

# Final Project Report: Housing Market Tableau Analysis

Team ID - LTVIP2025TMID49598

## Introduction:

### 1.1: Project Overview

The real estate industry generates massive amounts of data, yet understanding the key factors influencing housing prices remains a challenge. This project, conducted for ABC Company, aims to analyze and visualize trends in the housing market using Tableau. By leveraging historical housing data, the project explores how attributes like house age, renovation status, and structural features (bedrooms, bathrooms, floors) correlate with sales prices.

### 1.2: Project Purpose

Through interactive dashboards and visual storytelling, the project equips real estate analysts, marketing teams, and executives with actionable insights to make informed pricing, renovation, and investment decisions. The outcome enhances strategic planning and drives competitive advantage in the housing sector.

## 2: Ideation Phase

### 2.1: Brainstorming

Team members contributed ideas on what insights would be most valuable to extract from housing market data. Ideas were grouped into clusters such as data enhancement, visualisation, interactivity, stakeholder needs, reporting, and future enhancements.

#### **Brainstorm & Idea Prioritisation 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. Prioritising 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 brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

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



## Brainstorm & idea prioritization

Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau

1

### Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⌚ 5 minutes

#### Problem Statement

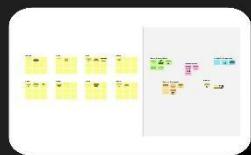
Real estate stakeholders often struggle with fragmented, raw housing data from various sources, making it difficult to identify reliable market trends, understand price drivers, and make data driven decisions regarding sales or investments. The lack of interactive and comprehensive insights leads to reactive strategies and missed opportunities.



#### Key rules of brainstorming

To run an smooth and productive session

- 🕒 Stay in topic.
- 💡 Encourage wild ideas.
- 🕒 Defer judgment.
- 👂 Listen to others.
- 🕒 Go for volume.
- 👁️ If possible, be visual.



#### Need some inspiration?

See a finished version of this template to kickstart your work.

[Open example →](#)

Step 2: Brainstorm, Idea Listing and Grouping

2

**Brainstorm**

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

House Age vs Market Preference

Features &amp; Structural Drivers of Value

Removal Impact on Sale Price

Buyer Psychology and Behavioural Insight

Basement and Total Area Correlation

Temporal Trends

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 can break it up into smaller sub-groups.

⌚ 20 minutes

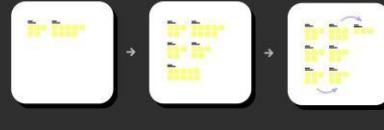
Insightful Visualizations

Data Enhancement &amp; Cleaning

Future Enhancements &amp; Scalability

User Interaction

Reporting and Output



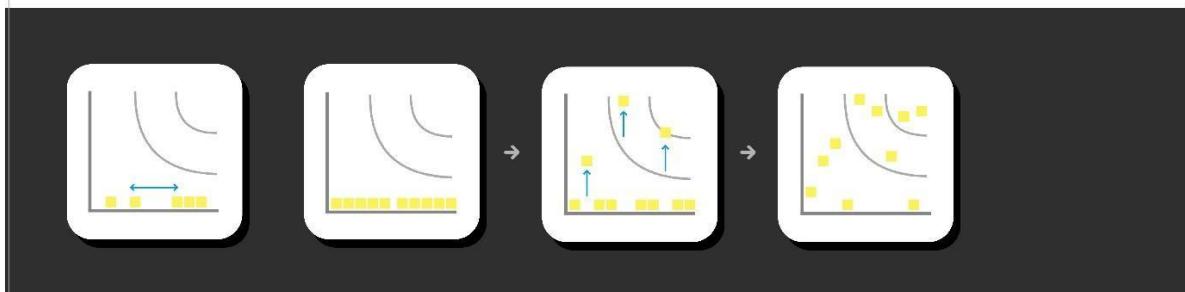
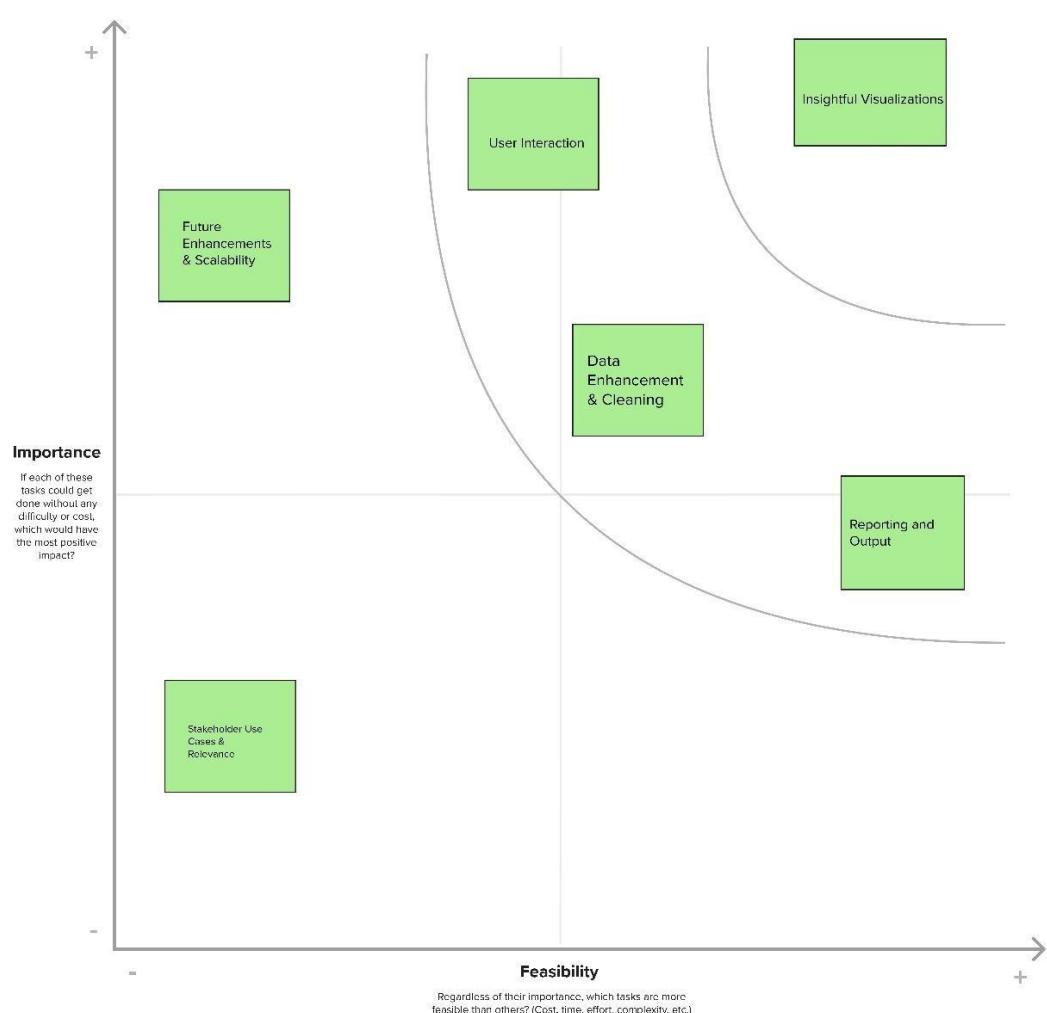
## Step 3: Idea Prioritisation

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



## 2.2: Empathy Map

The empathy map highlighted real estate analysts, executives, and marketers as key users. Their goals were to understand pricing trends, evaluate the impact of renovations, and identify housing feature preferences.

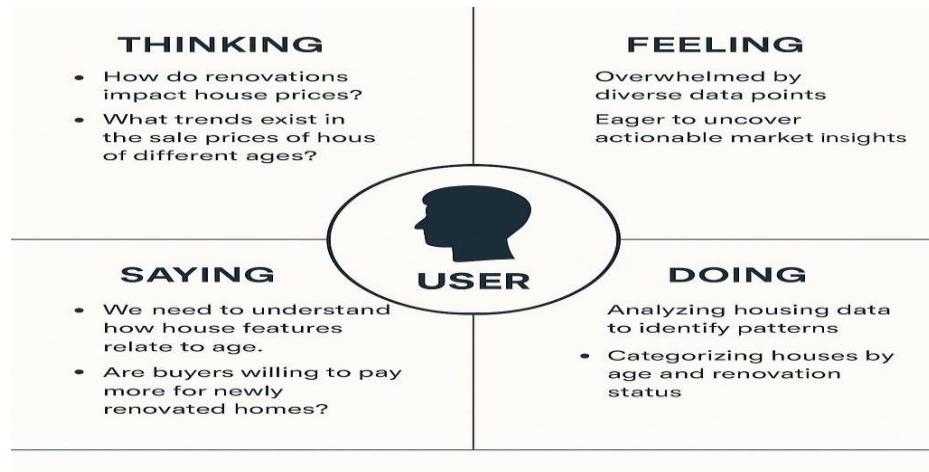
### **Empathy Map Canvas:**

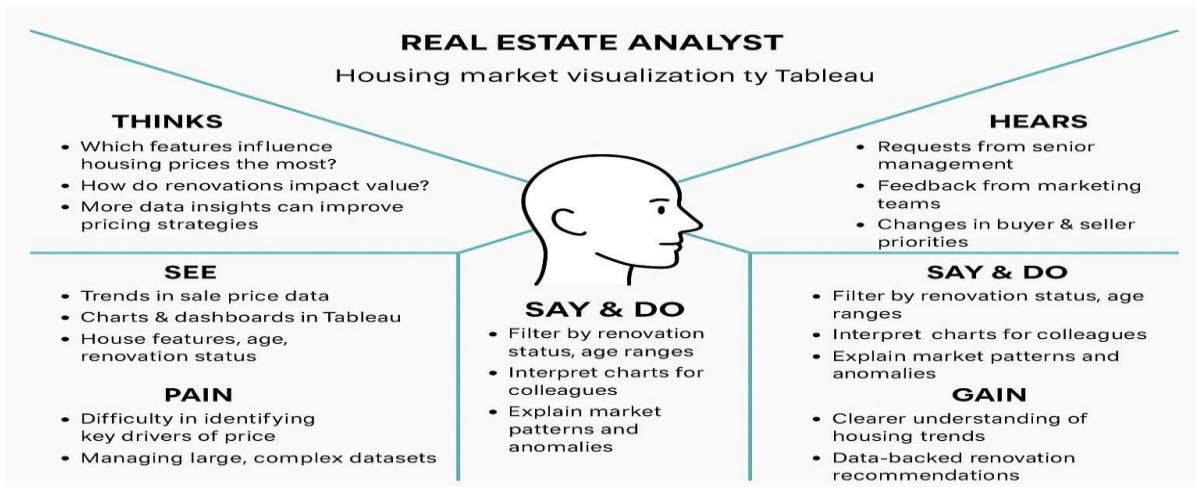
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to help 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: Visualizing Housing Market Trends: An Analysis of Sale Prices and Features**





Understanding users' frustrations and goals ensures our Tableau dashboard directly addresses what matters most to ABC Company's analysts and decision makers.

### 2.3: 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 empathise with your customers, which helps you better understand how they perceive your product or service.

I am	Describe customer with 3-4 key characteristics - who are they?	Describe the customer and their attributes here
I'm trying to	List their outcome or "job" the care about - what are they trying to achieve?	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way - what bothers them most?	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists - what needs to be solved?	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view - how does it impact them emotionally?	Describe the emotions the result from experiencing the problems or barriers

**Example:**

**ABC Company seeks to better understand how structural housing features, such as the number of bathrooms, bedrooms, and floors, relate to the age of homes in the market. However, raw data alone does not reveal how these features have evolved. There is currently no visualisation that illustrates how house age correlates with specific amenities or structural characteristics. In particular, stakeholders lack clarity on:**

- Whether older homes tend to have fewer features (e.g., 1 bathroom, fewer floors).
- If newer homes are being built with more modern layouts, such as multiple bathrooms or levels.
- How buyer preferences and architectural trends have changed over the decades.

This lack of insight limits ABC Company's ability to plan strategic renovations, forecast market trends, or target development in line with modern housing demands.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	ABC Company's strategic planners and analysts	better understand how structural housing features relate to the age of homes in the market	Raw data alone does not reveal how these features have evolved	There is currently no visualisation illustrating how house age correlates with specific amenities or structural characteristics	uninformed and limited in grasping market evolution
PS-2	ABC Company's decision-makers (e.g., for renovations, forecasting, development)	plan strategic renovations, forecast market trends, and target development in line with modern housing demands	A lack of insight limits our ability to do so	We lack clarity on whether older homes tend to have fewer features, if newer homes are built with more modern layouts, and how buyer preferences/architectural trends have changed over the decades	Unable to make data-driven strategic decisions and potentially missing market opportunities

### **3: Requirement Analysis**

#### 3.1: Customer Journey Map

Users begin by exploring overall housing data, applying filters, and narrowing down based on their needs.

They interact with dashboards and stories to extract insights before exporting reports or making decisions.

#### **User Persona**

**Name:** Raj

**Role:** Real Estate Analyst at ABC Company

**Goal:** Understand patterns in house sales, renovations, and structural features to support pricing strategy.

#### **Customer Journey Map Structure**

Stage	User Action	User Thoughts	Pain Points	Opportunities / Features
1. Discover	Opens Tableau dashboard	"Where do I begin with so many filters?"	Dashboard feels overwhelming without a starting point.	Create a simple, welcoming summary page (Scenario 1).
2. Navigate	Clicks through house feature filters	"How does house age affect features?"	Too many dimensions to view in one place.	Grouped bar charts by house age (Scenario 4).
3. Explore Insights	Filters by renovation status and bathrooms	"Are newer homes really offering more features?"	Hard to connect features with sale price over time.	Use visual cues like color/size for price tiers.
4. Analyze Trends	Reviews grouped bar charts of bathrooms/floors vs age	"Ah! Older homes mostly have 1-2	Comparisons across charts are inconsistent.	Provide consistent legends and color schemes.

5. Recommend	Prepares report with visuals	"This will help the team suggest feature upgrades."	Exporting might need manual work.	Add export/summary page buttons in Tableau.
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#### **Key Features to Include (from this journey):**

- Simple filters (renovation status, house age group).
- Interactive bar charts for bathrooms, bedrooms, floors.
- Consistent color-coding (e.g., for age bins).
- Export-ready dashboard view (summary slide/print).

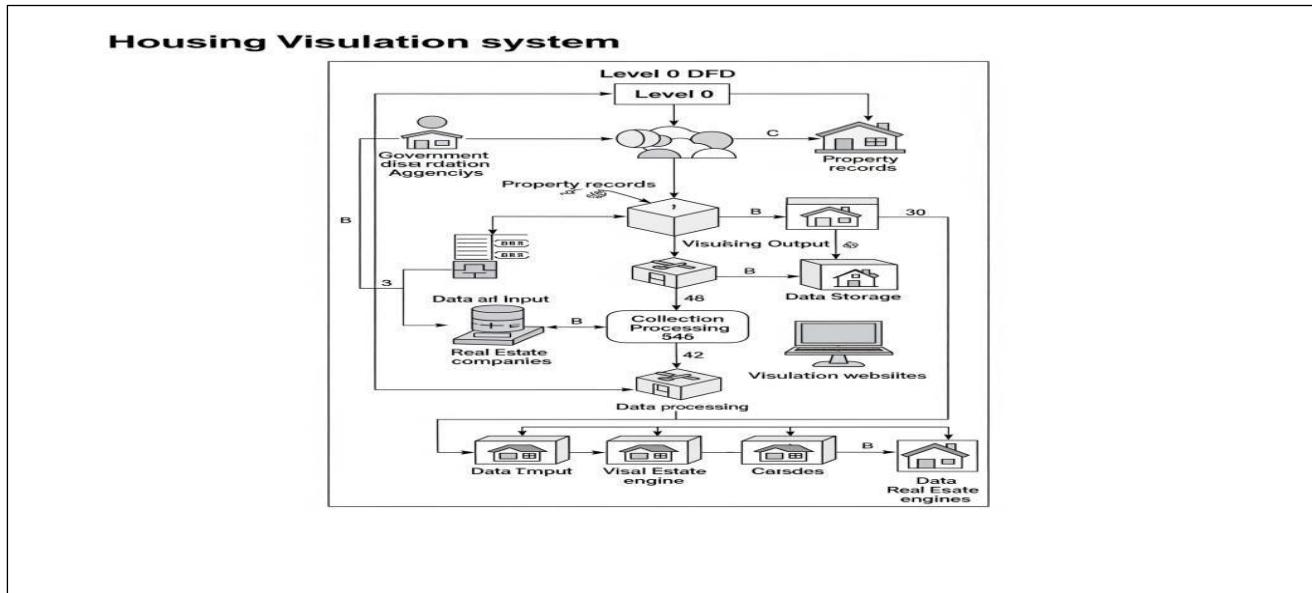
#### **3.2:Data Flow Diagram**

Data flows from the cleaned CSV file into Tableau, where calculated fields and dashboards are generated.

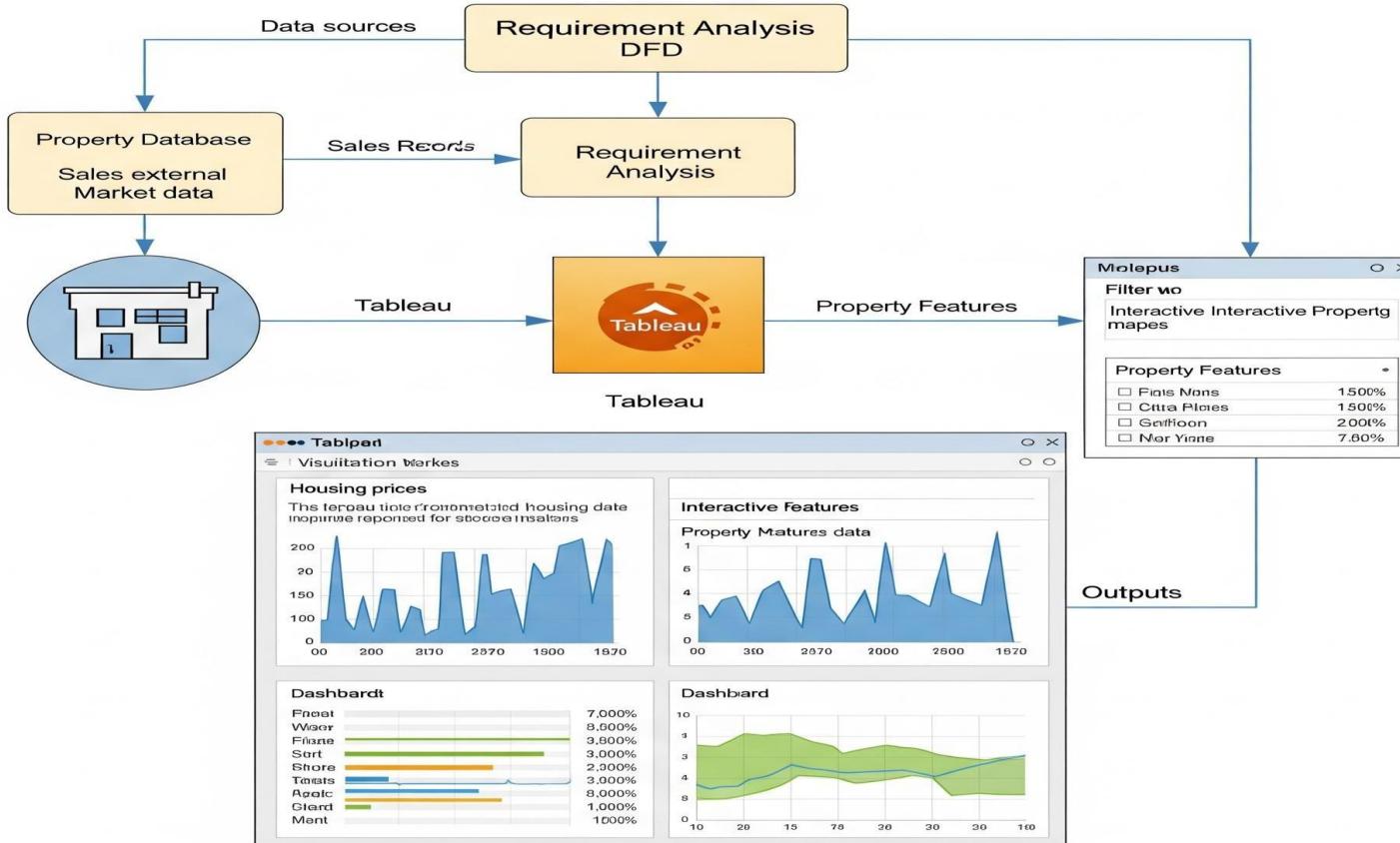
#### **Data Flow Diagrams:**

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.

**Example:**



## Visualization of Housing Market trends



### 3.3: Solution Requirements

Functional: KPI dashboard, visual filters, grouped visualisations. Non-functional: performance, usability.

#### **Functional Requirements:**

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub-Requirement (Story / Sub-Task)
FR- 01	Data Collection and Import	System must allow importing housing dataset from Excel/CSV.
FR- 02	Data Cleaning and Transformation	Must calculate house age and years since renovation; handle missing or invalid data.
FR- 03	Visualization of Key Metrics	Dashboard must display KPIs such as average price, total houses, and basement area.
FR- 04	Sales Analysis by Renovation	Create a histogram that groups total sales based on years since renovation.
FR- 05	Feature-based House Age Distribution	Display grouped bar charts showing house age versus bathrooms, bedrooms, and floors.
FR- 06	Renovation Status Visualization	Show proportion of renovated vs. non- renovated houses using pie charts.
FR- 07	Dashboard Interactivity	Enable users to filter dashboard by house age, renovation status, bedrooms, bathrooms, and floors.
FR- 08	Reporting and Export	Allow export of visualizations in PDF or image format for reporting and presentations.

## **Non-functional Requirements:**

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

<b>NFR No.</b>	<b>Non-Functional Requirement</b>	<b>Description (Non-Functional Requirements)</b>
NFR-01	Usability	Dashboard must be intuitive and easy to navigate for non-technical stakeholders.
NFR-02	Performance	Dashboard should load within 5 seconds with a dataset of up to 10,000 records.
NFR-03	Scalability	The system should be able to accommodate additional features or larger datasets in the future.
NFR-04	Accessibility	Visuals must be readable on standard desktop and tablet screens.
NFR-05	Maintainability	The solution must be easily updatable if new scenarios or charts are added.
NFR-06	Security (if hosted online)	Only authorized users should be able to access or modify the dashboard if published to a secure server.
NFR-07	Compatibility	Dashboard should be compatible with Tableau Public and Tableau Desktop versions used by the team.

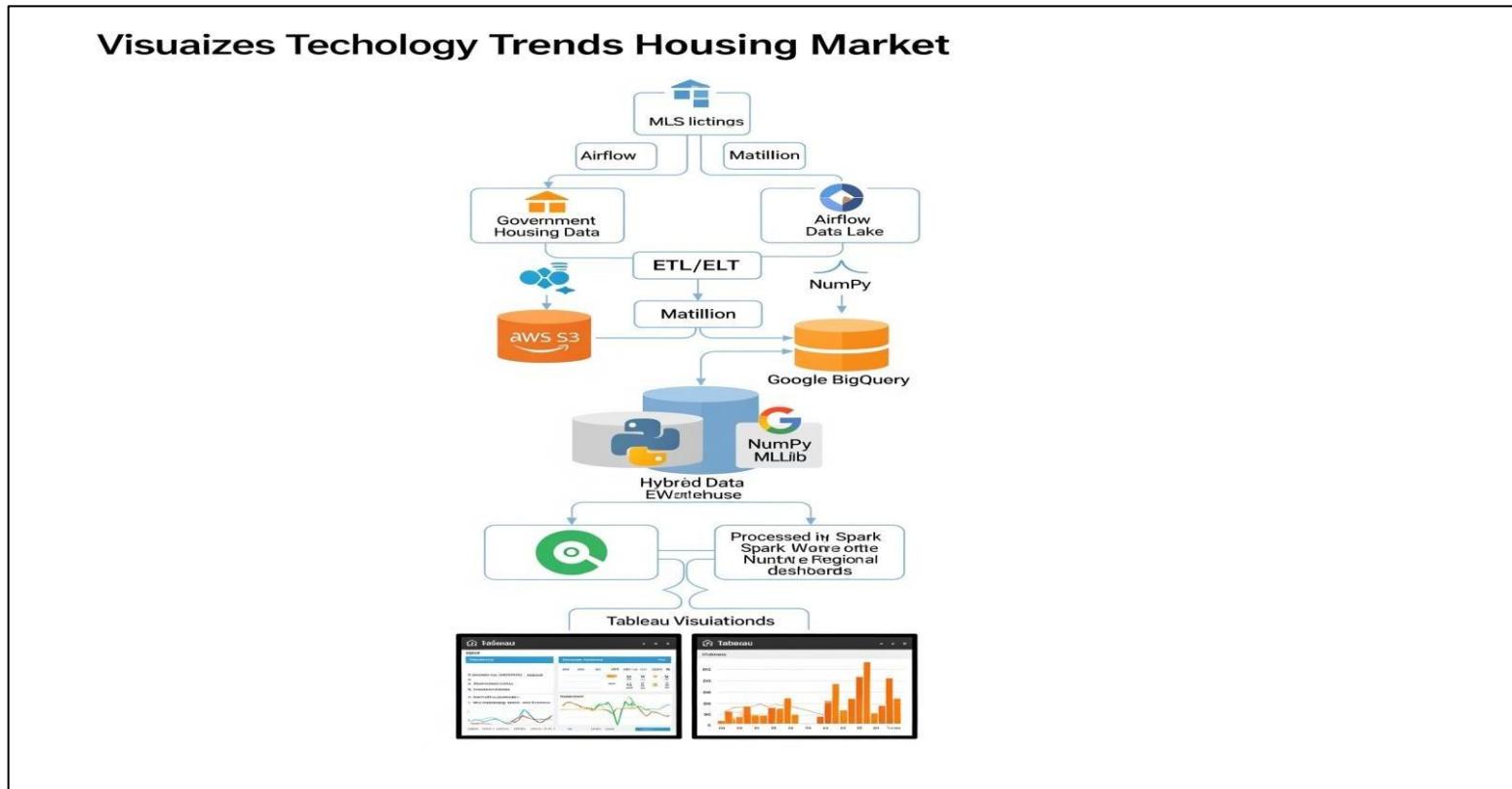
## **3.4: Technology Stack**

Tools used: Tableau, MS Excel, CSV data, Word (reporting), PNG (infographics).

## Technical Architecture:

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

### Example: Visualizing Housing Market Trends: An Analysis of Sale Prices



**Table : Components & Technologies:**

Component	Technology Used	Description
Data Source	Microsoft Excel / CSV / Google Sheets	Easily accessible and widely used formats for structured housing datasets.
Data Cleaning	Tableau Prep / Excel Formulas / Power Query	Quick transformation, field derivation, and cleaning within a visual interface.
Data Analysis & Viz	Tableau Desktop / Tableau Public	Drag-and-drop analytics with grouped bar charts, pie charts, histograms, etc.
Optional Backend	Python with Pandas (Jupyter Notebooks)	For deeper pre-processing or model-based analytics if needed in the future.
	Tableau Public (Free) or Tableau Server (Enterprise)	Shareable dashboards, secure access control, and collaboration support.
Hosting		
Export / Reporting	Built-in PDF/Image Export from Tableau	Simplifies reporting and snapshot sharing with stakeholders.

**Conclusion:**

This Requirement Analysis sets the foundation for developing a data visualisation solution using Tableau that empowers stakeholders to interpret housing trends with ease. The system ensures usability, flexibility, and actionable insight delivery by combining clean data practices with interactive visual analytics.

## **Phase 4: Project Design Phase**

### **4.1: Problem-Solution Fit**

The solution enables visual insights into housing trends that cannot be easily grasped via raw data.

#### **Purpose:**

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.
- Sharpen your communication and marketing strategy with the right triggers and messaging.
- Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, urgent or costly problems.
- Understand the existing situation to improve it for your target group.**

#### **Template:**

<b>1. CUSTOMER SEGMENT(S)</b>	<b>CS</b>	<b>6. CUSTOMER CONSTRAINTS</b>	<b>CC</b>
Real estate analysts, company executives, housing investors, and marketing teams looking to understand trends in house pricing and renovations.			
<b>2. JOBS-TO-BE-DONE / PROBLEMS</b>	<b>J&amp;P</b>	<b>7. PROBLEM ROOT CAUSE</b>	<b>RC</b>
Understand factors influencing house prices Analyze how renovations affect value Identify buyer trends by house features Optimize sales and marketing strategies			
<b>3. TRIGGERS</b>	<b>TR</b>	<b>10. YOUR SOLUTION</b>	<b>SL</b>
Rising real estate competition Renovation surge in urban areas Market demand for data-driven decisions Competitor firms adopting dashboards			
<b>4. EMOTIONS: BEFORE / AFTER</b>	<b>EM</b>	<b>8. CHANNELS OF BEHAVIOUR</b>	<b>CH</b>
BEFORE: Uncertain, reactive, slow decision-making AFTER: Confident, data-driven, predictive insights			
		8.1 ONLINE: Tableau dashboards, public visualizations, online property platforms	

## 4.2: Proposed Solution Table

A tabular format highlighting the problem statement, solution description, uniqueness, social impact, business model, and scalability was created.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Real estate analysts struggle to identify which features influence housing prices the most.  There is limited visibility into how renovations or house age affect value.

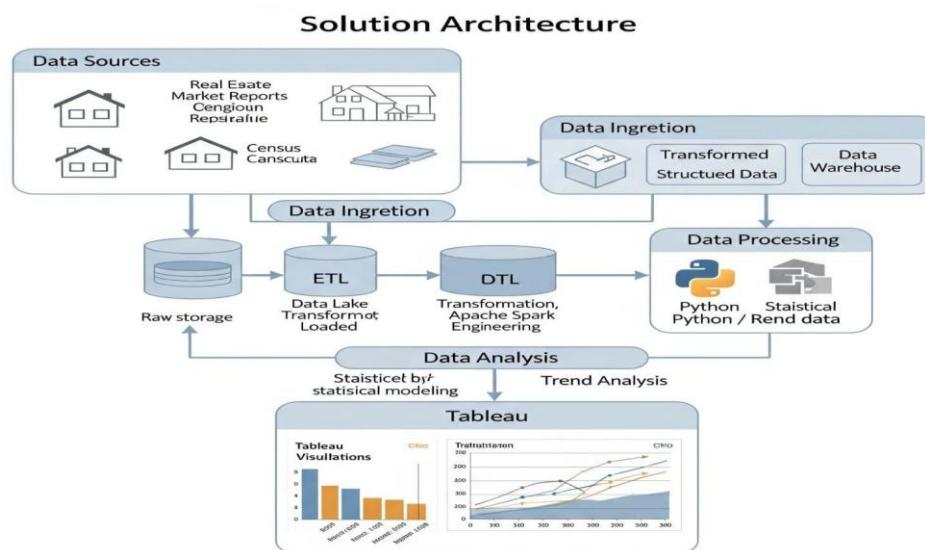
2.	Idea / Solution description	A Tableau-based interactive dashboard that visualises house sale prices by structural features (bedrooms, bathrooms, floors) and renovation status.
3.	Novelty / Uniqueness	Combines renovation timelines, feature counts, and house age into a unified, filterable dashboard. Offers grouped comparisons not typically seen in standard reports.
4.	Social Impact / Customer Satisfaction	Enables data-driven housing decisions for buyers and developers. Improves transparency in pricing and helps customers plan renovations effectively.
5.	Business Model (Revenue Model)	Can be offered as a data consulting tool for real estate firms or integrated into premium analytics services. Supports better pricing and property strategies.
6.	Scalability of the Solution	The dashboard can be expanded to include geospatial maps, time-series trends, and external APIs. Easily scalable to support larger datasets or regions.

### 4.3: Solution Architecture

Solution architecture is a complex process, with many sub-processes, that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

#### Example - Solution Architecture Diagram:



## Phase 5: Project Planning Phase

Timeline: Two-week plan with daily task mapping for 4 team members.

Milestones: Ideation complete (Week 1)

Tableau visualisations built (Week 2)

Report finalisation.

Success Criteria:

- Accurate and clean data used
- Visuals deliver meaningful insights
- Stakeholder usability confirmed
- Timely submission with complete documentation

## 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 & Cleaning	USN-1	As a data engineer, I want to collect housing data and clean missing/duplicate values.	3	High	Student 1
Sprint- 1	Feature Calculation	USN-2	As a data engineer, I want to calculate house age and years since renovation from the raw dataset.	2	High	Student 1
Sprint- 1	Visualisation – KPIs	USN-3	As a Tableau developer, I want to display total houses, average price, and basement area as KPIs on the dashboard.	2	Medium	Student 2
Sprint- 2	Visualisation – Sales by Renovation Age	USN-4	As a user, I want to analyse how sales vary by year since the renovation using a histogram.	3	High	Student 2

Sprint- 2	Visualisation – Feature vs Age	USN-5	As a user, I want to compare house age with the number of 4 bathrooms, bedrooms, and floors using grouped bar charts.	4	High	Student 2
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Sprint- 2	Interactivity & Filters	USN-6	As a user, I want to filter by renovation status, number of rooms, age group, and view dynamic updates in the charts.	3	Medium	Student 3
Sprint- 2	Exporting / Sharing Dashboard	USN-7	As a user, I want to export or snapshot the dashboard views for reporting.	1	Low	Student 4

#### 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	7	6 Days	21 June 2025	23 June 2025	7	23 June 2025
Sprint- 2	11	6 Days	27 June 2025	27 June 2025	11	27 June 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)

**Total Story Points Completed:** 7 (Sprint-1) + 11 (Sprint-2) = **18 Total Days Worked:** 3 + 4 = **7 Days**



#### Average Velocity per Sprint:

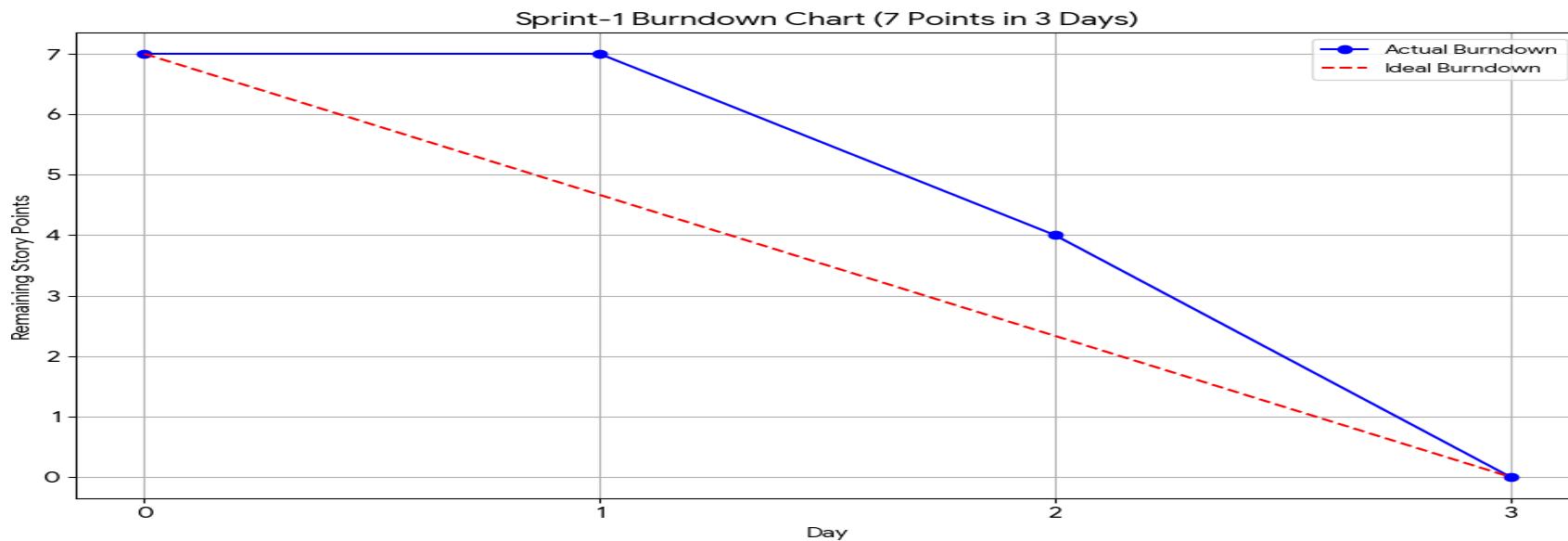
- Sprint-1:  $7 / 3 = 2.33$  story points/day
- Sprint-2:  $11 / 4 = 2.75$  story points/day

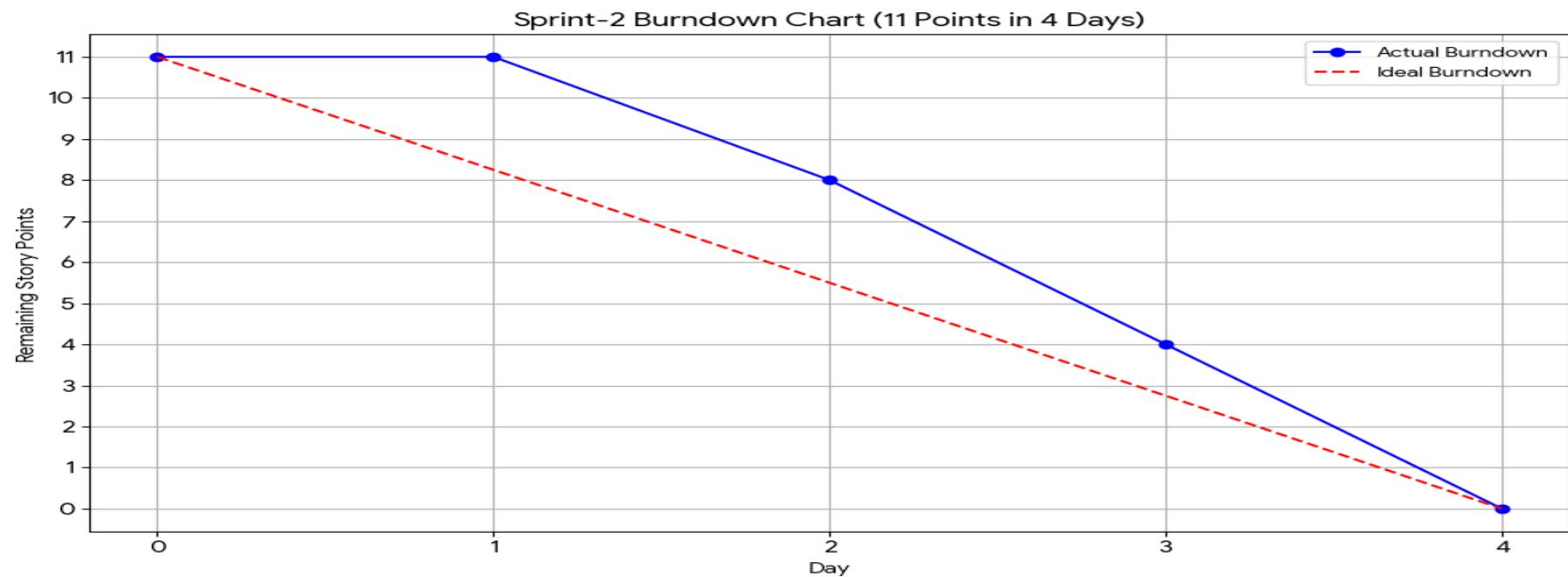
- Overall Average Velocity:

18 story points / 7 days = \*\*2.57 story points/day\*\*

### 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.

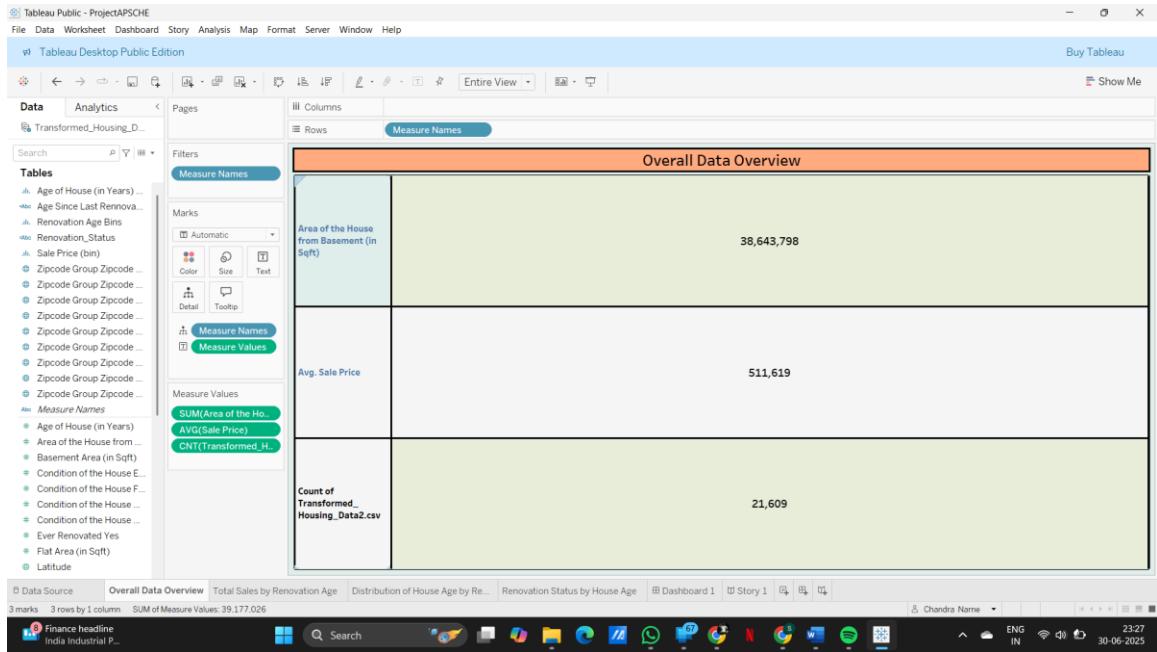




## Phase 6: Project Executable Files (Tableau Visualisations)

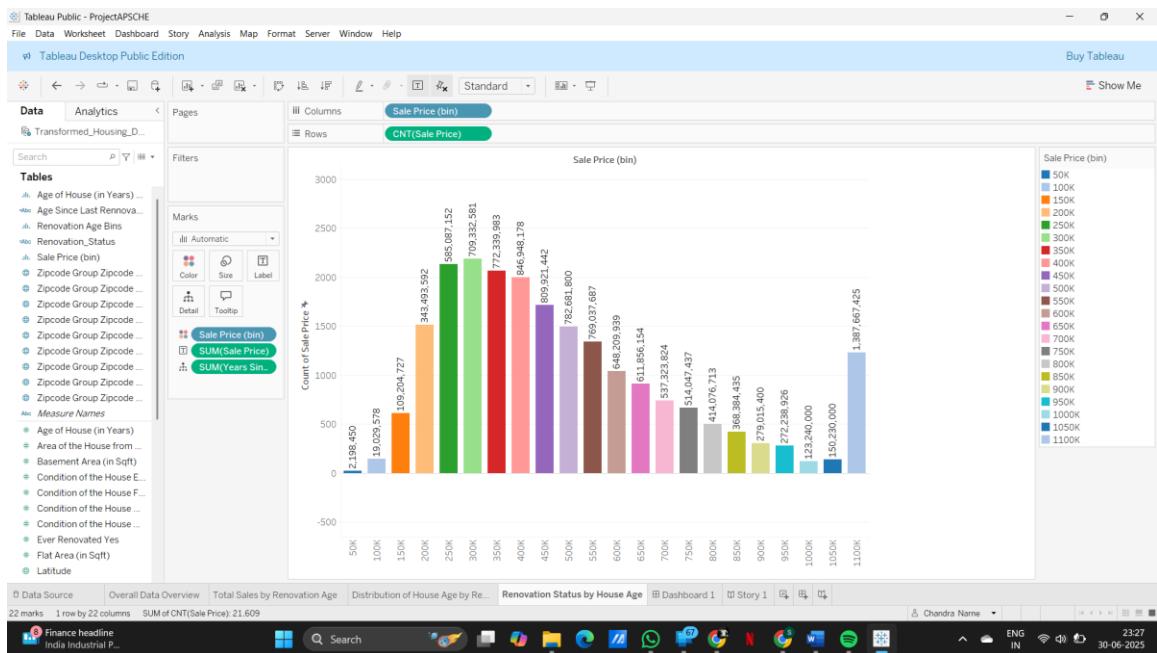
### Scenario 1: Overall Data Overview

Includes average price, total house count, and total basement area using KPI cards.



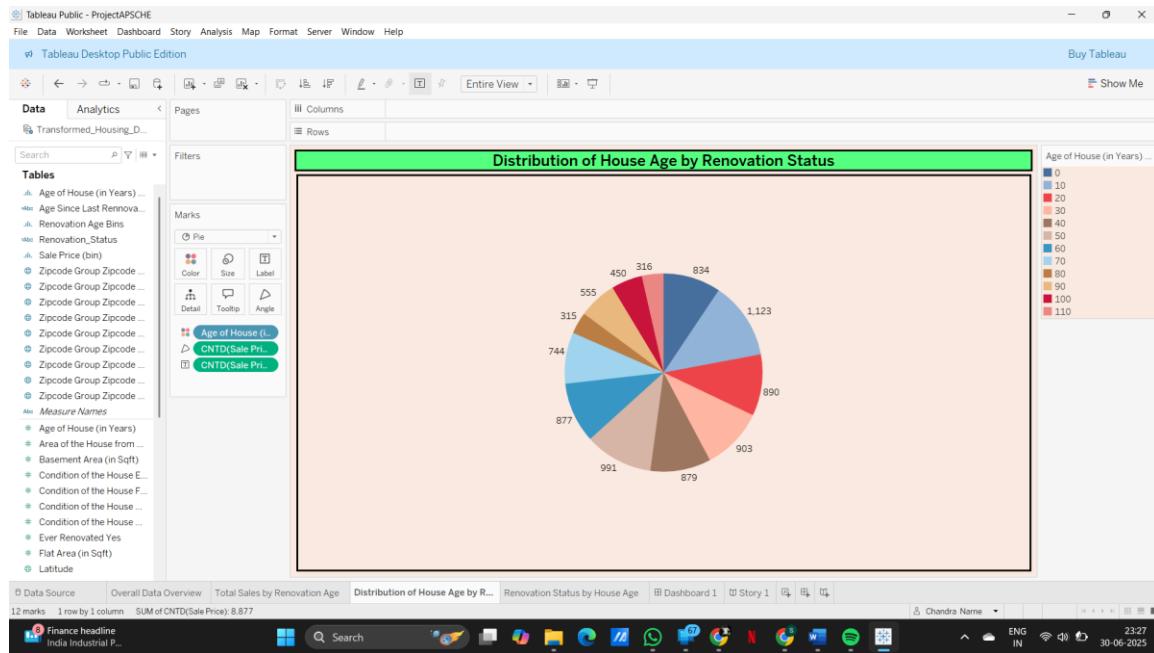
### Scenario 2: Total Sales by Years Since Renovation

Histogram showing how the renovation year influences total sale price distribution.



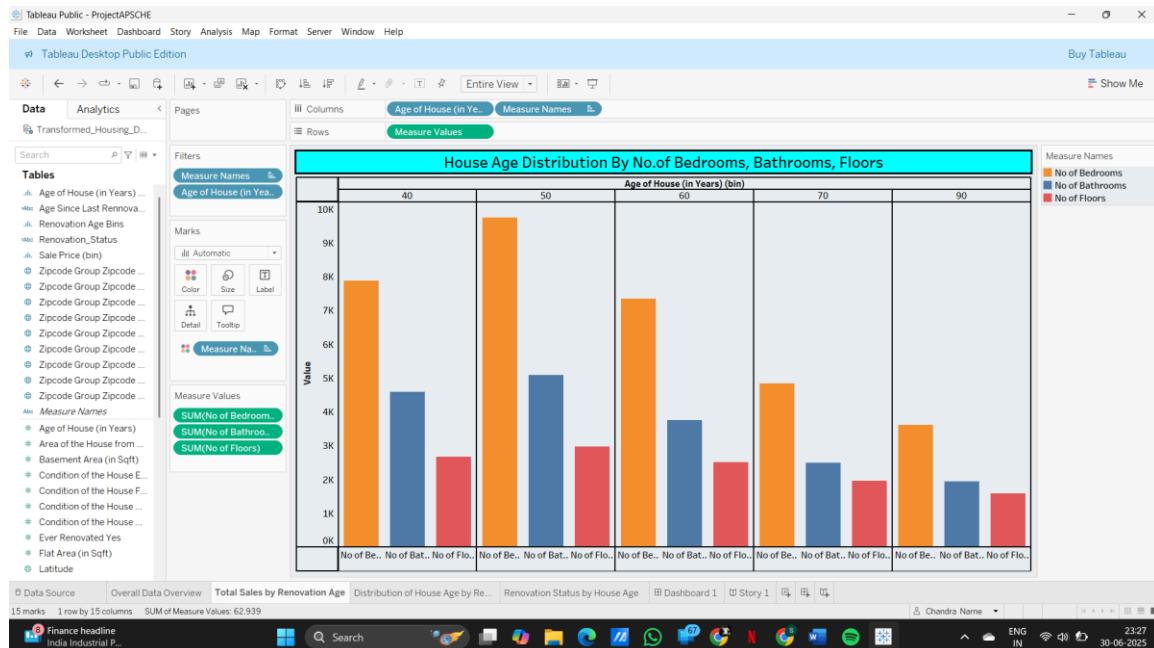
## Scenario 3: Distribution of House Age by Renovation Status

Pie chart revealing proportions of house age segments with or without renovation.



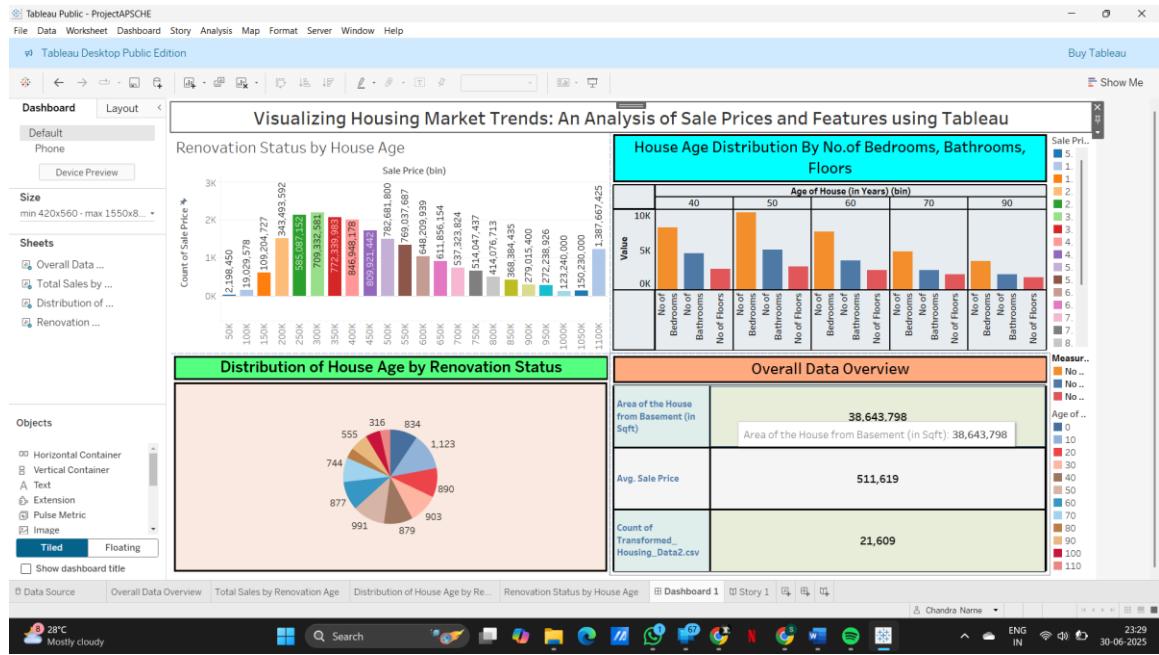
## Scenario 4: House Age Distribution by House Features

Grouped bar chart showing the relationship of age with the number of bathrooms, bedrooms, and floors.



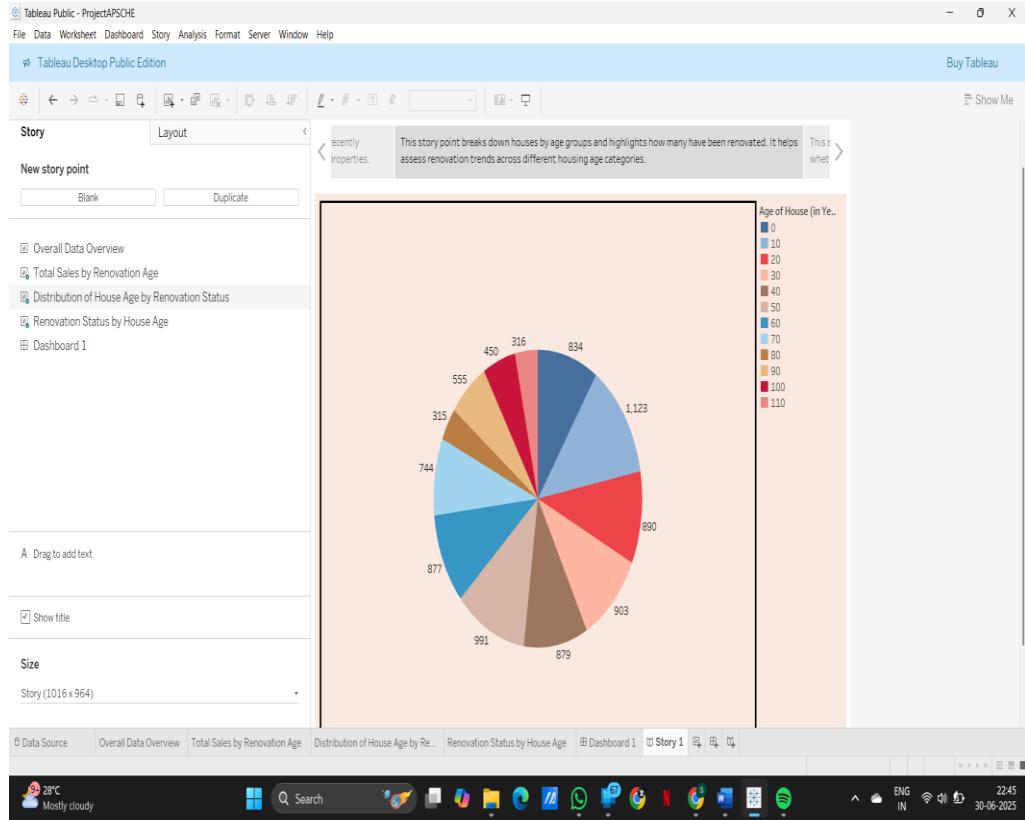
Dashboard Design:

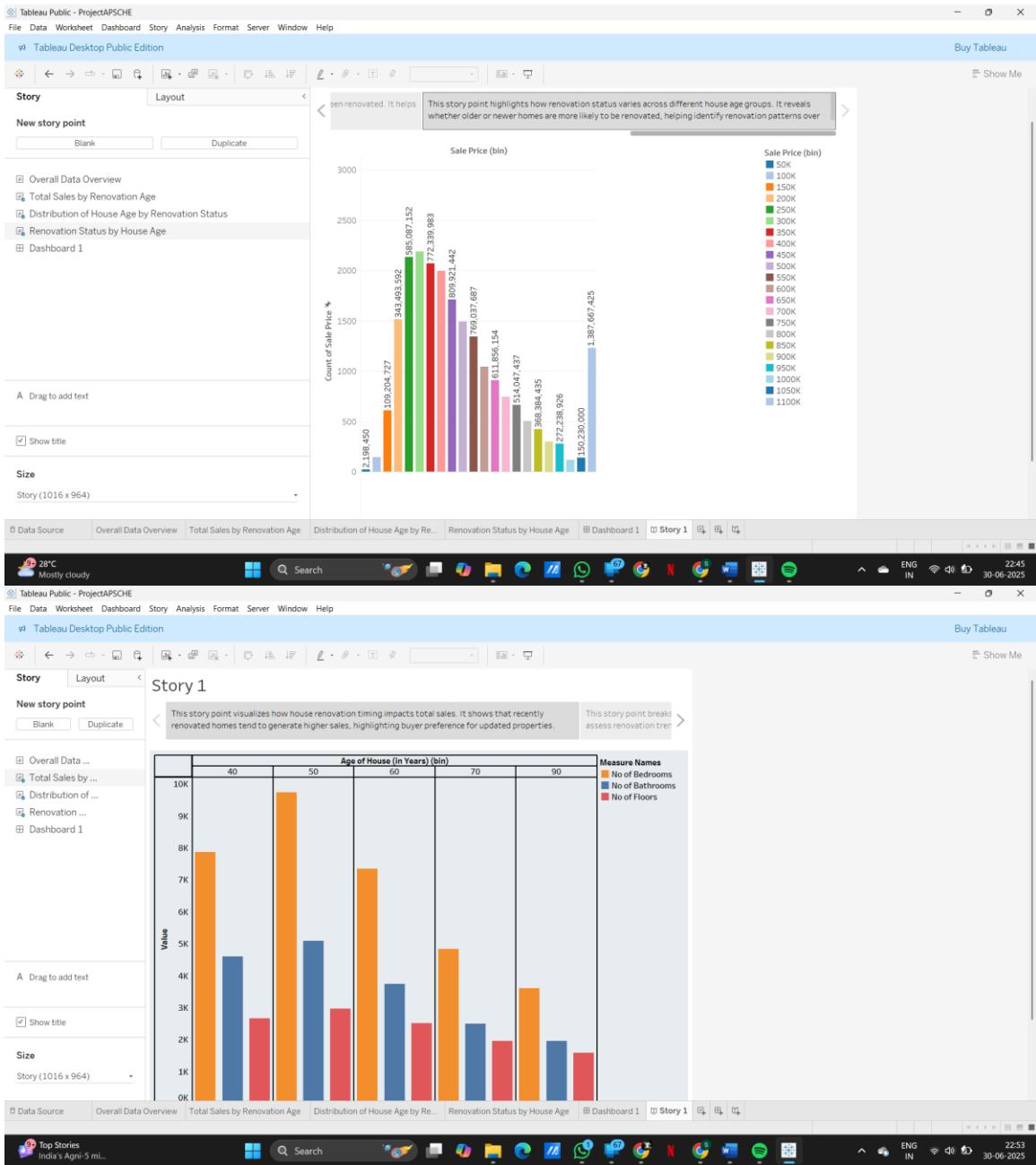
Each scenario is placed on a dashboard with filters and interactivity.



## Story Design:

Four story points summarise the four dashboard scenarios for narrative-style presentation.





## Phase 7: Functional and Performance Testing

Data Rendered: 21,609 records from CSV file across 31 columns.

Data Preprocessing: Null handling, calculated fields for age and renovation.

Filters: Bedrooms, bathrooms, floors, and renovation status.

Calculated Fields: House age, years since renovation, renovation flag.

Dashboards: Four total, with one per scenario.

Story: Summary of key insights through a four-point Tableau story.

### **Model Performance Testing:**

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

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	21,609 records successfully loaded into Tableau 31 columns, including numeric, categorical, and calculated fields No data truncation or errors
2.	Data Preprocessing	Null values handled in relevant columns (e.g., bathrooms, renovations) Derived fields like House Age, Years Since Renovation, and flags generated
3.	Utilisation of Filters	Filters applied: Bedrooms, Bathrooms, Floors, Renovation Status, House Age ranges. Interactivity is verified across all dashboard scenarios.
4.	Calculation fields used	House Age (in Years), Years Since Renovation, Renovated Flag (Yes/No) Grouped bins for visualisation, e.g., price ranges, age groups
5.	Dashboard design	No of Visualisations / Graphs - 4 <ul style="list-style-type: none"><li>• KPI Cards (Avg Price, Total Houses, Basement Area)</li><li>• Pie Chart</li><li>• Histogram</li><li>• Grouped Bar Chart</li></ul>

6	Story Design	No of Visualisations / Graphs -Each dashboard scenario visualised as a story step  4 story points: <ul style="list-style-type: none"><li>• Overview</li><li>• Sales by Renovation</li><li>• Renovation vs Age</li><li>• Age by Features</li></ul>
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## Advantages:

1. **Interactive Dashboards:** Allow users to explore data dynamically using filters and visual elements.
2. **User-Friendly Interface:** Easy for non-technical stakeholders like marketing teams and executives to interpret data.
3. **Time-Saving Insights:** Visualisations reduce time spent on manual data analysis.
4. **Scalable Design:** The solution can easily be updated with new data or expanded to other housing markets.
5. **Informed Decision-Making:** Provides evidence-based insights for pricing strategies, renovation planning, and investment evaluation.

## ⚠ Disadvantages

1. **Static Dataset:** The current solution does not use live or real-time data — updates must be done manually.
2. **Tool Dependency:** Users must have Tableau or Tableau Public to view or interact with dashboards.
3. **Limited Prediction:** The project is descriptive; it does not provide predictive analytics or forecasting yet.
4. **Learning Curve:** Some users may need training to fully explore Tableau filters and storyboards.

## **Conclusion:**

The housing market Tableau project successfully transforms complex real estate data into clear, interactive visual stories. It highlights patterns related to house age, renovation, and pricing, enabling real estate professionals to make informed, strategic decisions. Through well-designed dashboards and user-centric storytelling, the project demonstrates the power of data visualisation in addressing business challenges and enhancing market competitiveness.

## **Future Scope:**

1. **Live Data Integration:** Connect to live databases or APIs for real-time updates.
2. **Geographic Mapping:** Use Tableau maps to analyse trends by city, zip code, or neighbourhood.
3. **Predictive Analysis:** Add machine learning models to forecast house prices based on features.
4. **Mobile Optimisation:** Create mobile-friendly versions of dashboards for on-the-go access.
5. **Stakeholder-Specific Views:** Customise dashboard views based on roles (e.g., analyst vs. executive).