should be accessible 24/7 to stakeholders across different time zones with minimal scheduled maintenance downtime
NFR-6	**Scalability**	Solution should accommodate growing datasets and additional visualization requirements as ABC Company expands its housing market analysis

3.3 Data Flow Diagram





User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Real Estate Analyst	Data analysis & Visualization	USN-1	As a real estate analyst, I can view the overall data overview dashboard to understand the dataset scale and key metrics	I can see coun of housing records, average sales price, and total basement area	High	Sprint-1
Real Estate Analyst	Renovation Impact analysis	USN-2	As a real estate analyst, I can analyze total sales by years since renovation through histogram visualization	I can identify correlation between renovation timing and price ranges	High	Sprint-1

Real Estate Analyst	House Age Distribution	USN-3	As a real estate analyst, I can view house age distribution by renovation status through pie chart	I can assess age characteristics and renovation prevalence	HIgh	Sprint-1
Real Estate Analyst	Feature analysis	USN-4	As a real estate analyst, I can analyze house age distribution by number of bathrooms, bedrooms, and floors	I can identify patterns in housing characteristics over time	High	Sprint-2
Real Estate Analyst	Interactive dashboard	USN-5	As a real estate analyst, I can access an interactive dashboard combining all visualizations	I can navigate between different views and filter data dynamically	Medium	Sprint-2

3.4 Technology Stack

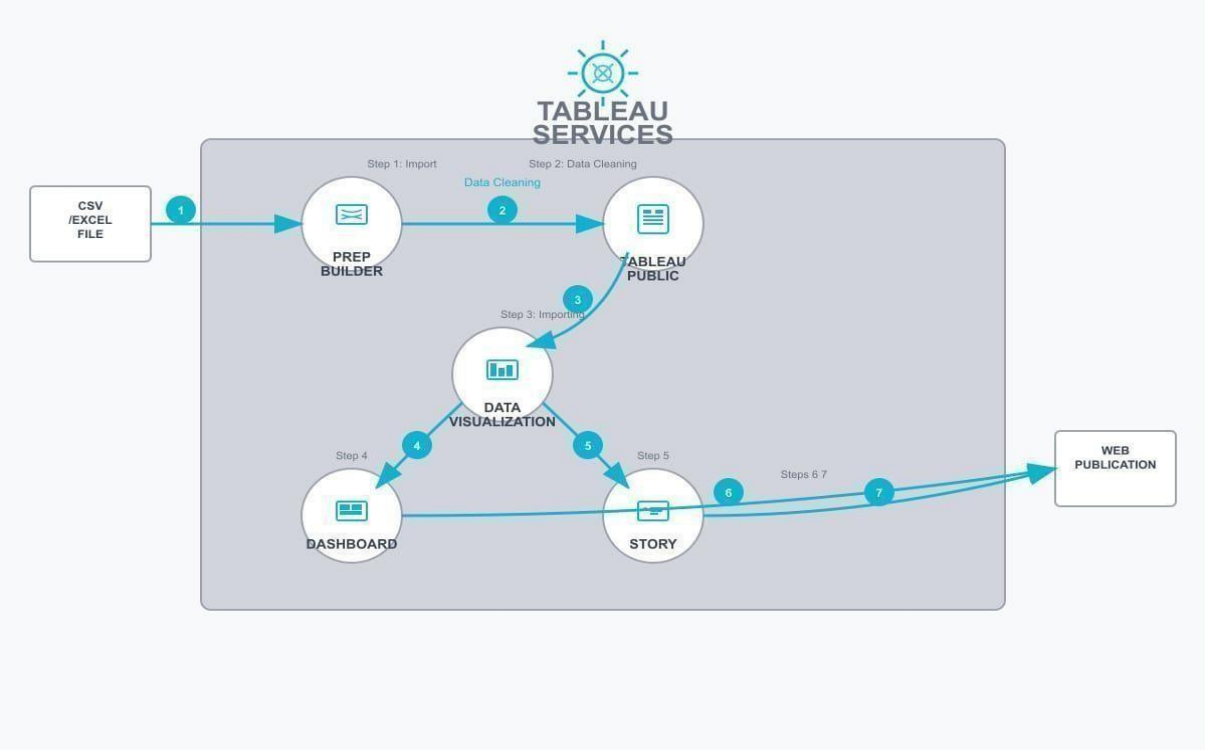
Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Web-based dashboards for viewing and interaction	Tableau Public
2.	Application Logic-1	Data preprocessing and transformation workflows	Tableau Prep Builder
3.	Application Logic-2	Interactivity using filters, parameters, and actions	Tableau Filters, Parameters, Actions
4.	Dashboard/Story Logic	Logical flow of insights using story features	Tableau Story Feature
5.	Data Source	Flat files used as housing market datasets	CSV
6.	File Storage	Housing datasets stored locally	Local File System / Google Drive

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	yes	Tableau Public
2.	Security Implementations	N/A	N/A
3.	Scalable Architecture	Can scale by publishing to Tableau Cloud for wider access	Tableau Public
4.	Availability	Dashboards available online 24/7	Tableau Public
5	Performance	Good \ Better performance	Tableau Public

Technical Architecture:



4. PROJECT DESIGN

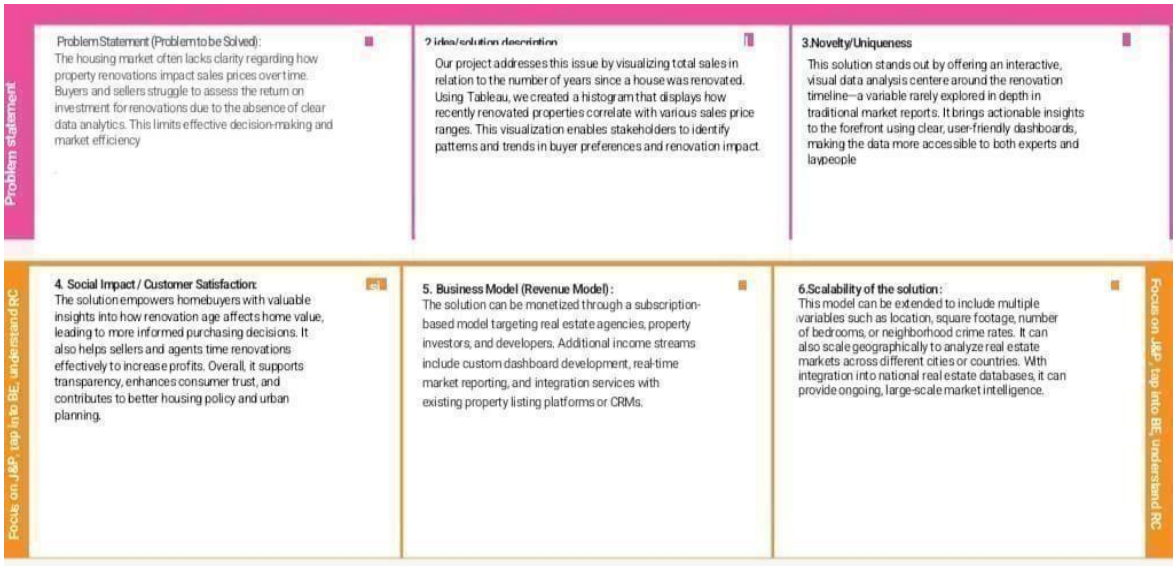
4.1 Problem Solution Fit

Problem-Solution fit canvas

<table>
<tr>
<td>1. CUSTOMER SEOMENT(S)
First time home buyers, real estareinvestors, urban professionals (ages 25-48), brokers and real estate an-</td>
<td>2. CUSTOMER CONSTRAINTS
Limited knowledge of data tools
Budget constraints
Overload of conflicting information
Distruct in brokers
Limited time to explore options</td>
<td>8. PROBLEM ROOT CAUSE
Housing market data is scattered and unorganized
Lack of visualization makes pan hard to detect</td>
</tr>
<tr>
<td>2. JOBS TO BE-DONE / PROBLEMS
Understand housing price frends
Compare proporty features and sale
Identify good investment zones
Make data-driven decisions abou buying properties</td>
<td>7. BEHAVIOUR
Browse listings on real estate
Compare prices manually
Ask friends/family for opinions
Use EMI calculators</td>
<td>6. BEHAVIOUR
Browse listings on real estate sites
Compare prices manually
Ask friends/family for opinions
Watch property review videos</td>
</tr>
<tr>
<td>3. TRIGGERS
Rising rental prices
Ads or deals on prooporties
Peerifamily recommnendations
Using clear charts as plece charts</td>
<td rowspan="2">YOUR SOLUTION
An Interactive Tableau dashboard that visualizes housing data (sale price, size, type, local, trends)</td>
<td rowspan="3">8. CHANNELS OF BEHAVIOUR
6.1 ONLINE
Real estate websites (MagicBricks, 99-
Tableau dashboards
Keggle datasets
Youtube reviews
6.2 OFFLINE
Property site visits
Broker consultations</td>
</tr>
<tr>
<td>EMOTIONS. BEFORE / AFTER
Before, Confused, unsure, over whelm, skepti-</td>
</tr>
<tr>
<td colspan="2">EMOTIONS. BEFORE / AFTER</td>
</tr>
</table>

4.2 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	People struggle to understand how housing prices vary by location, room count, or size, making it hard to compare data and make informed decisions.
2.	Idea / Solution description	The solution is an interactive Tableau dashboard that visualizes housing data using charts, maps, and filters, making complex trends easy to understand.
3.	Novelty / Uniqueness	Unlike static reports, this solution offers dynamic, filterable visuals that users can interact with, giving personalized insights in real time.
4.	Social Impact / Customer Satisfaction	It empowers homebuyers, sellers, and agents with clear, accessible data, leading to confident decisions and greater market transparency.
5.	Business Model (Revenue Model)	Proposes a tiered subscription model with additional revenue streams.
6.	Scalability of the Solution	Describes how the solution can grow with increased data, users, and market expansion.



4.3 Solution Architecture

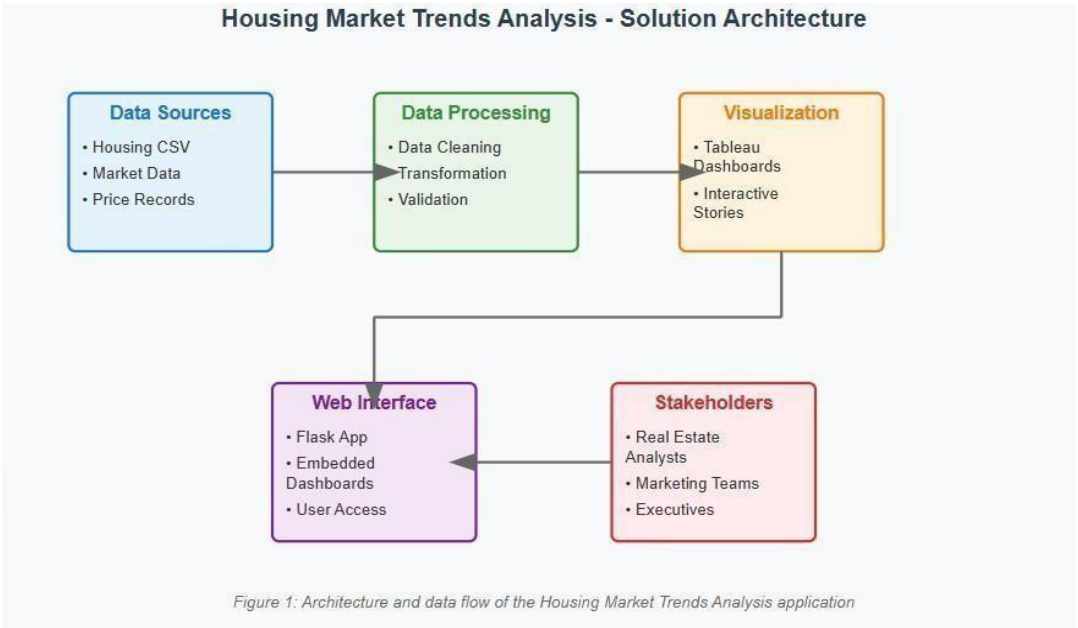


Figure 1: Architecture and data flow of the Housing Market Trends Analysis application

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

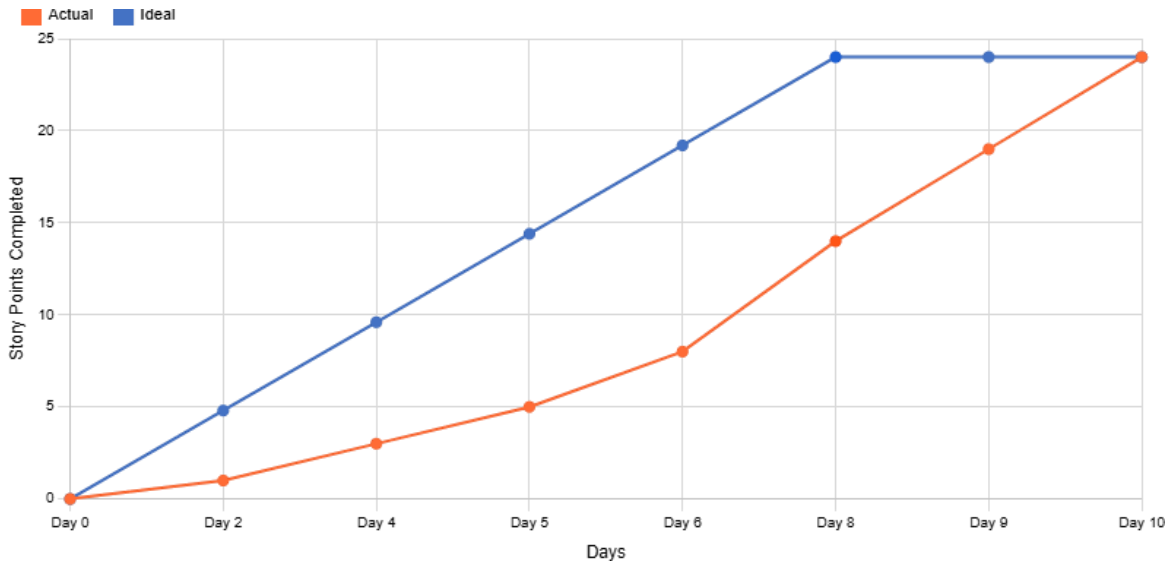
Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection & Extraction	USN-1	As a user, I can collect housing market data from reliable sources, including prices, property types, and trend.	2	High	1
Sprint-1	Data Preprocessing	USN-2	As a user, I can preprocess data to clean and filter out unnecessary information, such as outliers, duplicates, or missing values	3	High	1
Sprint-2	Data Visualization	USN-3	As a user, I can visualize housing trends using charts, graphs, and heatmaps to understand the current market dynamics and pricing fluctuations	3	High	1
Sprint-2	Interactive Dashboard	USN-4	As a user, I can interact with a dashboard that displays live market trends, data filters, and performance insights for better decision-making	2	High	1
Sprint-3	User Stories (Dashboard Views)	USN-5	As a user, I can set custom views of the dashboard to save preferences for quick future reference (e.g., specific locations, budget, etc.)	3	Medium	1
Sprint-3	Web Integration	USN-6	As a user, I can integrate the dashboard and data visualizations into a website for online accessibility and usability	2	Medium	1

Project Tracker, Velocity & Burndown Chart

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	2 Days	18 July 2025	19 July 2025	5	18 July 2025
Sprint-2	5	3 Days	21 July 2025	23 July 2025	5	22 July 2025
Sprint-3	5	2 Days	24 July 2025	25 July 2025	5	26 July 2025

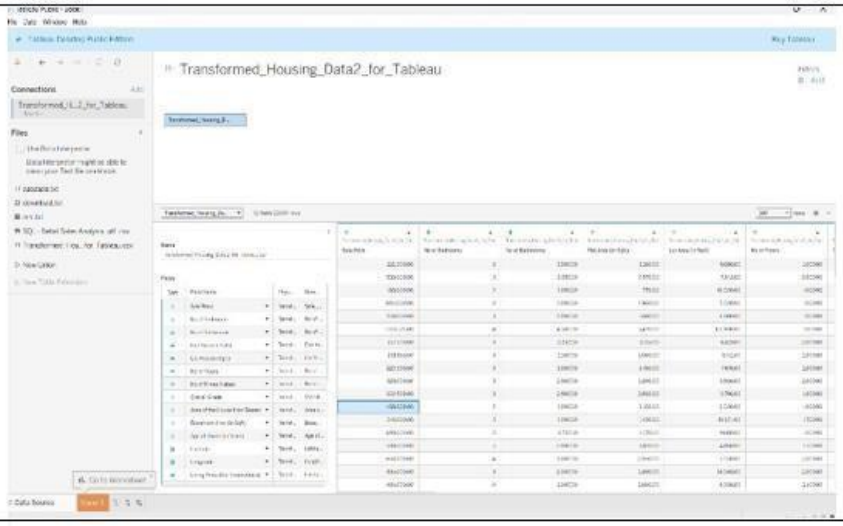
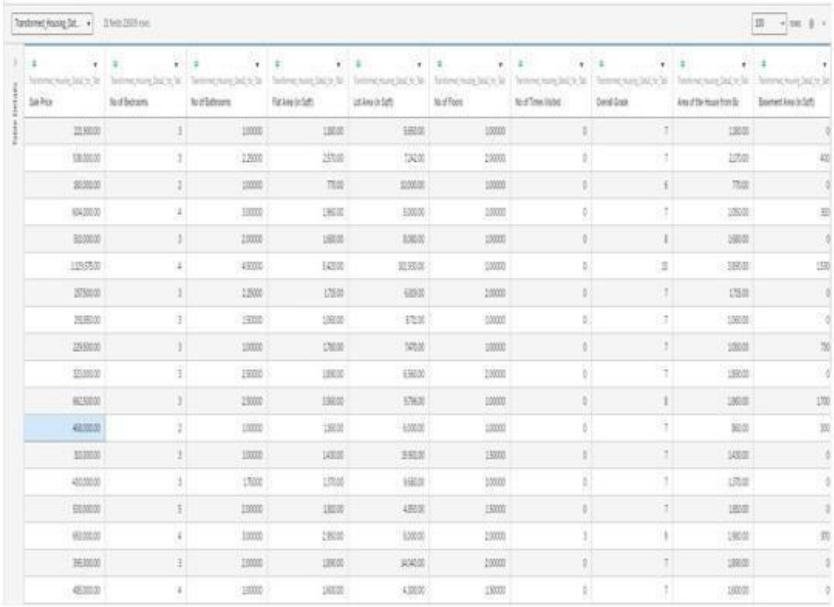
Burndown Chart

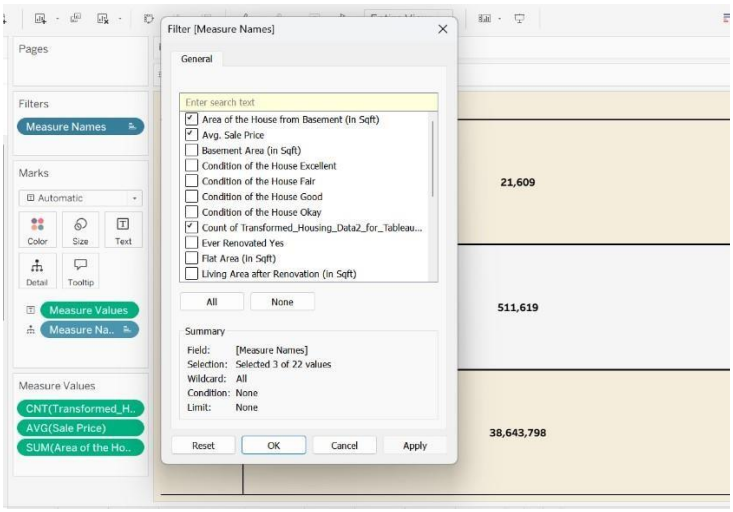
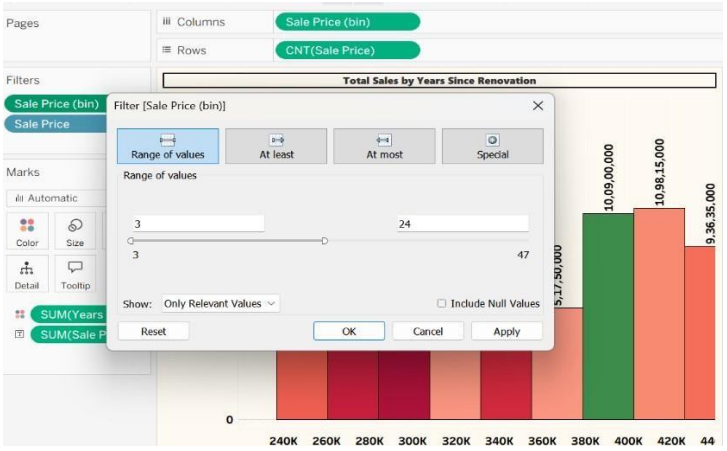
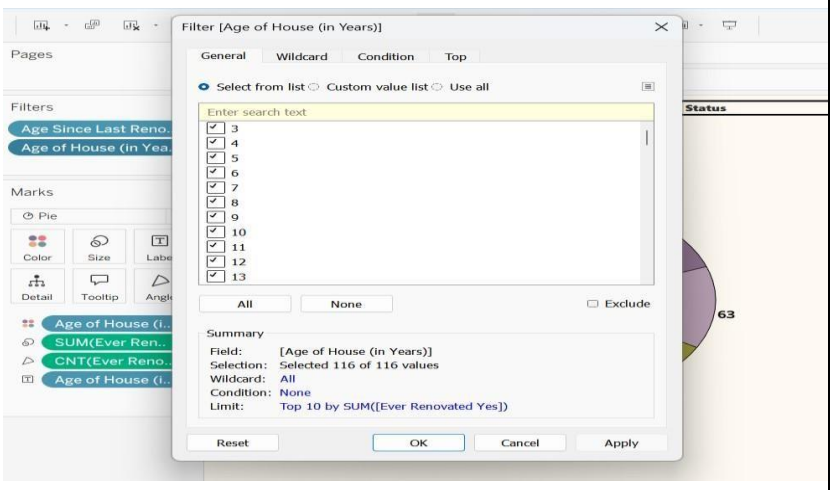


6. FUNCTIONAL AND PERFORMANCE TESTING

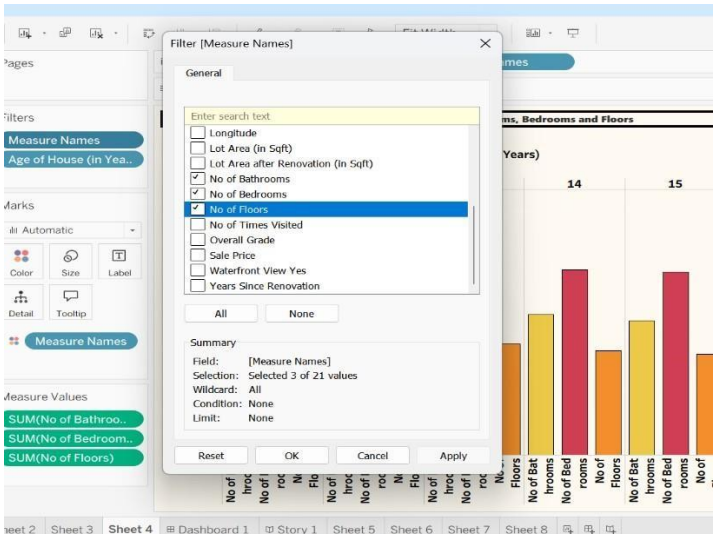
6.1 Performance Testing

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

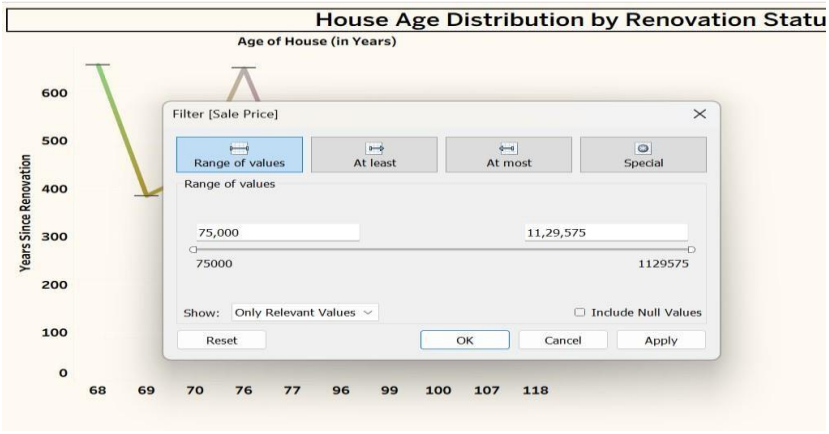
S.No.	Parameter	Screenshot / Values
1.	Data Rendered	
2.	Data Preprocessing	

3.	Utilization of Filters	For scenario – 1  For scenario – 2  For scenario – 3 

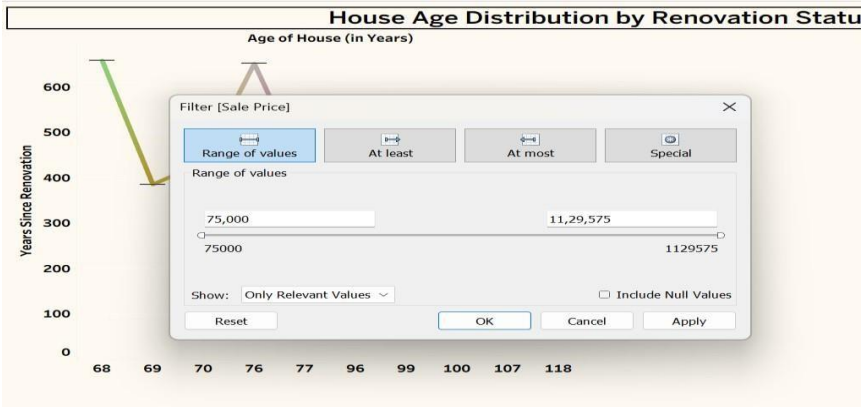
For scenario – 4

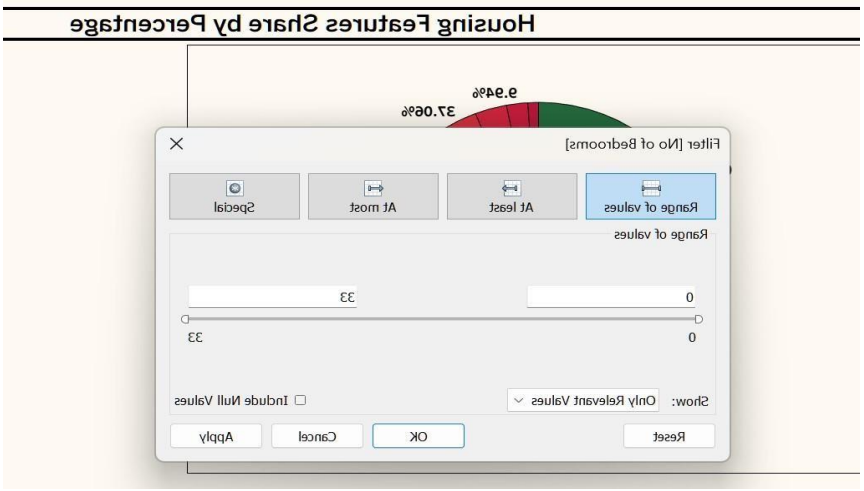
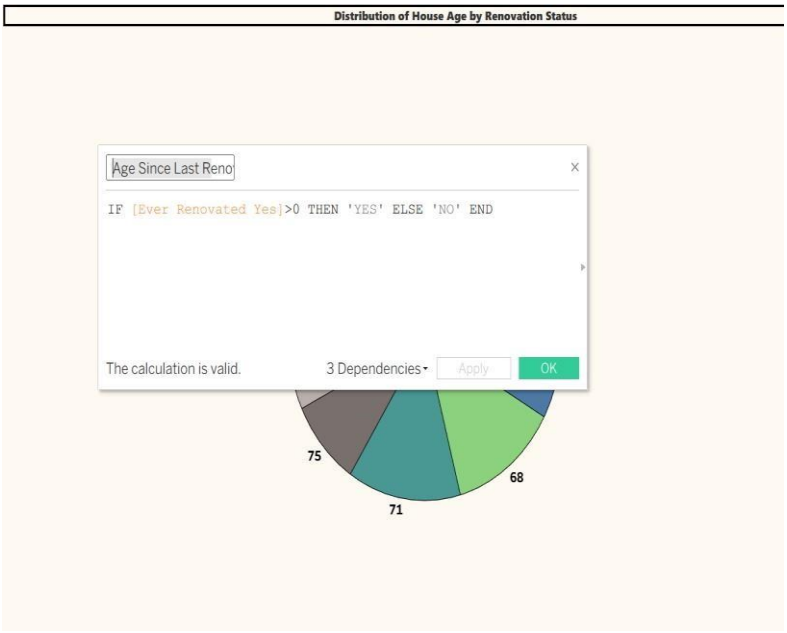


For scenario – 5

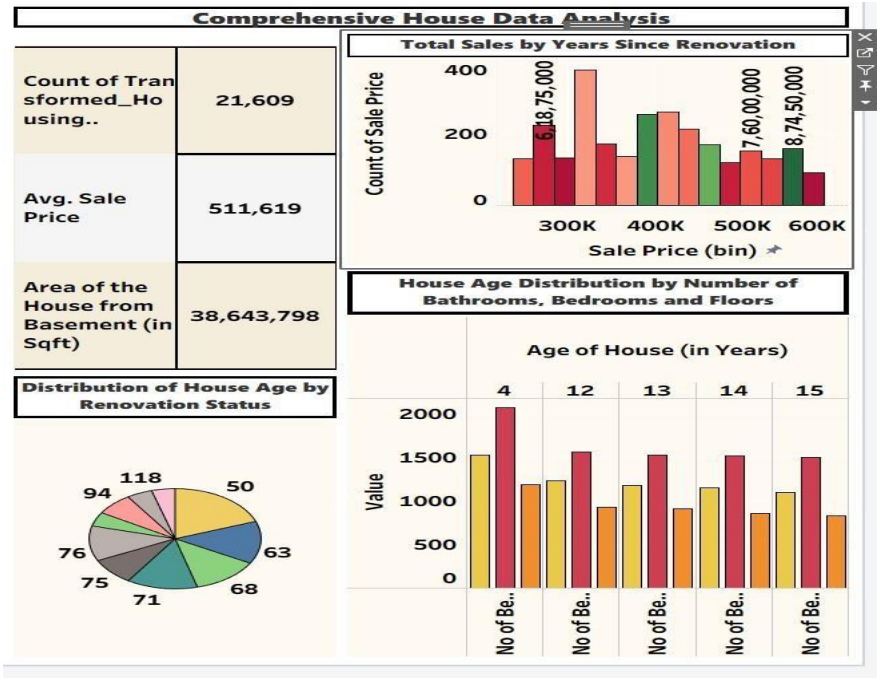


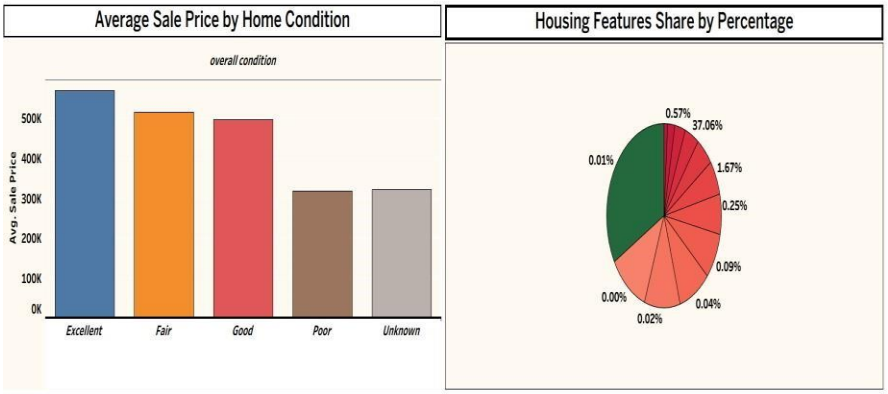
For scenario – 6

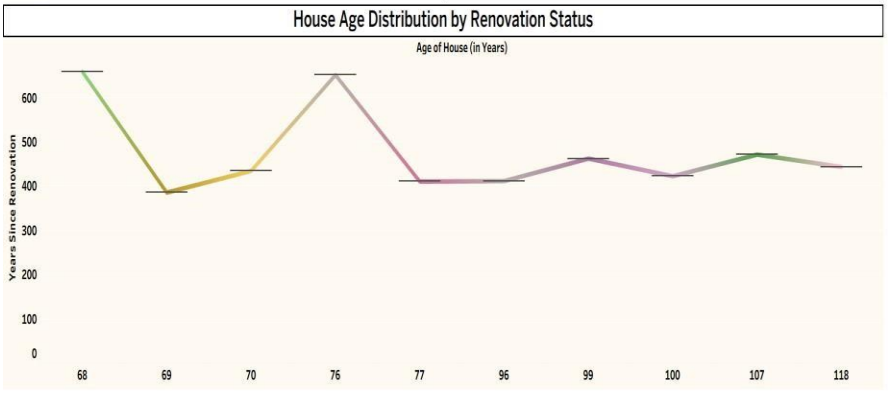


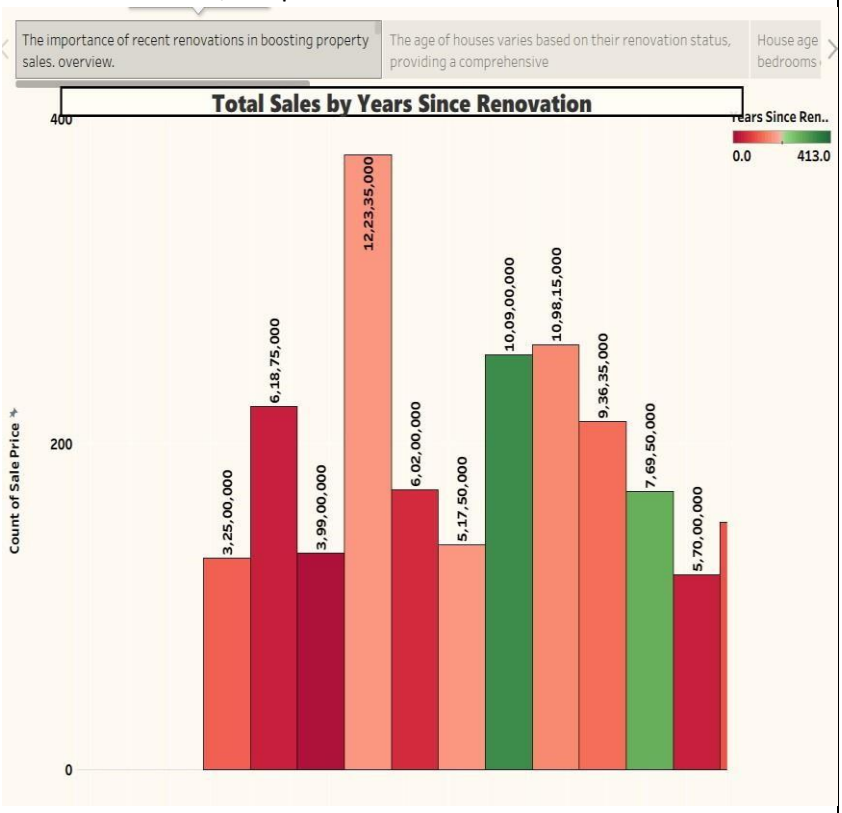
		For scenario – 7 
4.	Calculation fields Used	

5.	Dashboard design	No of Visualizations / Graphs – 4





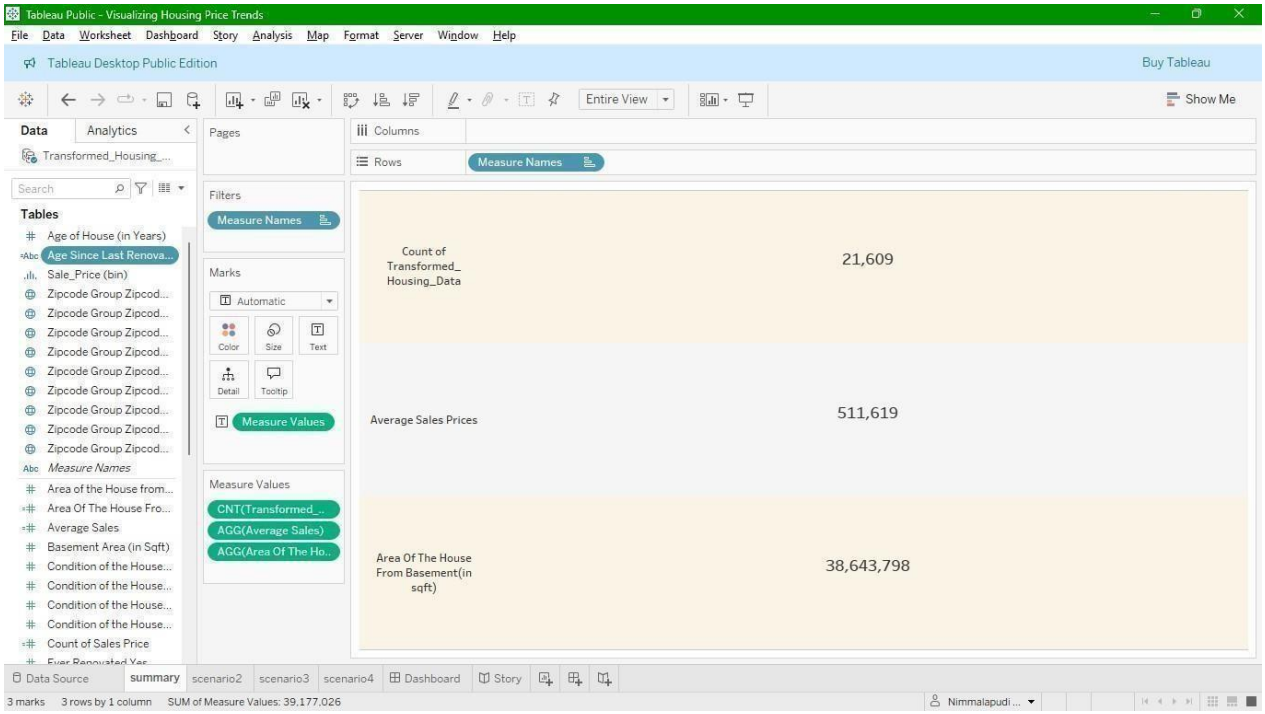


6	Story Design	No of Visualizations / Graphs – 4 

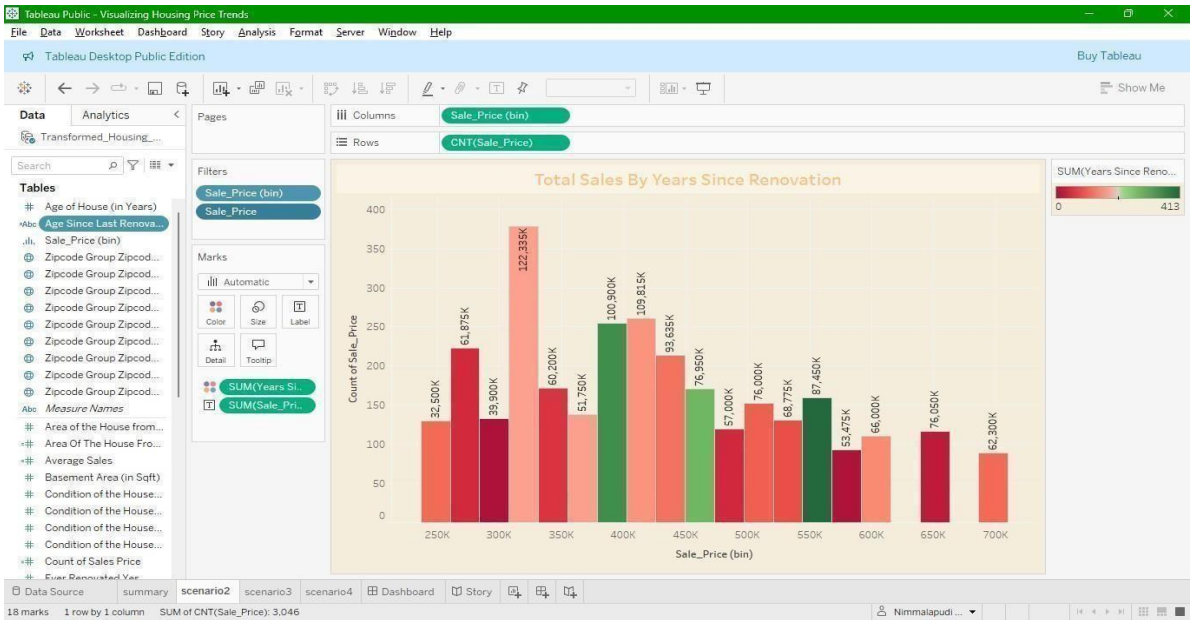
7. RESULTS

7.1 Output Screenshots

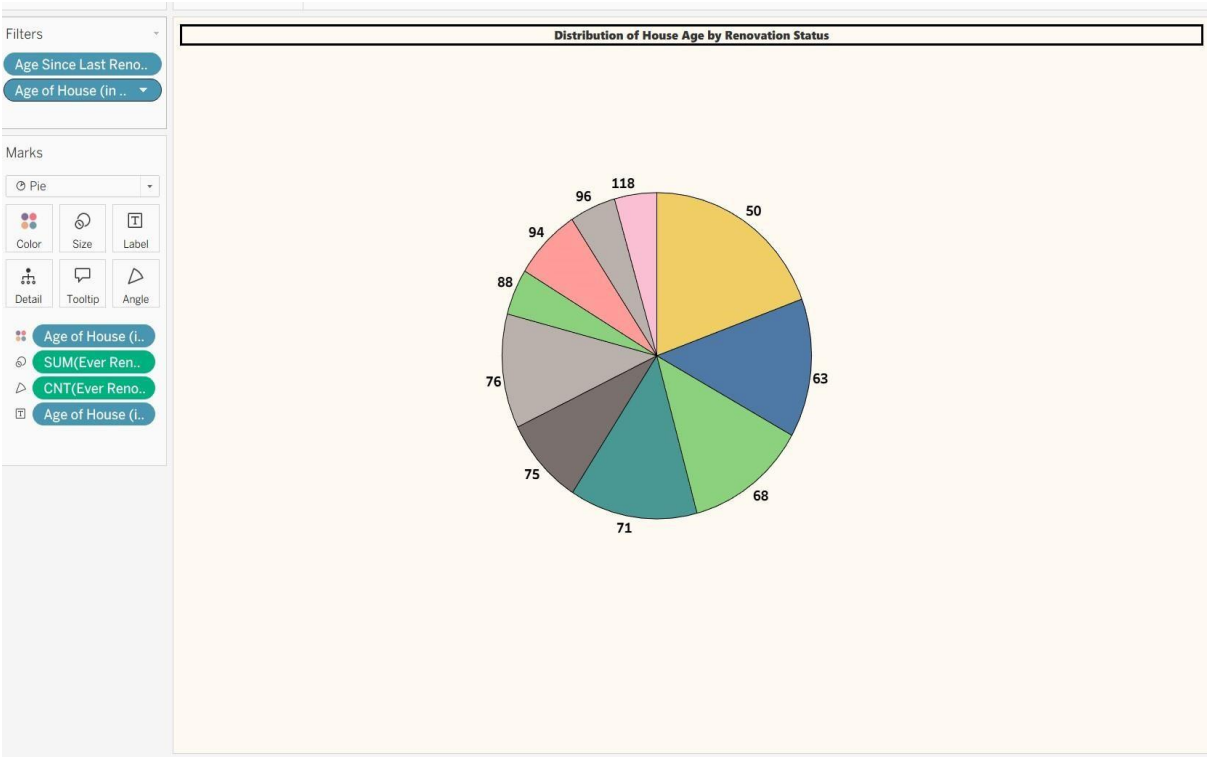
Scenario-1



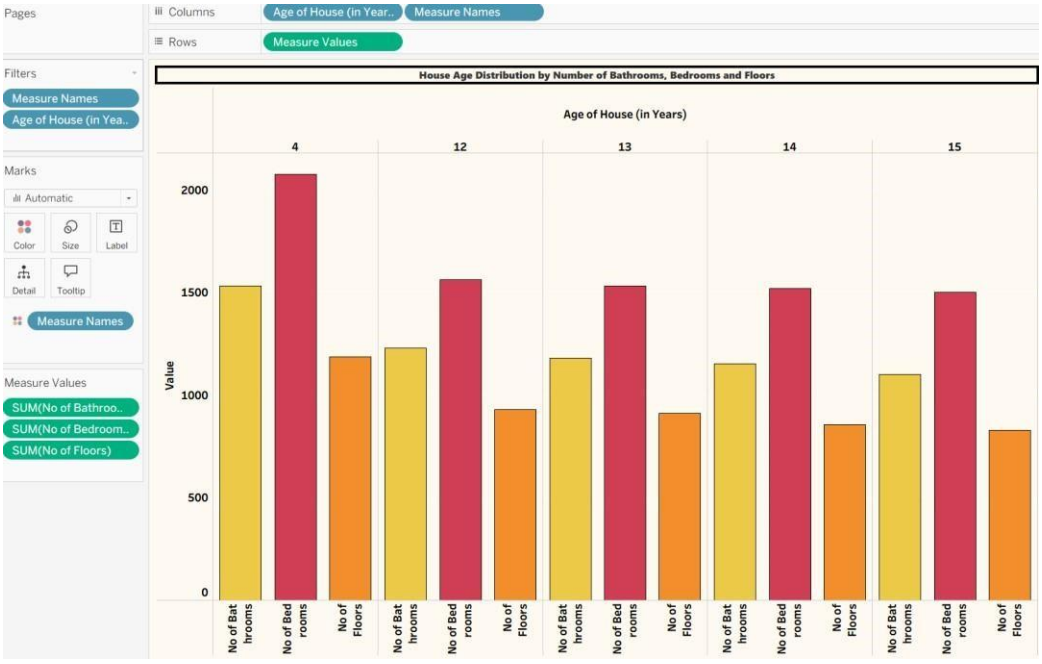
Scenario-2



Scenario-3

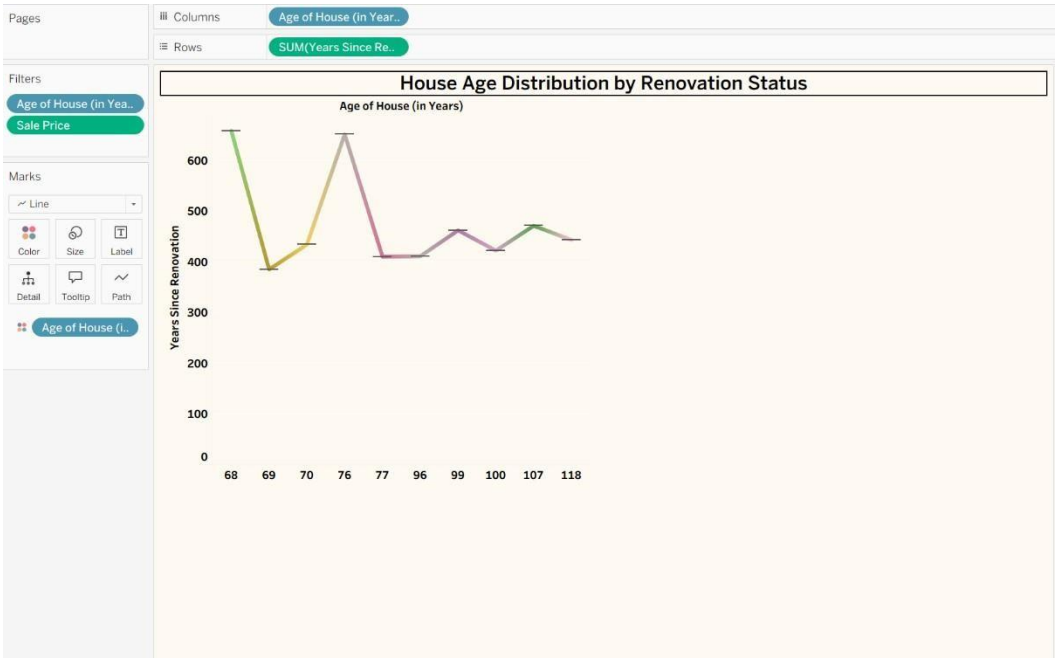


Scenario-4

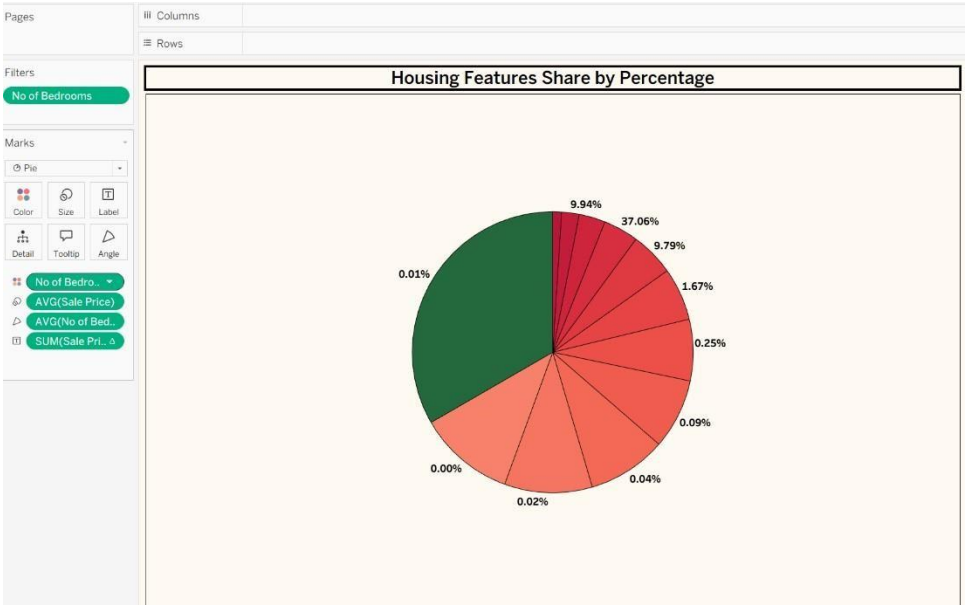


Scenario – 5

Scenario - 6

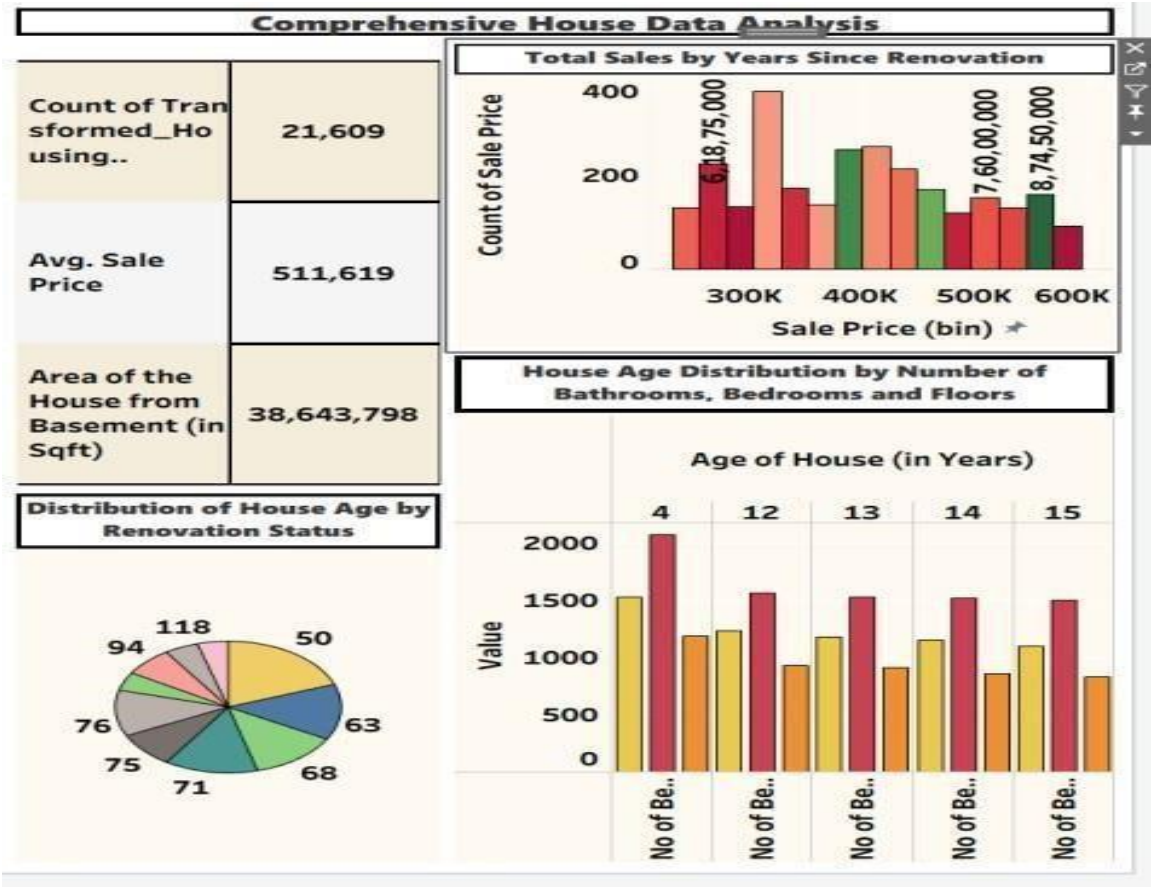


Scenario - 7

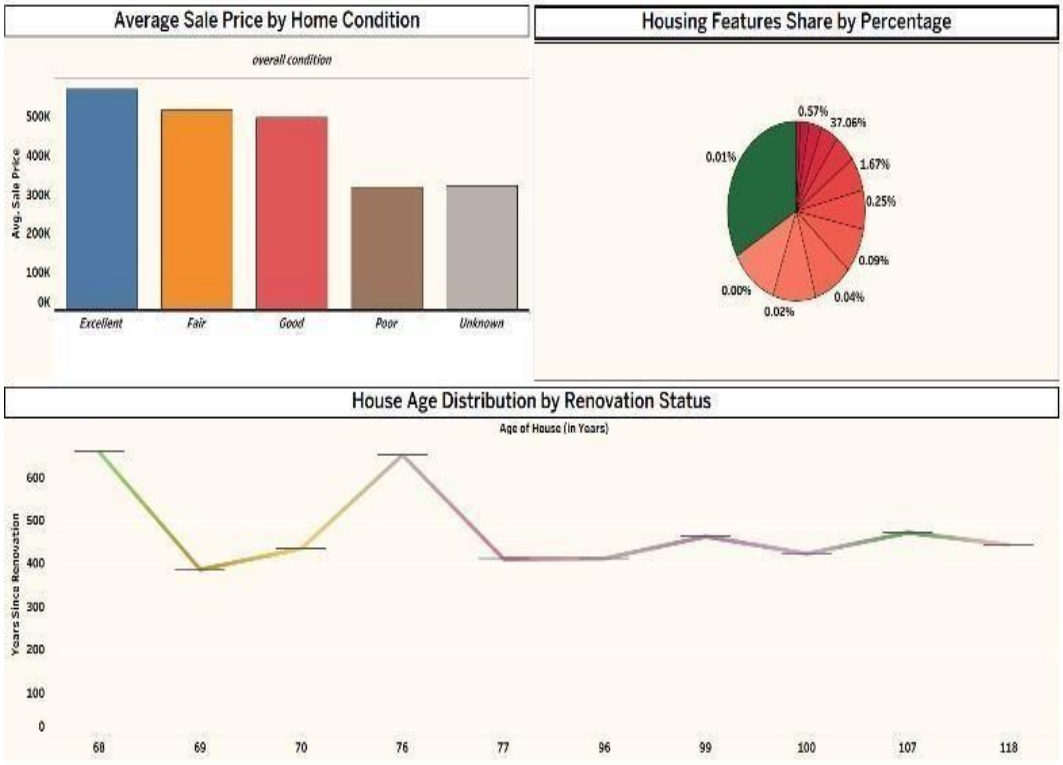


Dashboard

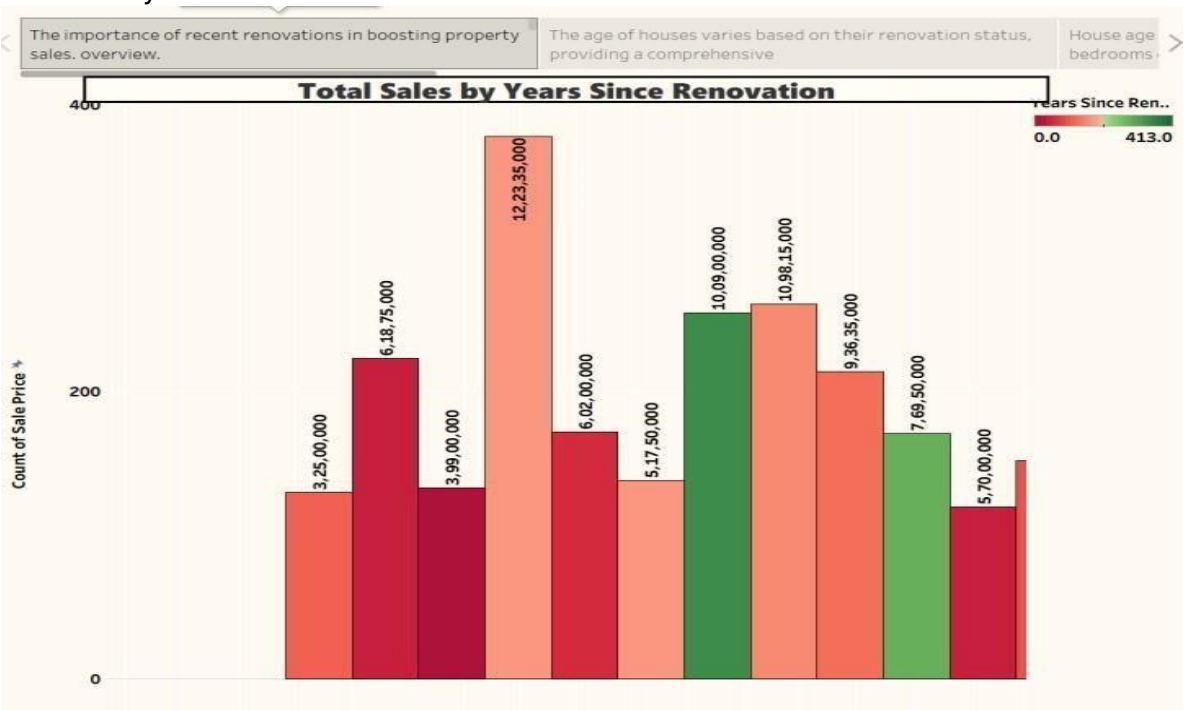
Dashboard 1



Dashboard 2



Story



8. ADVANTAGES & DISADVANTAGES

8.1 ADVANTAGES

1. **Visual Clarity**: Tableau enables intuitive, easy-to-understand visualizations for complex housing datasets.

2. **Interactive Dashboards**: Users can filter data dynamically based on features like renovations, age, or number of rooms.

3. **Business Insights**: Helps stakeholders identify trends and patterns that influence pricing strategies and buyer behavior.

4. **Time-Efficient**: Reduces manual analysis through automated and visual insights.

5. **Storytelling Capability**: Tableau's story feature allows presenting data as step-by-step narratives.

6. **Non-technical Accessibility**: Designed for business users with minimal technical skills.

7. **Improves Decision Making**: Enhances strategic planning through data-driven recommendations.

8. **Flexible Data Sources**: Supports a wide range of formats like Excel, CSV, and cloud-based data.

8.1 DISADVANTAGES

1. **No Predictive Modeling**: Tableau lacks built-in machine learning or forecasting capabilities.

2. **Dependence on Data Quality**: Inaccurate or unclean data can lead to misleading visualizations.

3. **Limited Data Cleaning**: Complex data transformations require external tools like Tableau Prep.

4. **Performance Issues**: Can slow down with very large datasets if not optimized properly.
5. **Story Limitations**: Tableau's story feature is static and not as flexible as interactive dashboards.

6. **Cost (for full version)**: Tableau Creator licenses and cloud solutions may be expensive.

7. **No Native Real-Time Streaming**: Tableau is not ideal for real-time dynamic updates.

8. **Requires Training**: Users need time to become proficient in designing meaningful dashboards.

9. CONCLUSION

This project demonstrates the effective use of **Tableau** and **Tableau Prep Builder** to analyze and visualize housing market data in a meaningful and interactive way. By examining patterns related to **sale prices, renovations, house age, and structural features**, the project reveals key insights that support a deeper understanding of real estate trends.

Through a combination of **interactive dashboards** and **story-driven visualizations**, the project transforms raw datasets into easily interpretable insights. It proves how data visualization can **enhance clarity, support decision-making**, and provide a **structured narrative** around complex datasets. The approach used ensures the findings are accessible to both technical and non-technical users, making it a valuable asset for real estate data analysis.

10. FUTURE SCOPE

1. **Add Predictive Analytics**: Integrate machine learning to forecast housing prices.

2. **Use Real-Time APIs**: Connect to real estate APIs (like Zillow or Realtor.com) for live data updates.

3. **Enhance with Maps**: Use Tableau's map visualizations for geospatial housing trends.

4. **Deploy on Tableau Server**: Expand collaboration through server-hosted dashboards.

5. **Include External Data**: Add economic, demographic, or regional data to enrich insights.
6. **Mobile Dashboards**: Optimize dashboards for mobile accessibility.

7. **Automated Data Refresh**: Schedule regular updates from connected data sources.

8. **Multi-User Interaction**: Enable tailored views for different user types like analysts, buyers, or planners.

11. APPENDIX

Dataset Link :
https://www.kaggle.com/datasets/rituparnaghosh18/transformed-housing-data-2

Project GitHub Link :
https://github.com/Ronak504/visualzing-housing-market-trends-and-analysis-of-sales-price-and-features.git

project Demo link

https://drive.google.com/file/d/1cOXqUSoqI_i7vWGMjHf9OLH3OVDO1cWp/view?usp=drive_link