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

Project Report

1. INTRODUCTION

1.1 Project Overview

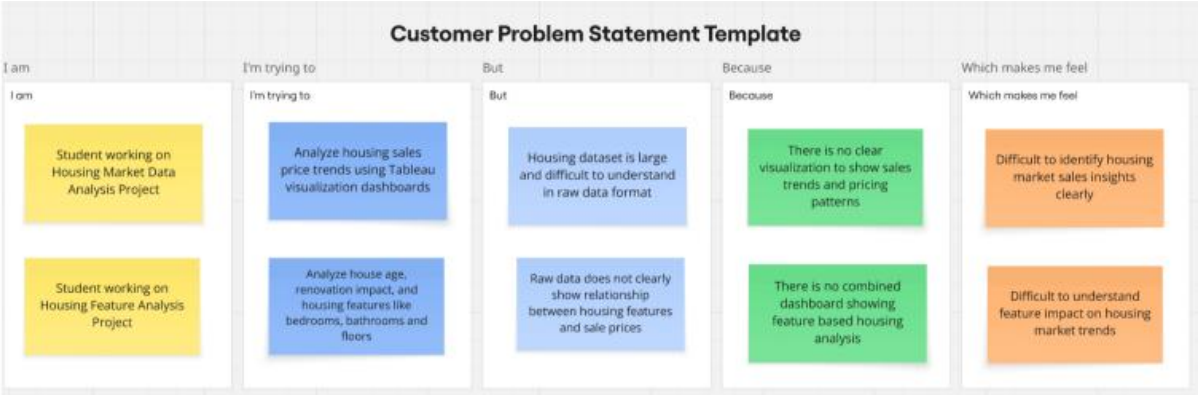
Our engagement centers on turning Ethan Hunt's raw real-estate data into an executive-ready Tableau story that clarifies housing-market dynamics for strategic decision-making. A four-person specialist team—data engineer, visualization designer, domain analyst, and project lead—will cleanse and enrich multi-source datasets, then craft interactive dashboards highlighting price trends, inventory shifts, geographic hot spots, and time-to-sale patterns. The project follows a prototype-first approach: within 48 hours Ethan receives an initial dashboard to validate direction, ensuring rapid iterations and full alignment with stakeholder questions. Beyond the core build, we embed sustainability and scalability. Reusable Tableau Prep flows automate future data refreshes, while template-driven dashboards allow quick expansion into new regions or data streams. Training sessions and a 30-day post-launch support window empower Ethan's team to self-service minor tweaks and confidently present insights to executives. Altogether, the project transforms overwhelming datasets into clear, persuasive visual narratives —reducing analysis turnaround times, raising decision-maker confidence, and laying groundwork for ongoing analytic maturity.

1.2 Purpose

Transform messy, multi-source housing data into clear, interactive Tableau dashboards that reveal price trends, inventory shifts, and geographic hot spots. • Empower Ethan to present confident, data-driven recommendations to executives, shortening analysis and decision cycles. • Establish a repeatable data-prep and visualization framework so future updates and new regions can be onboarded with minimal effort. • Elevate stakeholder understanding and trust in real-estate insights, ultimately guiding smarter investment and development strategies.

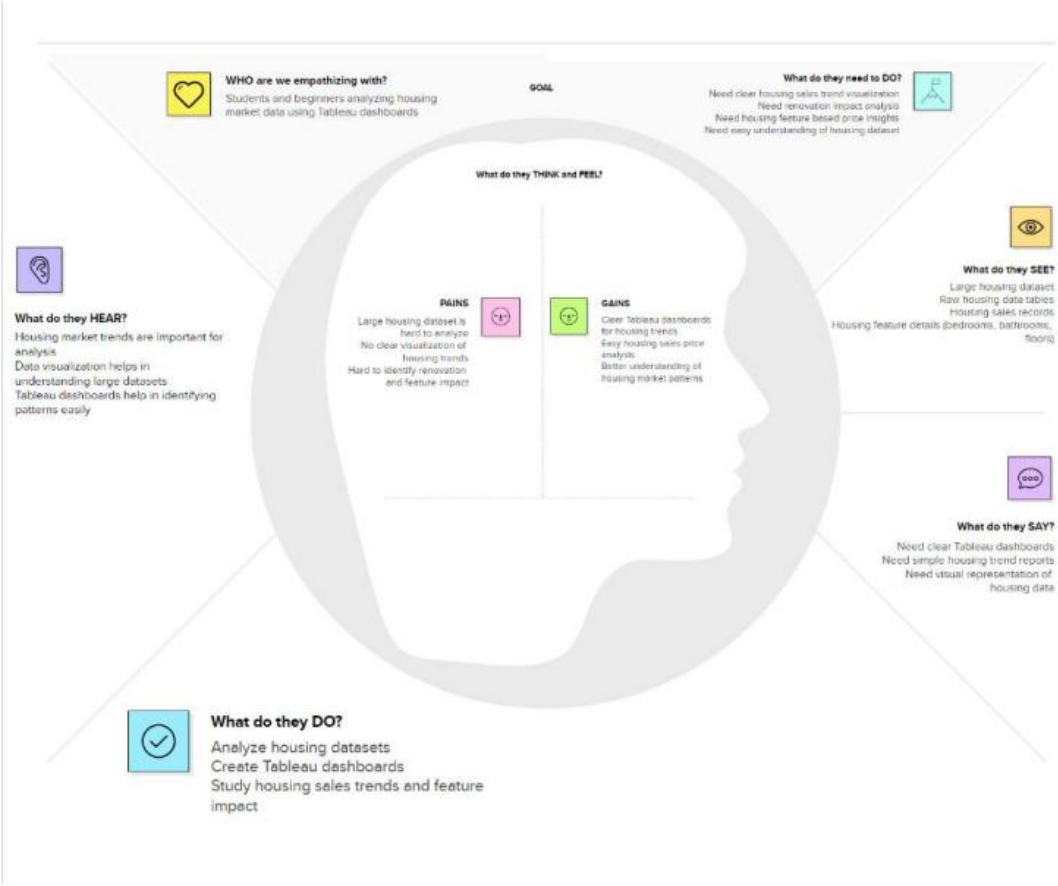
2. IDEATION PHASE

2.1 Problem Statement



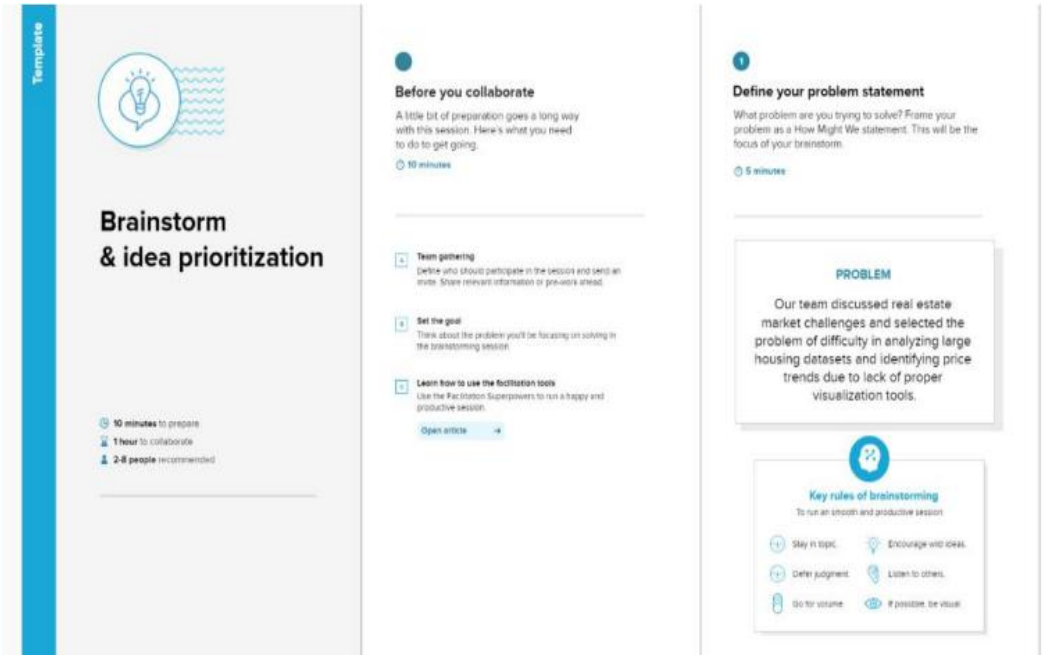
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Student working on Housing Market Data Analysis Project	Analyze housing sales price trends using Tableau dashboards	Housing dataset is large and hard to understand in raw format	No clear visualization showing sales trends and pricing patterns	Difficult to identify housing sales insights clearly
PS-2	Student working on Housing Feature Analysis Project	Analyze house age, renovation impact, bedrooms, bathrooms and floors influence on prices	Raw data does not clearly show relationship between features and sale price	No combined dashboard showing feature based housing analysis	Difficult to understand feature impact on housing market trends

2.2 Empathy Map Canvas

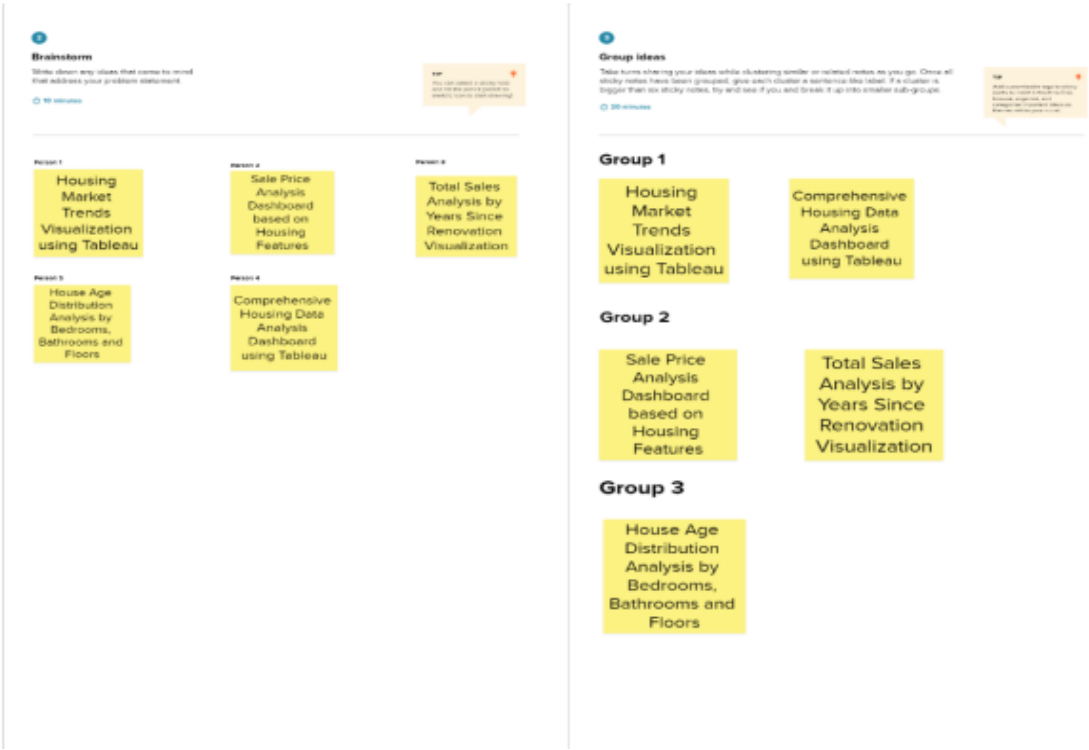


2.3 Brainstorming

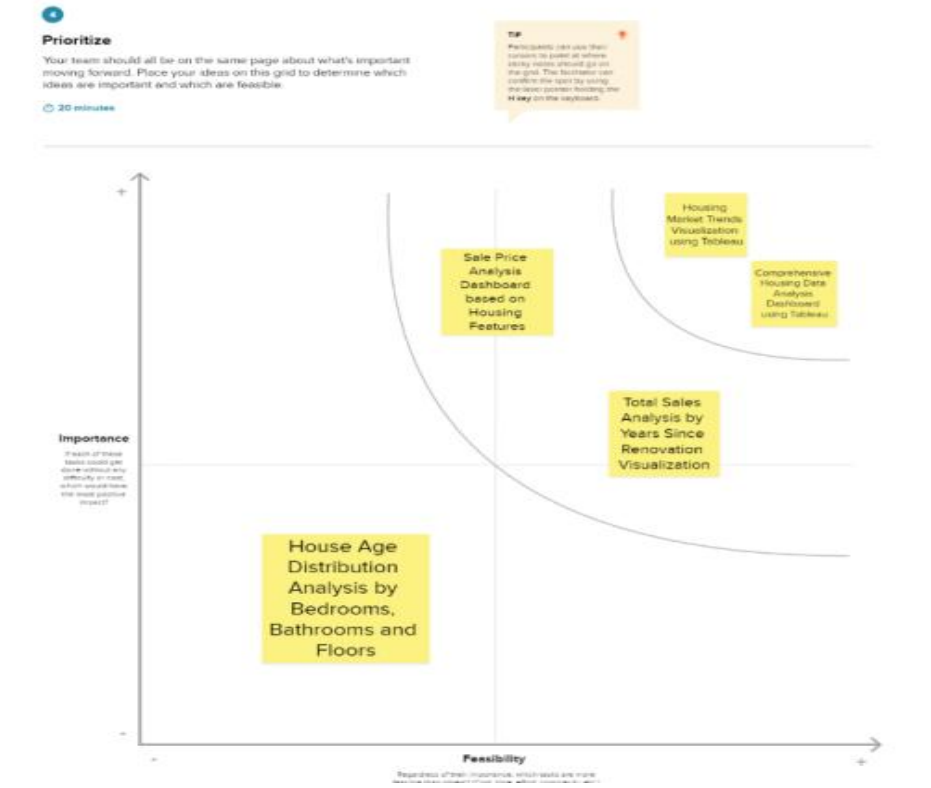
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping

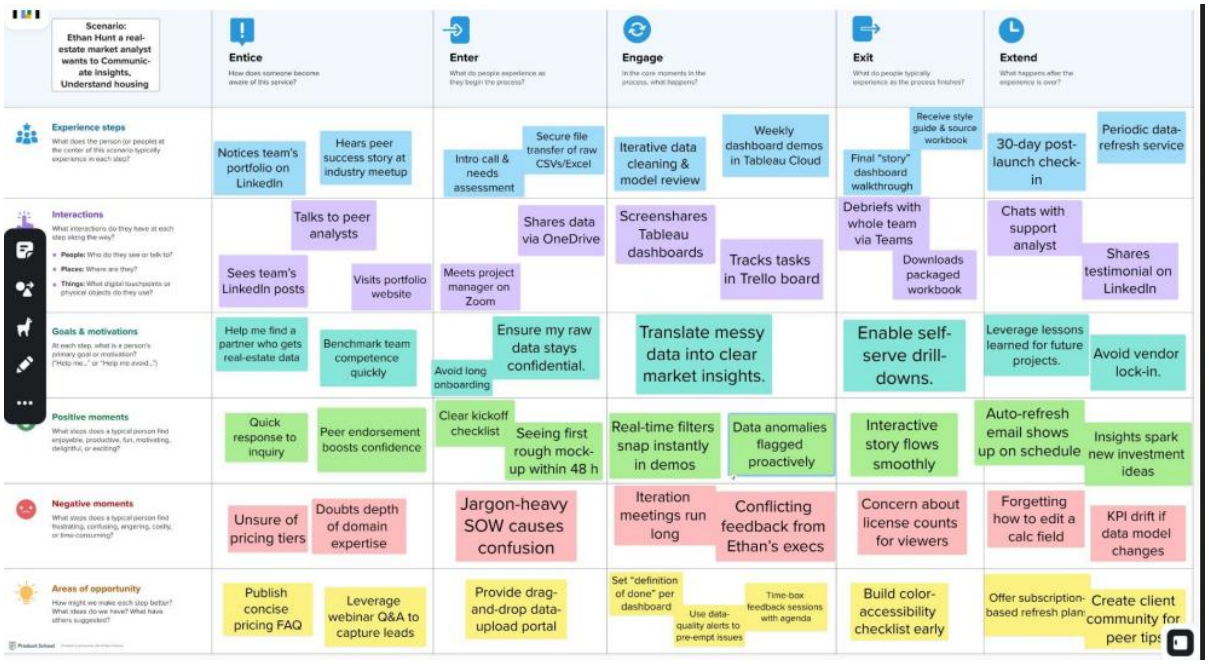


Step-3: Idea Prioritization



3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

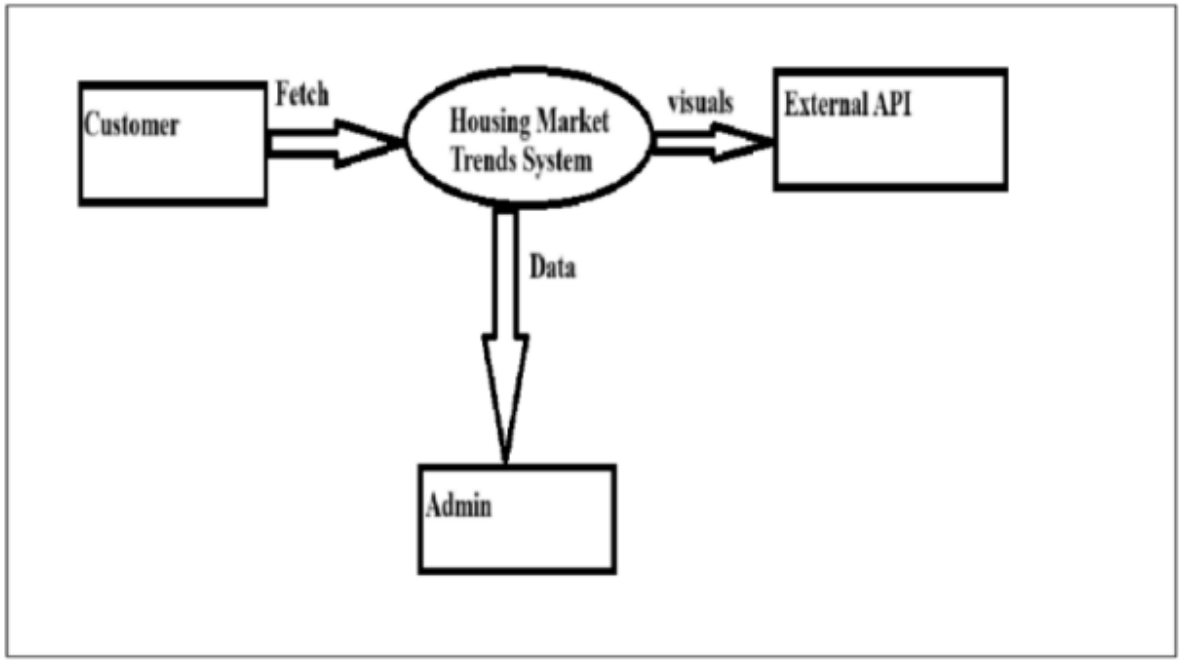


3.2 Solution Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Loading	Load Housing Dataset (CSV) into Tableau Upload dataset from local system Validate dataset format
FR-2	Data Preprocessing	Handle Missing Values Remove Duplicate Records Convert Data Types Create Calculated Fields (House Age, Renovation Years)
FR-3	Dashboard Visualization	Create Housing Price Trend Dashboard Create Renovation Impact Charts Create Feature Analysis Charts (Bedrooms, Bathrooms, Floors)
FR-4	Dashboard Interaction	Apply Filters (Price Range, Year, Features) Display Interactive Charts
FR-5	Story Visualization	Create Tableau Story Explaining Insights Show Trend Analysis Summary
FR-6	Web Deployment	Publish Dashboard in Tableau Public Display Dashboard in Flask Website

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Dashboard should be easy to understand and user-friendly
NFR-2	**Security**	Dataset access restricted to authorized users
NFR-3	**Reliability**	Dashboard should load data correctly without failure
NFR-4	**Performance**	Dashboard should load within few seconds
NFR-5	**Availability**	Dashboard available 24/7 via website
NFR-6	**Scalability**	System should support larger housing datasets in future

3.3 Data Flow Diagram



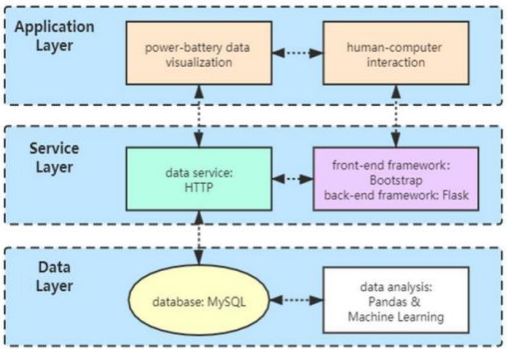
User Stories

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
Student / Analyst	Data Collection	USN-1	As a user, I can load housing dataset into Tableau	Dataset loads successfully	High	Sprint-1
Student / Analyst	Data Preprocessing	USN-2	As a user, I can clean and preprocess housing data	Missing values removed and dataset cleaned	High	Sprint-2
Student / Analyst	Dashboard Development	USN-3	As a user, I can view housing sales trend dashboard	Dashboard shows correct trends	High	Sprint-2
Student / Analyst	Dashboard Development	USN-4	As a user, I can view renovation and house age charts	Charts load and show correct data	High	Sprint-2
Student / Analyst	Feature Analysis	USN-5	As a user, I can analyze bedrooms, bathrooms and floors impact	Feature charts working correctly	High	Sprint-3
Student / Analyst	Story Visualization	USN-6	As a user, I can view Tableau story explaining insights	Story loads and shows insights clearly	Medium	Sprint-4
Student / Analyst	Web Deployment	CSN-7	As a user, I can view dashboards in website	Website loads dashboard successfully	Medium	Sprint-4

3.4 Technology Stack

Technical Architecture:



Guidelines:

1. The system processes housing data using Python preprocessing, Tableau visualization, and Flask web application.
2. Dataset and preprocessing run on local system, while dashboards are hosted on Tableau Public Cloud.
3. External interface used is Tableau Public and its embed visualization service.
4. Data is stored in local CSV dataset and Tableau dashboard cloud storage.

Table-1 : Components & Technologies:

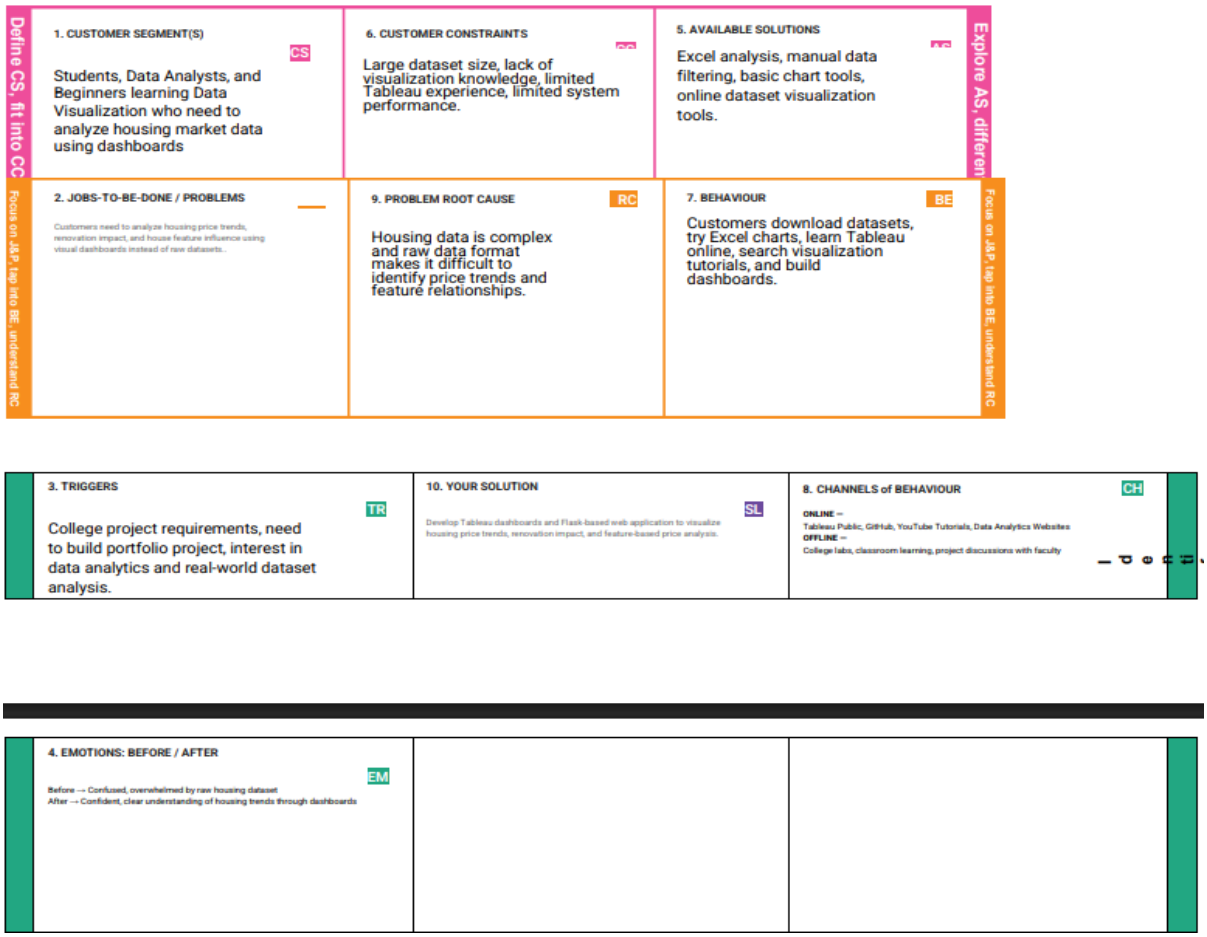
S.No	Component	Description	Technology
1.	User Interface	User interacts with dashboard via website	HTML, CSS, Bootstrap, JavaScript
2.	Application Logic-1	Website backend logic	Python Flask
3.	Application Logic-2	Data preprocessing logic	Python (Pandas, NumPy)
4.	Application Logic-3	Data Visualization Engine	Tableu
5.	Database	Housing dataset storage	CSV Dataset (Local Storage)
6.	Cloud Database	Not Used (Optional Future Scope)	Tableau Public Cloud Storage
7.	File Storage	Dataset storage	Local File System
8.	External API-1	Tableau Dashboard Embed Service	Tableau Public API
9.	External API-2	Not Used	—
10.	Machine Learning Model	Not Used	—
11.	Infrastructure (Server / Cloud)	Application Hosting	Local Server / Flask Server

Table-2: Application Characteristics:

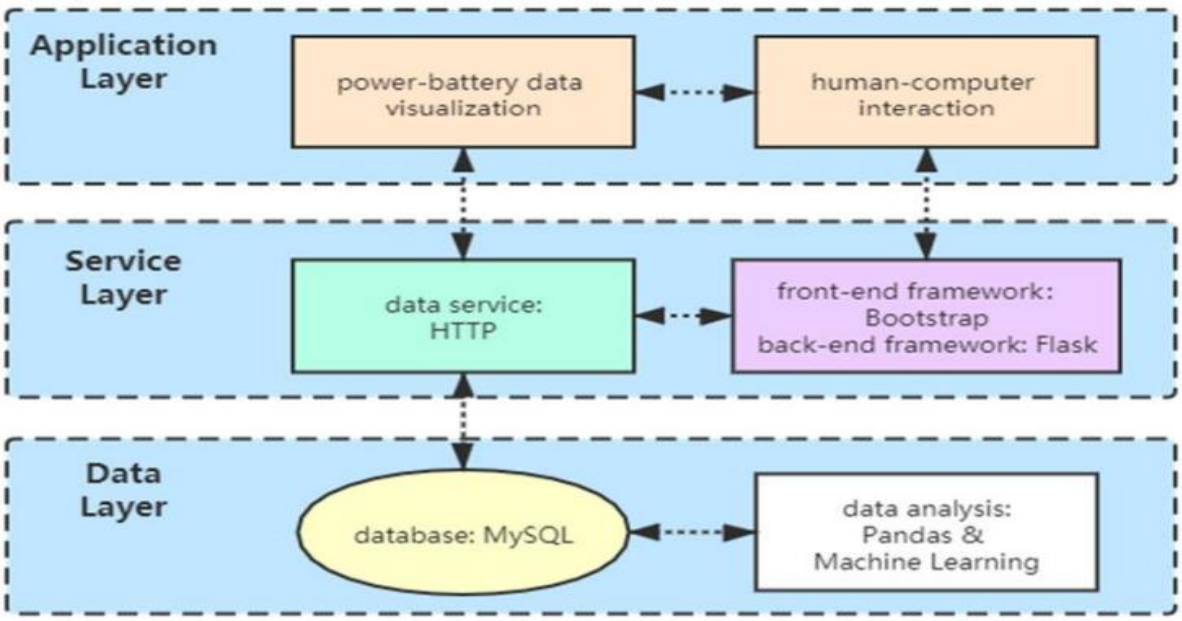
S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Used open-source web and analytics tools	Flask, Bootstrap, Pandas
2.	Security Implementations	Basic access control and secure hosting	HTTPS, Flask Security Config
3.	Scalable Architecture	Can scale by moving dataset to cloud	Cloud Hosting, Tableau Cloud
4.	Availability	Dashboard available via web browser	Flask Web Server
5.	Performance	Fast dashboard loading via Tableau Public	Tableau Optimization, Local Processing

4. PROJECT DESIGN

4.1 Problem Solution Fit



4.2 Proposed Solution



4.3 Solution Architecture

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Housing datasets are large and difficult to understand in raw format. There is no clear visualization showing housing sales trends, renovation impact, and feature-based price analysis, making it difficult to extract insights.
2.	Idea / Solution description	Develop interactive Tableau dashboards and integrate them into a Flask-based web application to visualize housing price trends, renovation effects, and house feature influence on pricing.
3.	Novelty / Uniqueness	The solution combines data preprocessing, advanced Tableau visualization, and web deployment into a single system for easy access and real-time visualization of housing market trends.
4.	Social Impact / Customer Satisfaction	Helps students, analysts, and researchers easily understand housing market trends and make data-driven decisions using visual dashboards.
5.	Business Model (Revenue Model)	Freemium model — Basic dashboard free, advanced analytics and customized reports available through subscription or service-based pricing.
6.	Scalability of the Solution	The solution can be scaled by integrating cloud databases, adding machine learning models for price prediction, and expanding to larger real estate datasets.

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	Housing Data Collection & Preparation	USN-1	As a user, I can load housing dataset into Tableau for analysis	2	High	5
Sprint-1	Housing Data Collection & Preparation	USN-2	As a user, I can clean and preprocess housing data for visualization	2	High	5
Sprint-2	Dashboard Development	USN-3	As a user, I can view housing sales trend dashboard	3	High	5
Sprint-2	Dashboard Development	USN-4	As a user, I can view renovation impact and house age distribution charts	3	High	5
Sprint-3	Feature Analysis Dashboard	USN-5	As a user, I can analyze housing features like bedrooms, bathrooms and floors impact on price	3	High	5
Sprint-4	Story & Final Visualization	UNS-6	As a user, I can view Tableau story explaining housing market insights	2	Medium	5

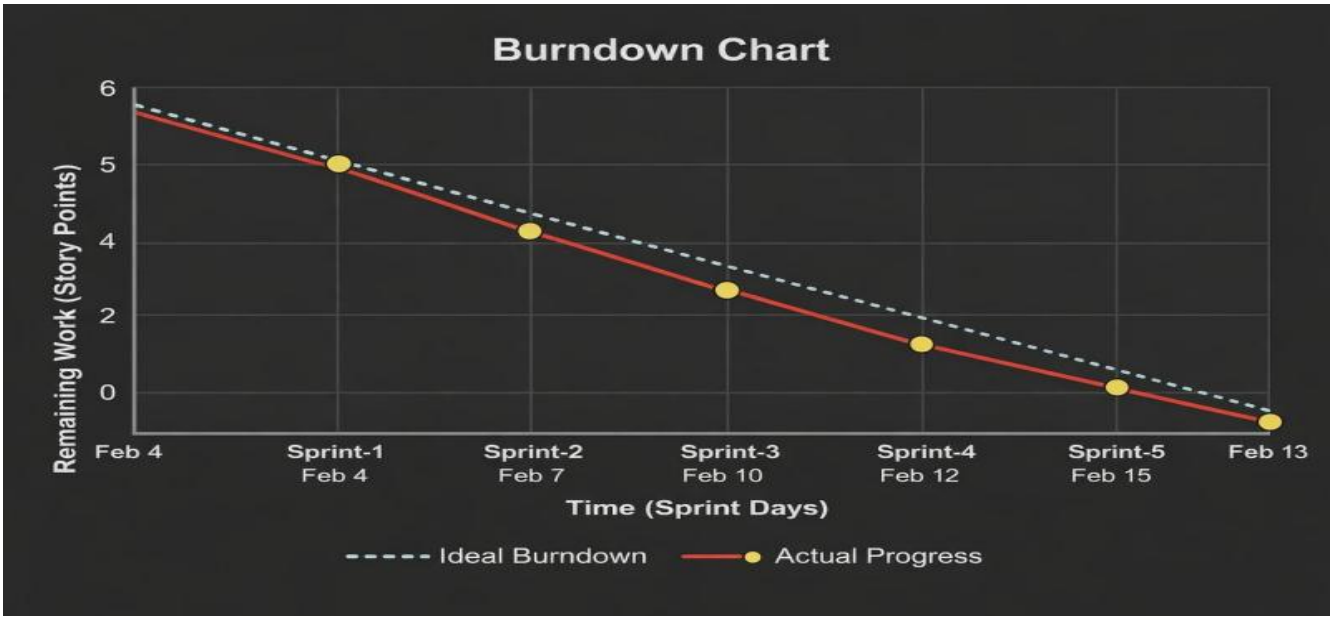
Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	4	2 Days	04 Feb 2026	06 Feb 2022	4	03 Feb 2026
Sprint-2	6	2 Days	07 Feb 2026	09 Feb 2022	6	03 Feb 2026
Sprint-3	3	2 Days	10 Feb 2026	12 Feb 2022	3	03 Feb 2026
Sprint-4	2	2 Days	13 Feb 2026	15 Feb 2022	2	03 Feb 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)

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

Average Team Velocity = 3.75 Story Points per Sprint



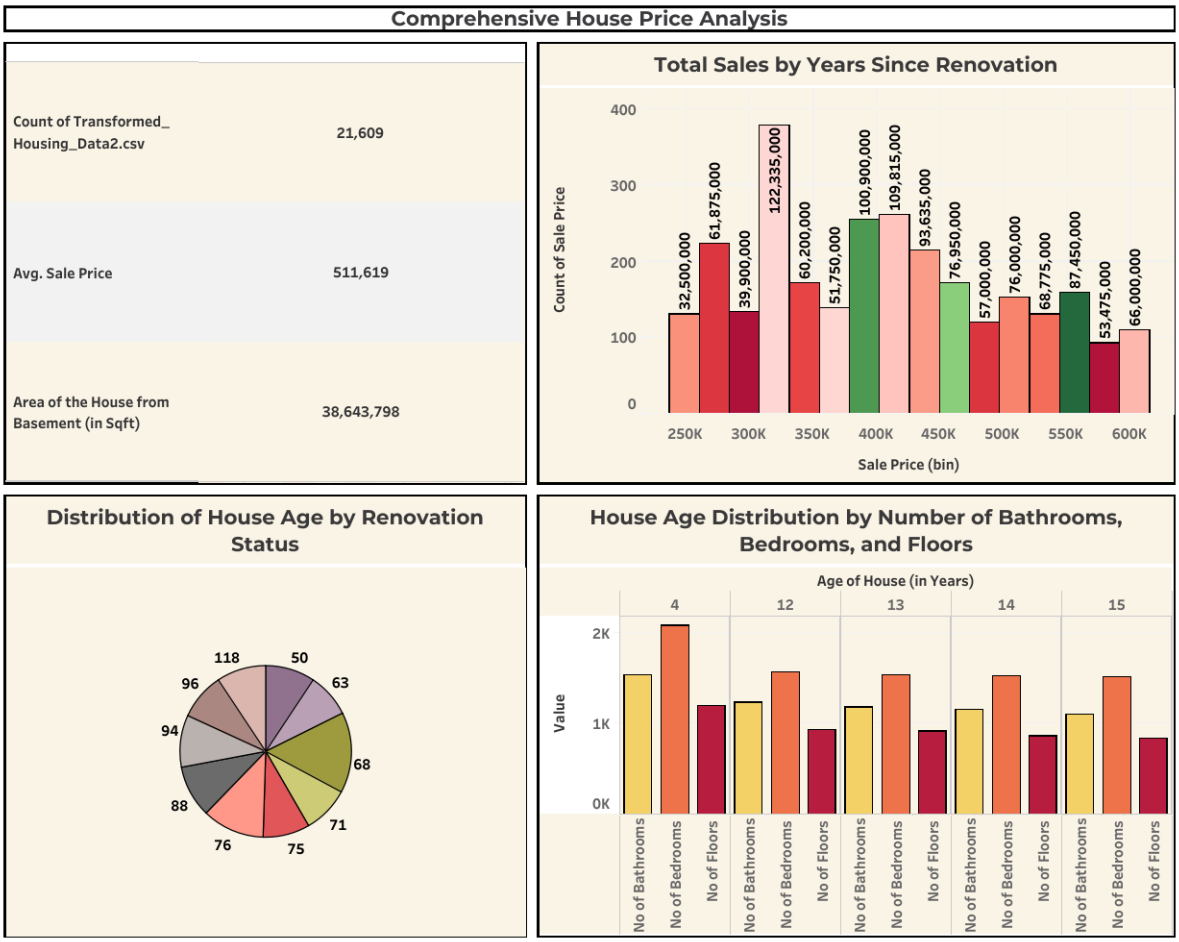
6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	Transformed_Housing_Data2.csv | Total Records: ~21,609 | Avg Sale Price: ~511,619
2.	Data Preprocessing	5 preprocessing
3.	Utilization of Filters	4 Filters
4.	Calculation fields Used	4 Fields
5.	Dashboard design	No of Visualizations: 4
6	Story Design	No of Visualizations: 3

7. RESULTS

7.1 Output Screenshots



8. ADVANTAGES & DISADVANTAGES

9. Advantages

Rapid Insight Delivery

Our prototype-first workflow produces an initial Tableau dashboard within 48 h, letting Ethan validate direction early and keep the project tightly aligned with stakeholder needs. This shortens analysis cycles and builds executive confidence faster than traditional, sequential BI engagements.

Domain-Tailored Expertise

The four-person team combines real-estate knowledge with advanced Tableau and data-engineering skills, delivering geo-spatial heat maps, predictive overlays, and accessibility-ready color palettes that generic consultants rarely offer. Ethan gains visuals that speak his market's nuances without needing to train an external vendor on the basics.

Disadvantages

Specialized Cost Structure

Premium, niche talent and rapid-turnaround service come at a higher price point than DIY approaches or commodity BI freelancers. For firms with tight budgets, the tiered fixed-fee plus optional subscription model may still feel prohibitive.

Vendor Dependency Risk

Although we provide training and reusable Prep flows, Ethan could remain reliant on our team for complex updates or new analytic modules. If internal capacity or Tableau proficiency doesn't grow in parallel, long-term dependence may limit flexibility and increase total cost of ownership.

10. CONCLUSION

Our Tableau-driven solution converts Ethan's raw housing data into a clear, interactive narrative that accelerates insight and boosts executive confidence. By coupling rapid prototypes with reusable Prep flows, we've built a framework that delivers value today while remaining easy to refresh and scale tomorrow. With dashboards live and training complete, Ethan is now equipped to guide smarter real-estate decisions and continually refine his market intelligence.

11. FUTURE SCOPE

Next, we'll plug in live MLS and economic feeds so the dashboards refresh in real-time and flag market anomalies automatically. The framework will be broadened to cover rental, commercial, and cross-city datasets, letting Ethan clone the solution to new regions with minimal re-work. We'll also embed predictive pricing models and auto-generated narrative insights, giving his team forward-looking guidance and instant executive summaries.

12. APPENDIX

Dataset Link

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

GitHub

https://github.com/bhuvan098/Visualizing-Housing-Market-Trends

Project Demo Link

https://drive.google.com/file/d/1rxSdip0Vfcz77jqe55neH0wlJ2ekvGcV/view?usp=drivesdk