BI Project Report

An observation on sales for AirBNB

Airbnb Open Data | Kaggle

Airbnb, Inc is an American company that operates an online marketplace for lodging, primarily homestays for vacation rentals, and tourism activities. Based in San Francisco, California, the platform is accessible via website and mobile app. Airbnb does not own any of the listed properties; instead, it profits by receiving commission from each booking. The company was founded in 2008. Airbnb is a shortened version of its original name, AirBedandBreakfast.com.

Context

Since 2008, guests and hosts have used Airbnb to travel in a more unique, personalized way. As part of the Airbnb Inside initiative, this dataset describes the listing activity of homestays in New York City

Content

The following Airbnb activity is included in this New York dataset: Listings, including full descriptions and average review score Reviews, including unique id for each reviewer and detailed comments Calendar, including listing id and the price and availability for that day

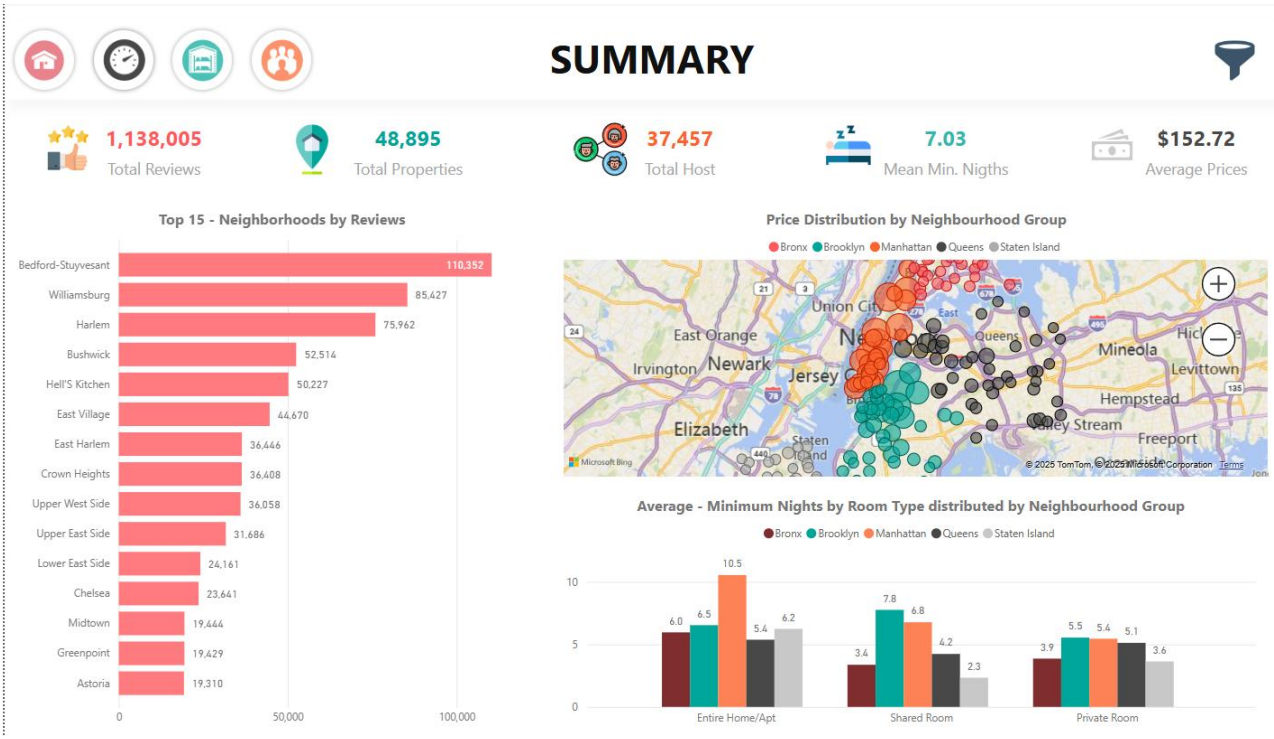
Home Screen:

Sections & Navigation:

"What are you looking for?" is a key question, guiding the viewer to explore specific data areas:

- Summary of latest results (clock icon)
- Overview of real estate (building icon)
- Host profile (group icon)

Summary:



This page provides a summarized overview of key metrics related to rental or hospitality platforms. Here's what each icon and value represent:

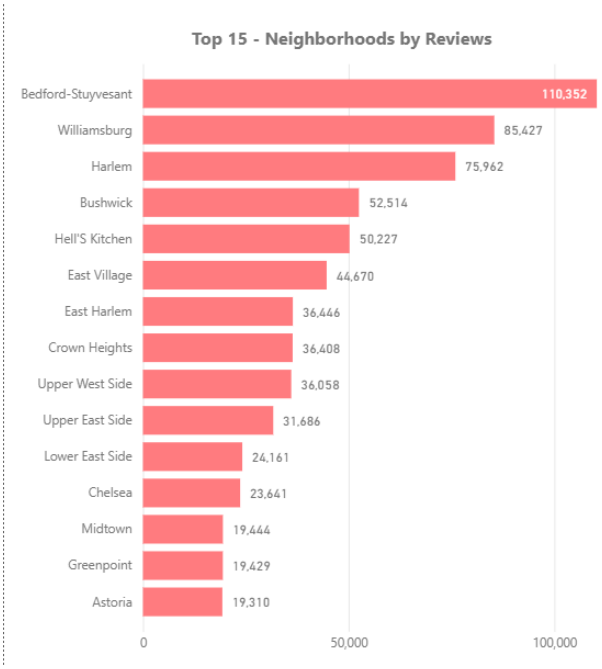
1. **Total Reviews: 1,138,005**
    - This indicates that users have left over **1.1 million reviews** on the platform, reflecting a high level of user interaction and feedback.

2. **Total Properties: 48,895**
    - There are **48,895 unique properties** listed on the platform, showing the scale of the rental inventory available.

3. **Total Hosts: 37,457**
    - A total of **37,457 hosts** are offering properties, indicating a diverse host base.

4. **Mean Minimum Nights: 7.03**
    - On average, the **minimum stay requirement** across listings is approximately **7 nights**.

5. **Average Prices: $152.72**
    - The **average nightly price** for rental property is **$152.72**, providing a sense of typical pricing on the platform.



1. Top 15 - Neighborhoods by Reviews (Bar Chart)

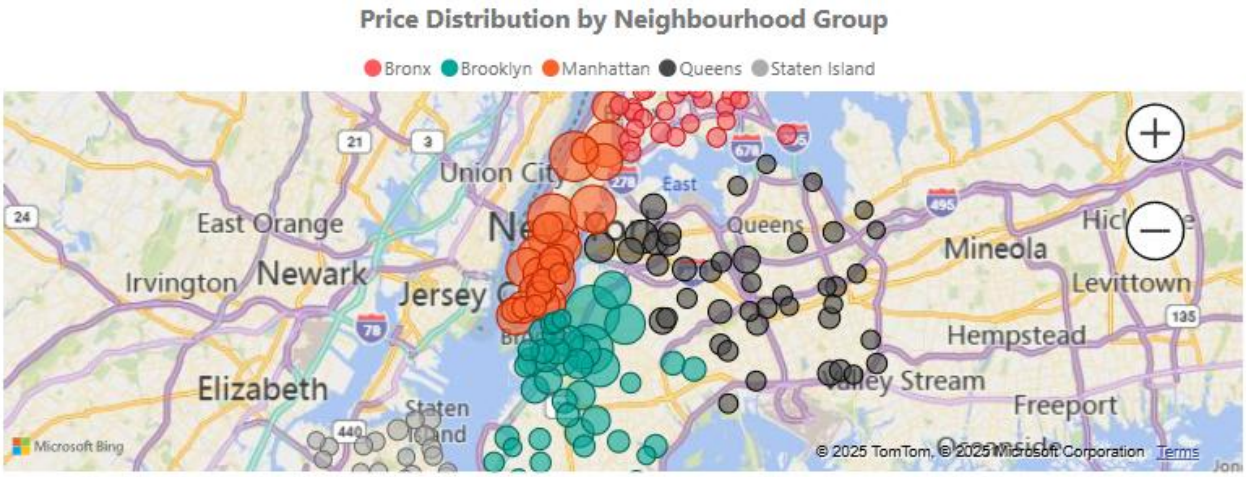
This horizontal bar chart shows the neighborhoods with the highest number of reviews.

- **Bedford-Stuyvesant** tops the list with 110,352 reviews, located in Brooklyn, often known for its cultural vibe and growing appeal to tourists.
- Followed by **Williamsburg (85,427 reviews)** and **Harlem (75,962 reviews)** both neighborhoods known for their trendy atmosphere, nightlife, creative scene, cultural significance, hence attracting many visitors.
- Most of the top-reviewed neighborhoods are in **Brooklyn** and **Manhattan**, indicating high tourist activity or rental popularity in these areas.

High review counts typically indicate:

- High visitor turnover
- Many active listings
- Popularity for short-term stays
- Possibly affordability compared to central Manhattan

This chart highlights how tourist and guest preferences are distributed across New York City neighborhoods, with some less traditionally tourist-heavy areas (like Bedford-Stuyvesant and Bushwick) seeing significantly more guest engagement than even central areas like Midtown. It reveals shifting trends in travel and accommodation preferences, with a growing interest in culturally rich, residential neighborhoods.

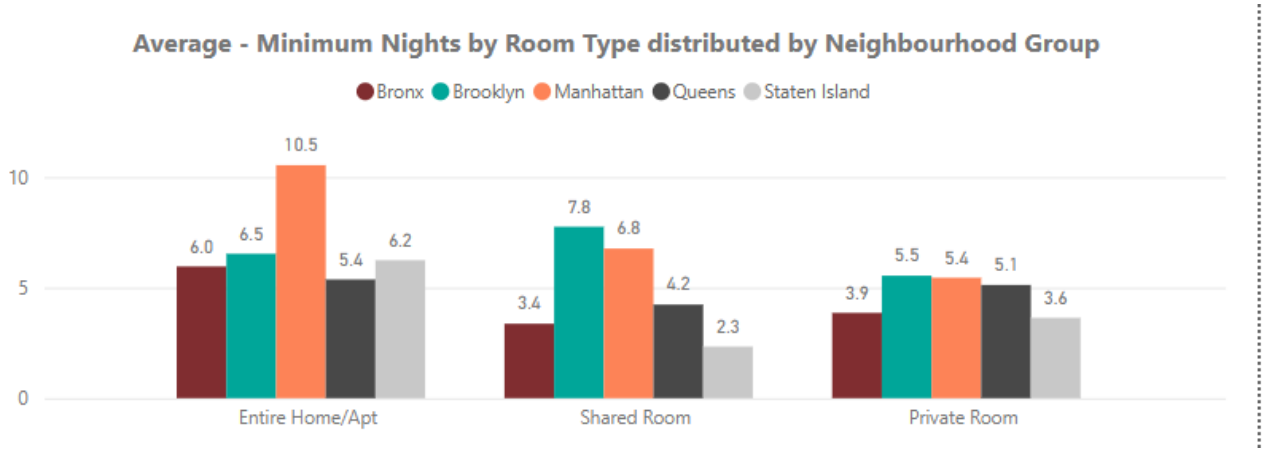


2. Price Distribution by Neighbourhood Group (Map Visual)

This map visual displays property price distribution across different boroughs of New York City.

- Each dot represents a rental listing, and the color identifies which neighbourhood group the listing belongs to. We can infer distribution patterns based on the concentration and clustering of dots.
- Different colored dots represent various Neighbourhood Groups (Bronx, Brooklyn, Manhattan, Queens, Staten Island).
- Manhattan and Brooklyn appear densely populated with listings, showing both the concentration of properties and potentially higher pricing patterns in these areas.This is likely because it contains some of the highest prices, given its prime location and tourist appeal.
- Queens, Bronx, and Staten Island have fewer listings and are likely to offer more budget-conscious accommodations.

This type of visualization helps **hosts, analysts, or tourists** see where listings are concentrated and possibly infer price ranges based on location. For example, **Manhattan** listings are likely premium, while **Staten Island** and **the Bronx** offer more budget-friendly options.



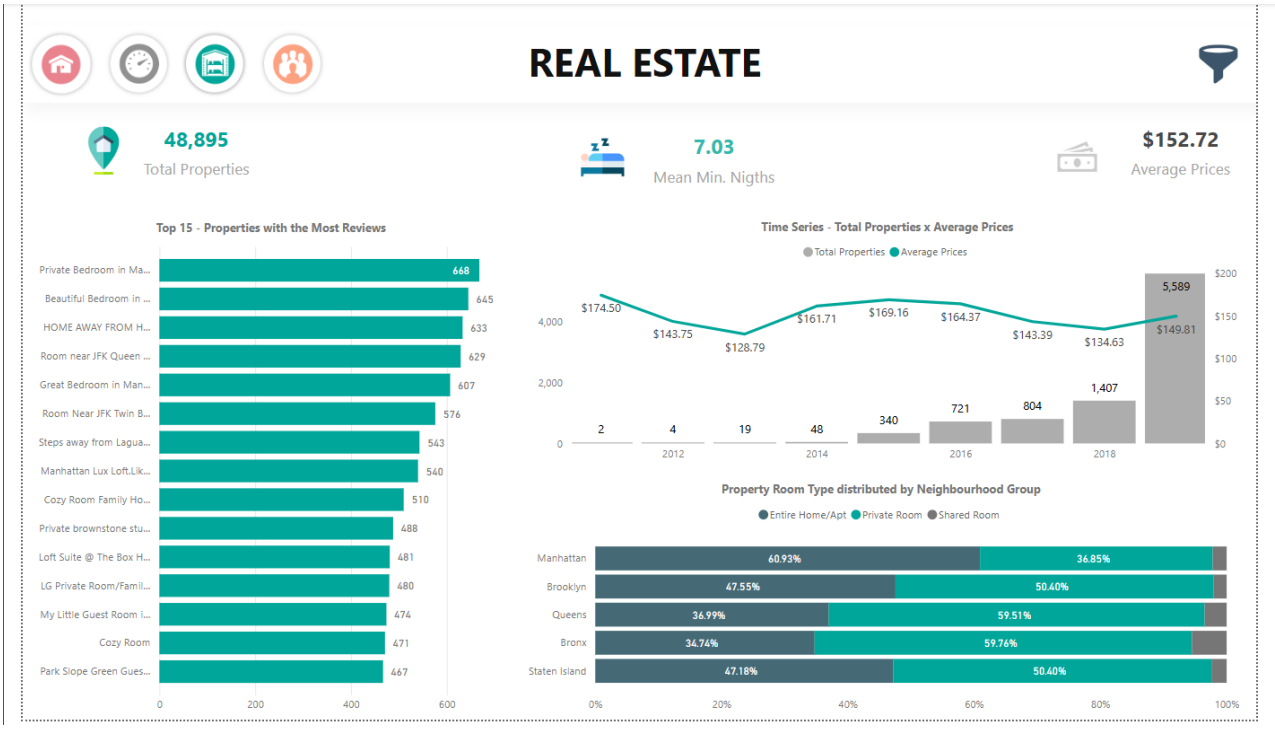
3. Average - Minimum Nights by Room Type distributed by Neighbourhood Group (Clustered Column Chart)

This means for each room type (Entire Home/Apt, Shared Room, Private Room), the average minimum number of nights a guest book is calculated for each neighbourhood group (Bronx, Brooklyn, Manhattan, Queens, Staten Island).

- Entire homes/apartments in Manhattan have the highest average minimum stay (10.5 nights), likely due to significantly stricter minimum stay requirements for full-home rentals, possibly due to legal regulations or host preferences targeting longer-term visitors.
- Shared and private rooms generally require fewer nights, especially in Staten Island, where averages are as low as 2.3 nights for shared rooms likely due to lower demand or more flexible policies.
- Private rooms have more balanced minimum night requirements across boroughs, with Brooklyn and Manhattan just slightly higher.

This chart helps travelers and analysts understand how **minimum stay policies vary** based on both **room type** and **borough**. For guests seeking **short stays**, Staten Island, Queens, or the Bronx may offer more flexibility. Those planning longer trips might find more availability in **Manhattan or Brooklyn**, especially for **entire homes**.

Property Profile:

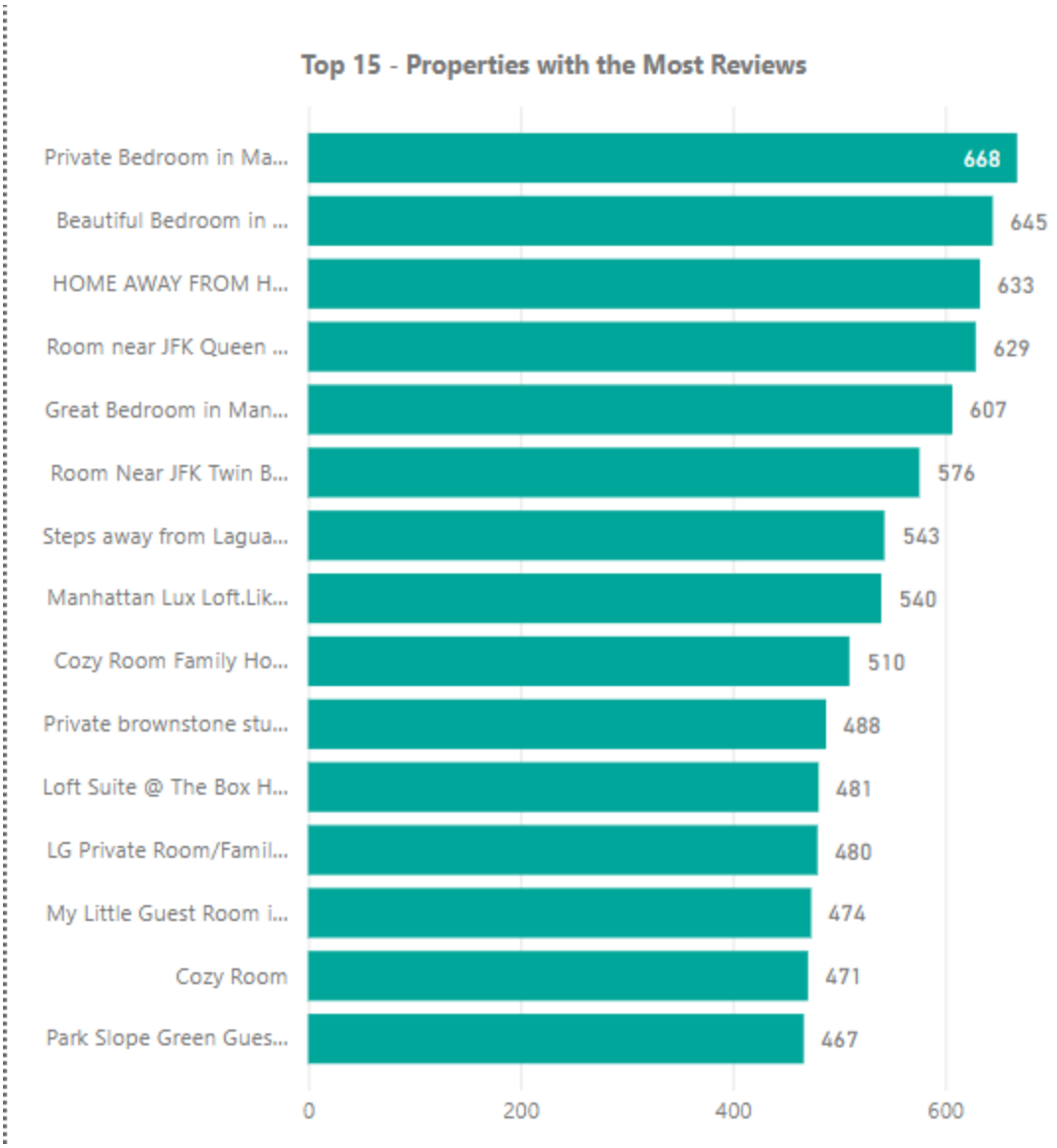


At the top of the dashboard, three summary metrics give a quick overview of the entire dataset:

1. **Total Properties: 48,895**
    - This is the total number of property listings included in the dataset. It represents all the rental properties analyzed.

2. **Mean Minimum Nights: 7.03**
    - “Minimum nights” is the least number of nights a host books. A mean (average) of 7.03 nights means that on average, hosts spend about 7 nights (roughly one week) as the minimum stay.

3. **Average Prices: $152.72**
    - This is the average nightly price of properties in the dataset. In other words, if you took all the rental prices, they average out to about $152.72 per night. This gives a sense of typical cost: around $150 per night is the norm across these properties.

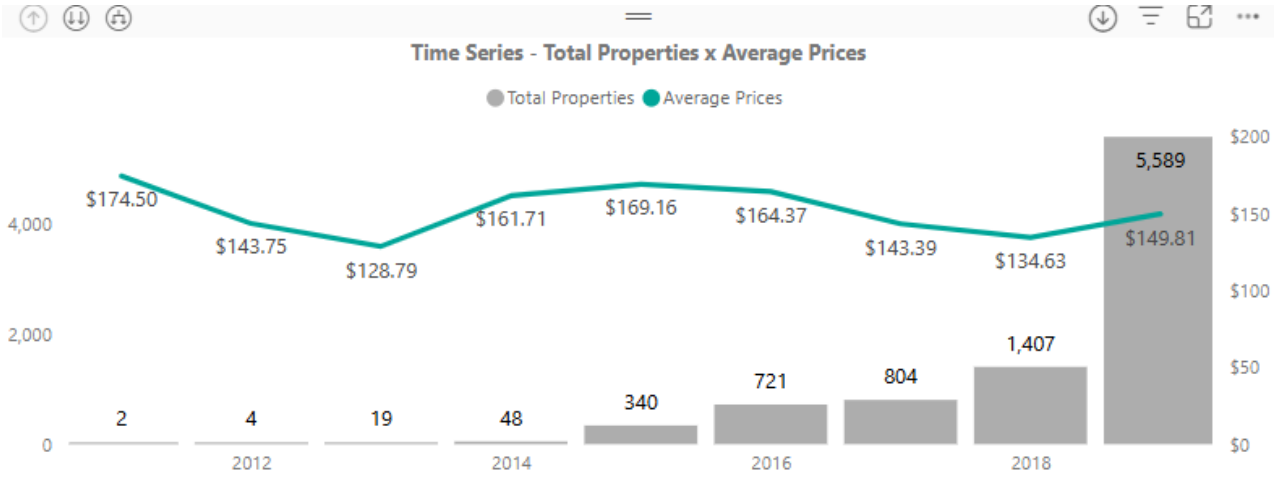


1. Top 15 Properties with the Most Reviews (Bar Chart)

This horizontal bar chart displays the 15 most-reviewed properties in the dataset, reflecting customer engagement and likely property popularity.

- The top-listed property, “Private Bedroom in Manhattan”, has received 668 reviews.
- Other high-ranking properties include private rooms in Manhattan, Brooklyn, and near JFK Airport, with review counts ranging from 467 to 645. This may be because Manhattan properties benefit from being in a high tourism area, while JFK-area listings are likely to attract frequent short-term stays from travelers and layovers.
- Most of these properties are private rooms, indicating that such accommodation is particularly appealing to budget-conscious travelers and solo guests.
- A high review count often builds trust and credibility for new potential guests. It may also influence search visibility and booking rates on platforms like Airbnb.

The most-reviewed Airbnb properties in NYC are primarily private rooms in Manhattan and Queens, especially near transit hubs like JFK. Their high engagement suggests a combination of affordability, convenience, and host effectiveness in encouraging guest feedback. This chart can guide hosts aiming to grow visibility or travelers looking for well-tested accommodation.

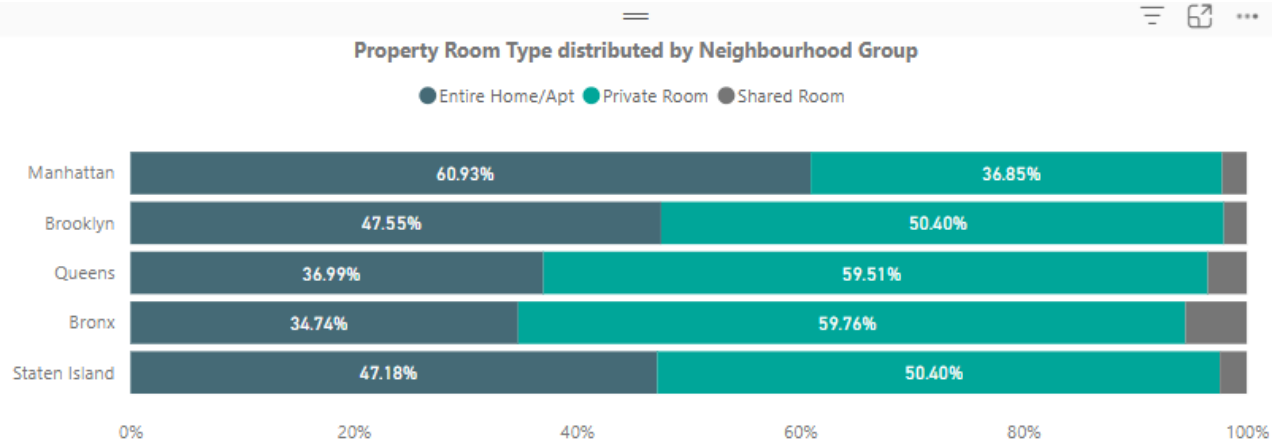


2. Time Series – Average Price (Line) and Total Properties per Year (Columns)

This composite chart integrates a line graph (representing average prices) and a bar chart (showing total properties listed per year):

- From 2011 to 2019, the number of properties increased dramatically from 2 to 5,589. This exponential growth demonstrates the rapid expansion of the short-term rental market, particularly post-2014. The largest jump occurred between 2018 and 2019, where listings nearly quadrupled (1,407 → 5,589).
- Prices peaked in 2011 at $174.50. A gradual decline was observed until 2013 ($128.79), reaching $128.79, followed by stabilization around the $160 range from 2015–2017 likely due to Market saturation (more competition) and expansion into lower-cost areas.
- The average price in 2019 was $149.81, indicating relative price stability despite increasing supply.
- While supply has increased substantially, the average prices have remained relatively consistent over time. This suggests that demand has kept pace with the growing number of listings, preserving rental value in the market.

This chart shows a strong growth trajectory for Airbnb in NYC, accompanied by price sensitivity as supply increased. It highlights how the platform matured: from premium, scarce options to a large, price-sensitive marketplace.



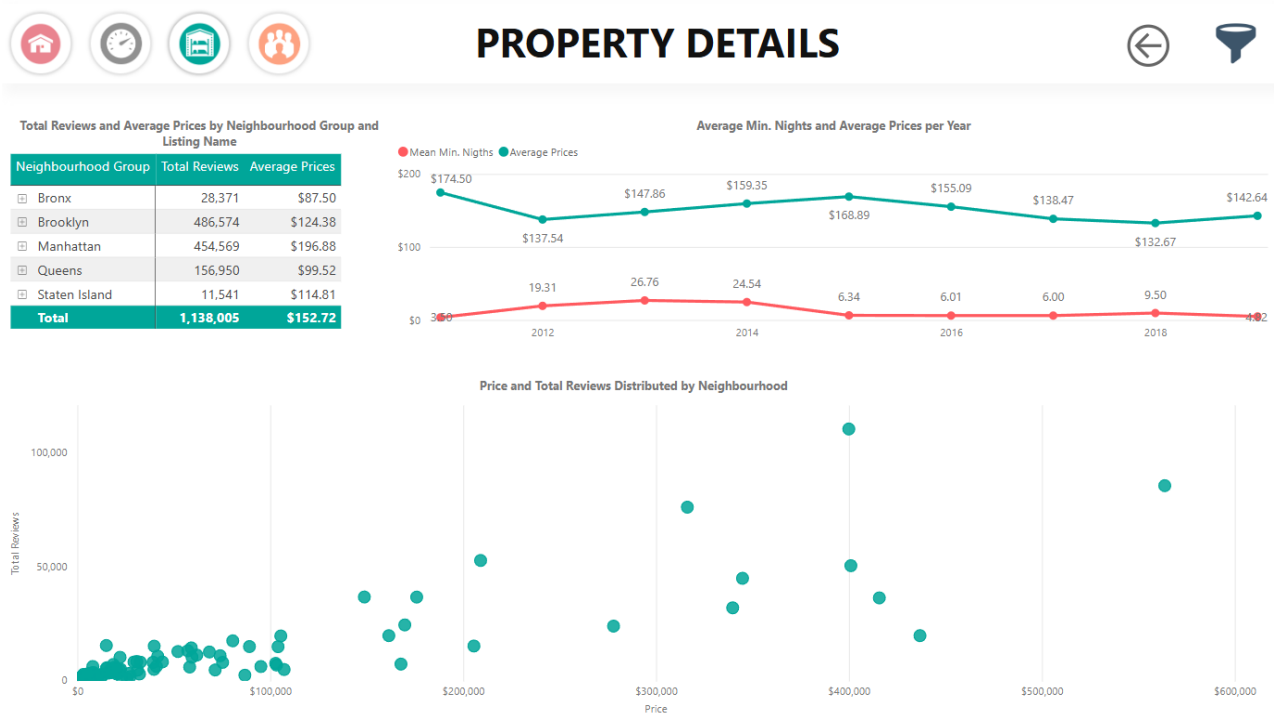
3. Room Type Distribution by Neighborhood Group (Stacked Bar Chart)

This stacked horizontal bar chart categorizes property types (Entire Home/Apt, Private Room, Shared Room) by neighbourhood group:

- Manhattan: Dominated by Entire Homes/Apartments (60.93%), suggesting higher availability of premium listings and catering to tourists or high-income guests.
- Brooklyn and Staten Island: Majority of listings are Private Rooms (50.40%), reflecting more accessible options for mid- to lower-income guests and shared housing trends.
- Queens and Bronx: Feature the highest proportion of Private Rooms (59.51% and 59.76% respectively), indicating that these boroughs are heavily oriented toward budget and shared accommodations.
- Shared Rooms: Account for a very small portion of listings across all boroughs, implying low popularity or regulatory discouragement. The Bronx has the highest shared room proportion at 5.5%, still relatively small.
- Affluent or tourist-heavy areas (e.g., Manhattan) favor entire property rentals. Residential and less touristy boroughs (e.g., Bronx, Queens) tend to offer private rooms, showing hosts might live on the property and use Airbnb for extra income. Shared rooms are uncommon, likely due to privacy concerns or local regulations.

This chart illustrates how Airbnb rental styles vary by borough—with Manhattan focusing on entire homes, and outer boroughs leaning toward private room sharing. This pattern reflects differing market demands, housing costs, and resident demographics across NYC.

Property Details:



The dashboard provides an overview of Airbnb property details across different neighbourhood groups in New York City.

Total Reviews and Average Prices by Neighbourhood Group and Listing Name

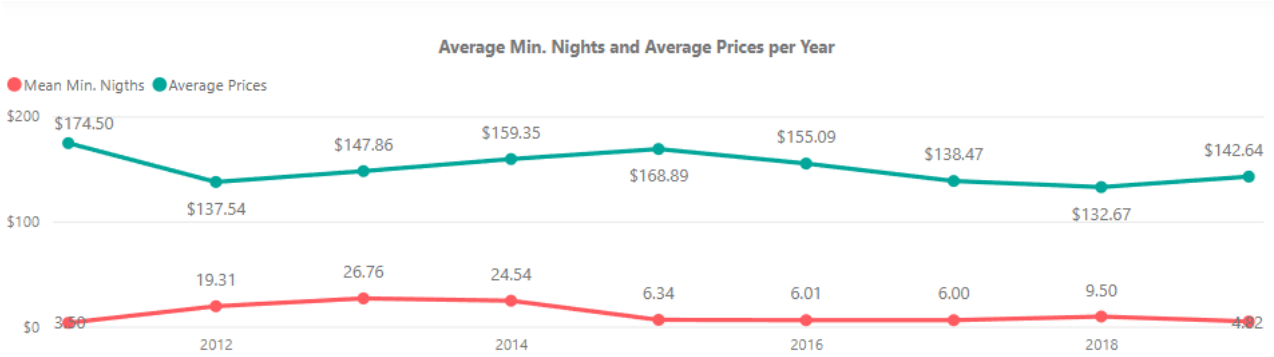
Neighbourhood Group	Total Reviews	Average Prices
⊞ Bronx	28,371	$87.50
⊞ Brooklyn	486,574	$124.38
⊞ Manhattan	454,569	$196.88
⊞ Queens	156,950	$99.52
⊞ Staten Island	11,541	$114.81
Total	**1,138,005**	**$152.72**

1. Total Reviews and Average Prices by Neighbourhood Group and Listing Name (Matrix)

- Brooklyn Has the Highest Number of Reviews (486,574 reviews), slightly more than Manhattan, indicating strong demand for Airbnb stays. Average price: $124.38, more affordable than Manhattan.

- Manhattan is the Most Expensive, average price is $196.88, highest among all boroughs. Despite being the priciest, it still has very high booking activity (454,569 reviews), confirming strong tourist appeal.
- The Bronx is the Cheapest, having an average nightly rate of $87.50, lowest across all boroughs. Review volume (28,371 reviews) is relatively low, indicating less tourist traffic or fewer listings.
- Queens and Staten Island Have Moderate Prices, ~$100/night with a decent volume of reviews (157k+ reviews).
- Staten Island: ~$115/night but very low activity (11,541 reviews), suggesting limited popularity or fewer listings.
- Overall Average Price is around $152.72 which reflects the combined pricing dynamics across all listings in NYC. Brooklyn and Manhattan dominate the Airbnb market in both volume and pricing. The Bronx and Staten Island are more budget-friendly but receive less traffic. Queens serves as a mid-range option in terms of both popularity and pricing.

This table gives a clear picture of pricing tiers and market activity by borough, helping travelers compare value and demand.



2. Average Min. Nights and Average Prices per Year (Line Chart)

- Mean Minimum Nights (in red) is the average number of nights a guest stays. Average Prices (in green) is the average nightly price in USD.
- Prices started high in 2011 ($174.50) but declined sharply in 2012. Prices peaked again in 2015 ($168.89) before declining again through 2018. Slight rebound seen in 2019 ($142.64). The market has shown volatility but an overall downward trend in average pricing since 2015.
- The average minimum night stay spiked dramatically from 2011 to 2013, peaking at 26.76 nights. From 2015 onwards, minimum nights dropped significantly to around 6 nights, then slightly up in 2018 (9.5) and down again in 2019 (4.82). This shift indicates that hosts moved toward shorter stays, likely to attract more bookings.
- 2013–2014: Marked by longer required stays and higher prices. Post-2015: A clear market adjustment with reduced minimum stays requirements, suggesting a move toward more flexible, short-term rentals, likely to appeal to tourists and compete better. The trend

reflects Airbnb's shift toward becoming a more mainstream short-stay option rather than long-term lodging.

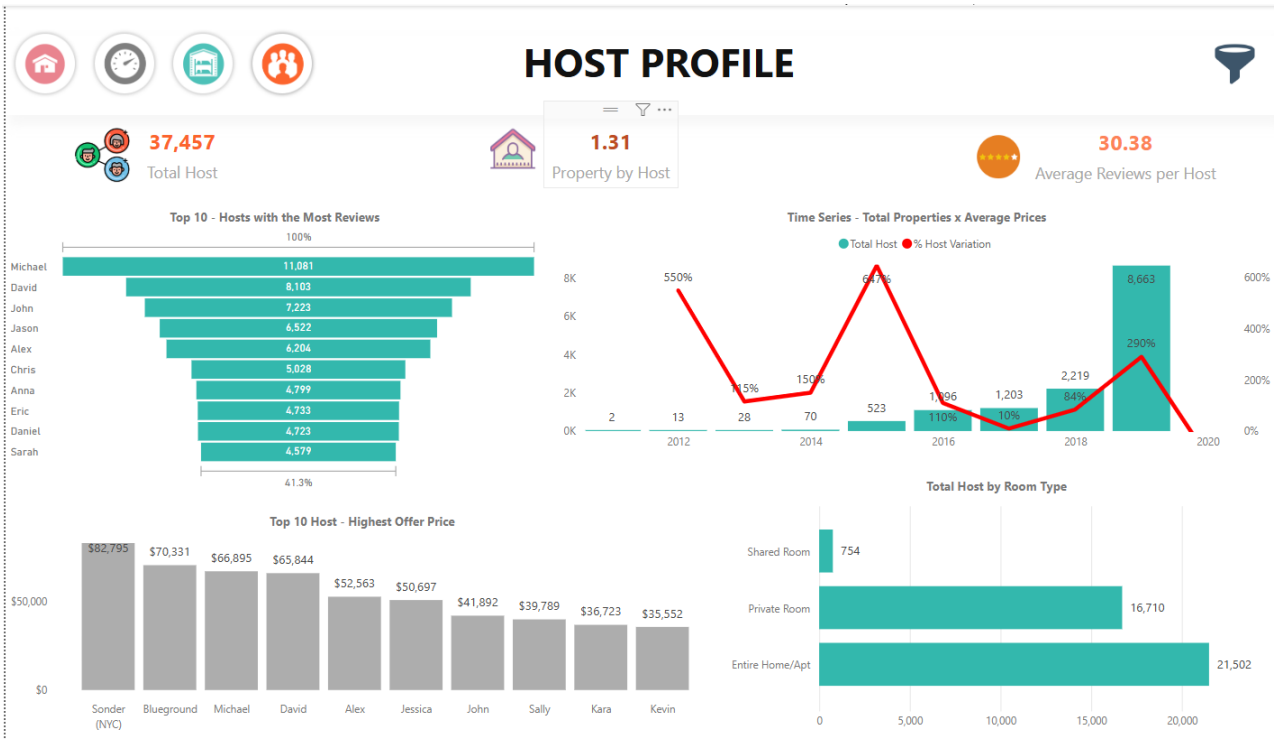
This chart shows that if you're a host, offering shorter minimum nights likely aligns with current market behavior or If you're a traveler, recent years have offered more flexible stays at more affordable prices compared to earlier years.

3. Price and Total Reviews Distributed by Neighbourhood (Scatter Plot)

- Most listings are clustered on the left (low-price range): The majority of listings fall below $100,000, with modest total review counts (generally under 20,000). This dense cluster indicates that lower-priced properties dominate the market and attract a steady volume of reviews.
- Higher-priced listings are more widespread: As price increases, listings become fewer but more varied in total reviews. Some very expensive listings (over $400,000) have high review counts (e.g., 100,000+), indicating exceptionally popular luxury properties.
- Outliers: A few listings priced at $300,000 to $550,000 have very high review counts, standing out significantly. These may be luxury or highly unique properties in sought-after neighborhoods.
- No strong correlation between price and reviews: High-priced properties don’t consistently get high reviews. Many lower- to mid-priced listings accumulate more reviews, likely due to affordability and higher turnover.
- Affordable listings are more common and more frequently booked, driving up their review counts. Expensive listings are rarer and more niche; some perform well, but most attract fewer reviews. Pricing alone doesn't dictate popularity; other factors (location, quality, amenities) are likely driving review volume.

This chart is helpful for hosts as competitive pricing may lead to more bookings and reviews. Expensive properties need to offer standout value to attract consistent traffic. While for travelers high-review listings tend to be in the lower price range, likely to indicate good value or location.

Host Profile:



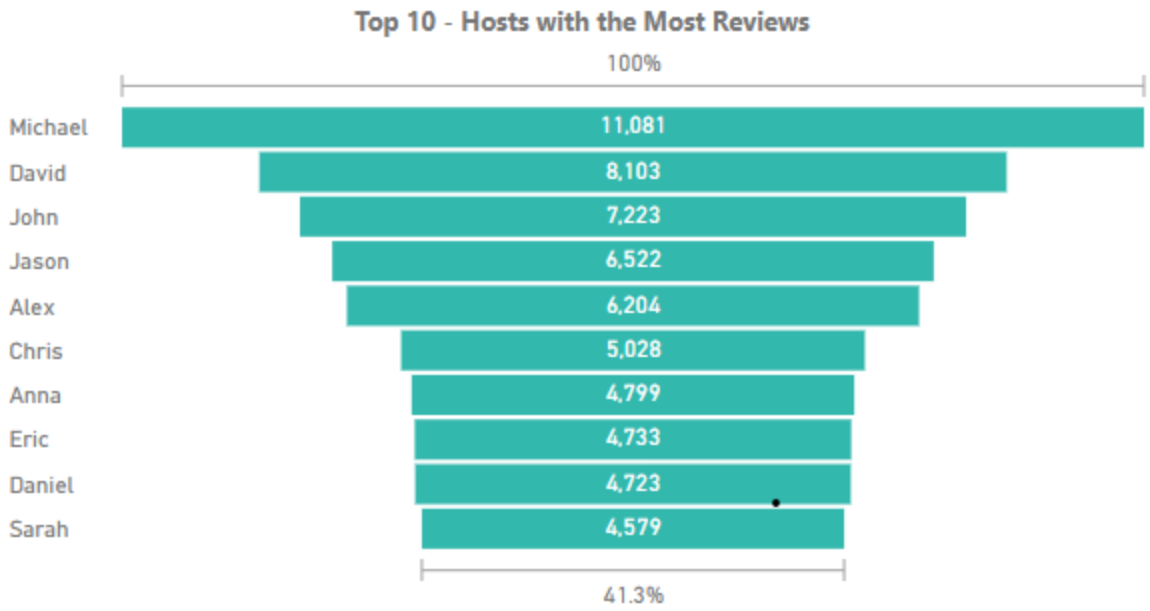
This dashboard displays three key metrics related to hosts on a platform (likely a rental or accommodation platform such as Airbnb). Here's what each metric means:

1. Total Host: 37,457
    - This is the total number of hosts on the platform.

2. Property by Host: 1.31
    - This indicates that, on average, each host manages 1.31 properties. It suggests that most hosts have just one property, but some manage multiple.

3. Average Reviews per Host: 30.38
    - On average, each host has received approximately 30 reviews from guests.

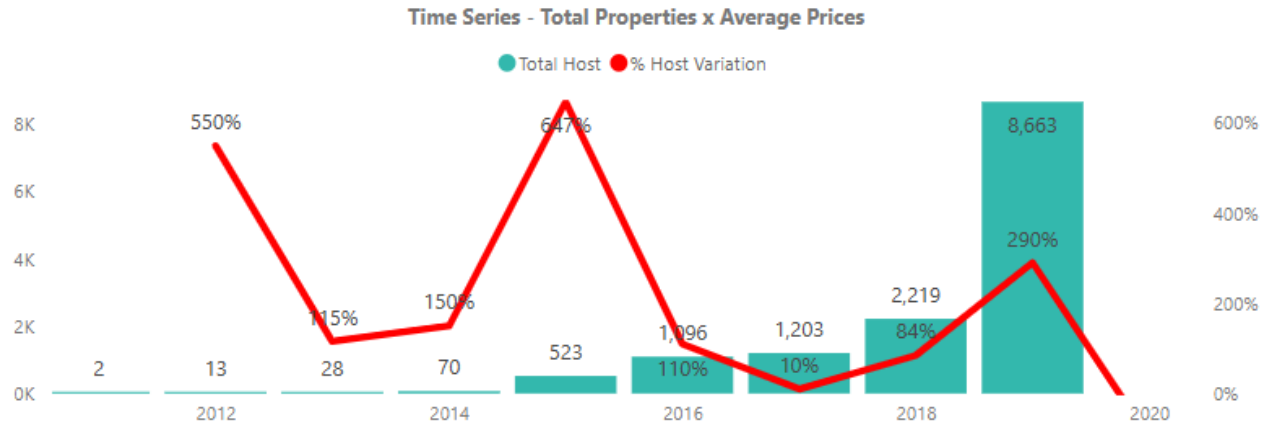
These metrics give a general idea of the host landscape: a moderately large host base with a slightly above-single-property average and a fair level of guest engagement.



1. Top 10 - Hosts with the Most Reviews (Funnel Chart)

- Michael stands out significantly as the top host, with over 11,000 reviews, far ahead of the rest. The number of reviews gradually declines as we move down the list.
- Sarah, at the bottom, has 4,579 reviews, which is 41.3% of Michael's total — showing a wide disparity.
- All hosts in this list have over 4,500 reviews, suggesting they are experienced and likely manage multiple or high-turnover properties.
- These hosts may: Manage multiple listings, operate in high-demand areas or offer exceptional guest experiences, driving return bookings and reviews.
- Michael likely has a well-established presence, potentially operating as a "superhost" or full-scale rental business.

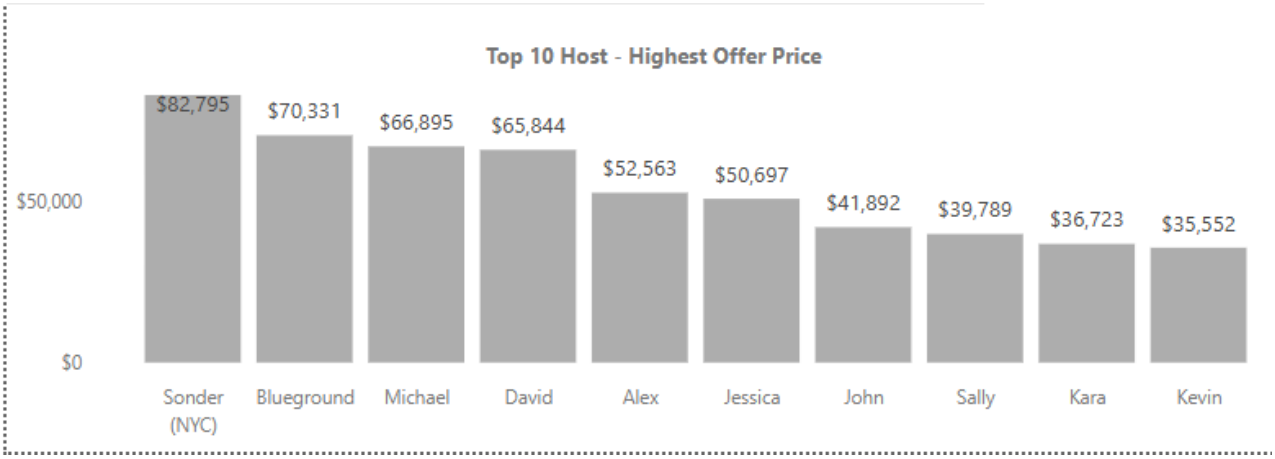
This chart for guests could help them book with one of these hosts that may indicate **reliable service** due to their experience. While, for hosts or analysts, these names represent **benchmark operators** worth studying for best practices in high-performing listings.



2. Time Series – Total Properties x Average Prices (Line and clustered column chart)

- Teal Bars (Left Y-Axis): Represent the Total Number of Hosts each year while, Red Line with Percentages (Right Y-Axis): Shows % Variation in Hosts year-over-year.
- Explosive Growth: Massive growth phases occurred in: 2012 (550%), 2015 (647%) — the highest spike, indicating a surge in host adoption and 2019 (290%) — another significant increase.
- Stagnation/Plateauing: 2017 saw minimal growth (10%), possibly due to market saturation, regulation, or platform stabilization.
- Latest Trend (2019 to 2020): Though 2019 had a very high host count (8,663), the % variation dropped significantly in 2020, suggesting market maturity or external disruptions (e.g., regulation or COVID-19).

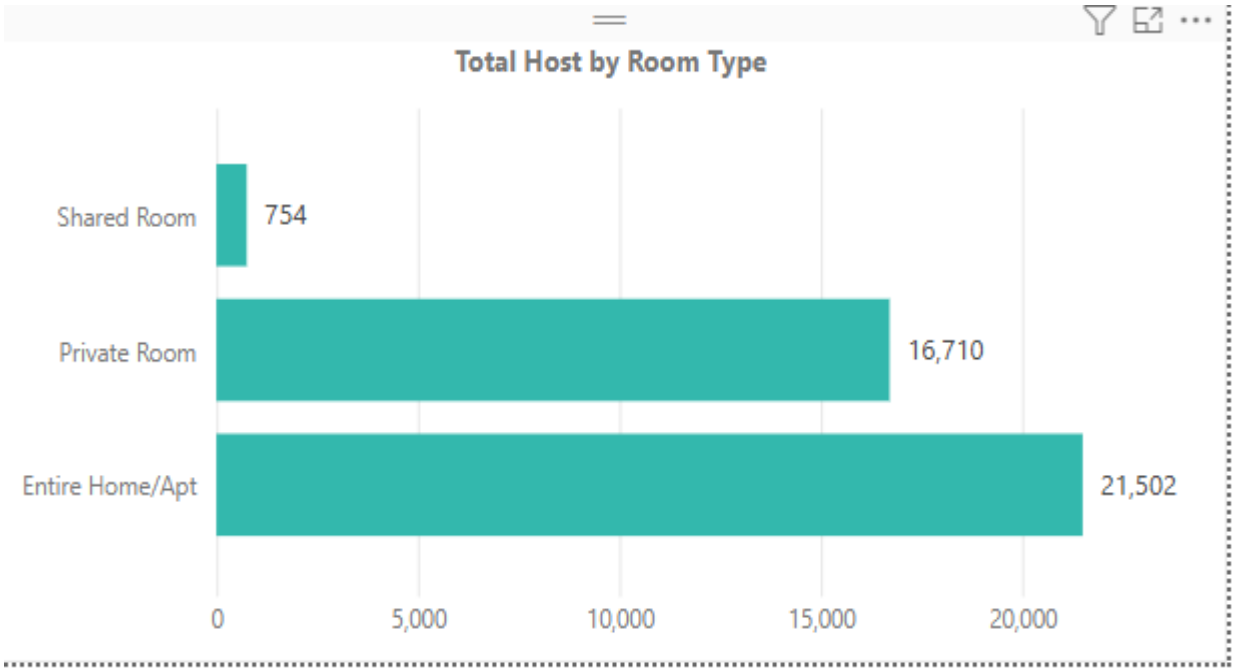
Airbnb saw early exponential growth in host adoption from 2011 to 2016. Periods of slower growth suggest potential market regulation or oversupply. The large jump in 2019 could reflect a final boom before market correction or external factors affected host registration.



3. Top 10 Host – Highest Offer Price (Bar Chart)

- Sonder (NYC) is the top host with the most expensive listing, significantly higher than the others. Sonder is a professional property management company, not an individual—this explains the exceptionally high price.
- Blueground is another corporate host, suggesting that corporate or managed properties dominate the upper end of the pricing spectrum.
- The rest (Michael, David, Alex, etc.) are likely individual hosts offering luxury accommodation.

Corporate hosts are leading in pricing power, likely due to better locations, amenities, or branding. The gap between the top 2 and the rest is quite large — over $12,000 difference from 2nd to 3rd. These extreme prices might be for luxury penthouses, full buildings, or long-term high-end bookings.



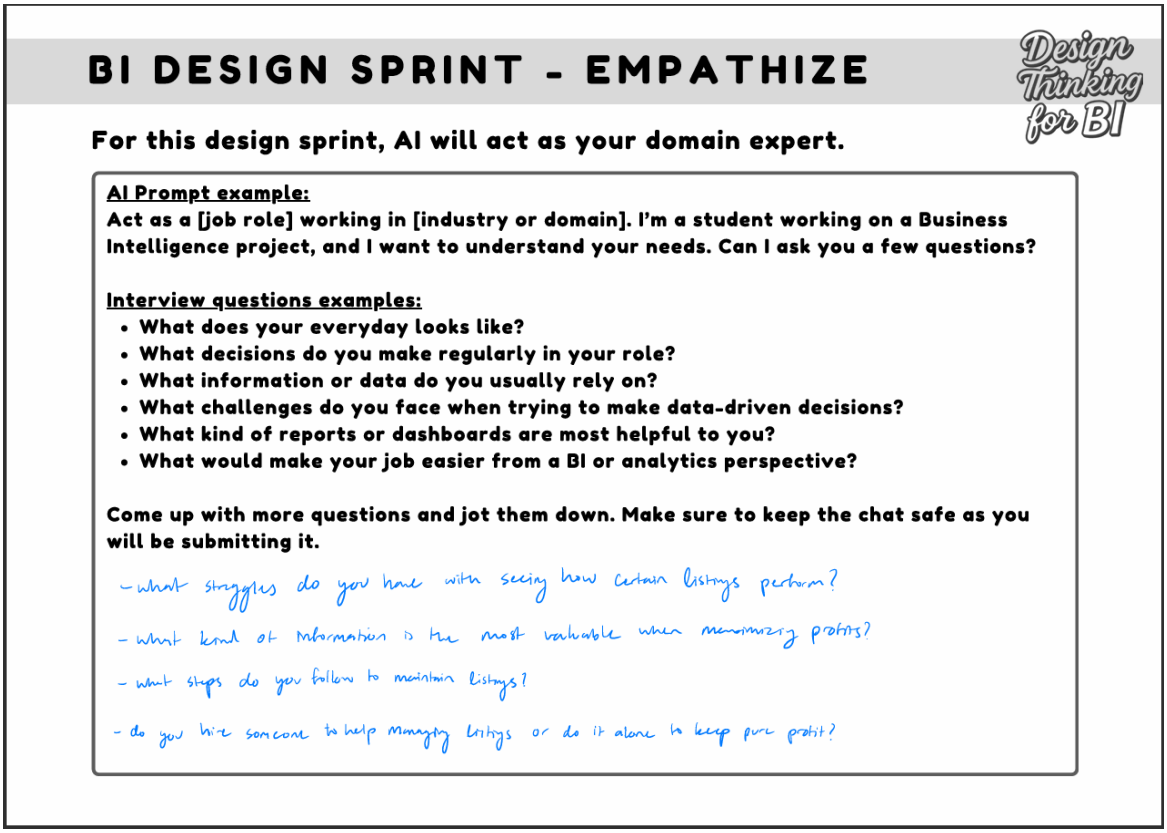
4. Total Host by Room Type (Bar Chart)

- Entire Home/Apt is the most common listing type, accounting for the majority of hosts. This suggests: Preference for full-unit rentals (more privacy for guests). Higher earning potential for hosts. Possibly more professional/entrepreneurial hosting.
- Private Rooms are also significant, showing that many hosts share their personal space (like renting a room in their home).
- Shared Rooms are very rare, likely due to: Lower demand (less privacy), Potential safety concerns and less attractive for tourists or business travelers.

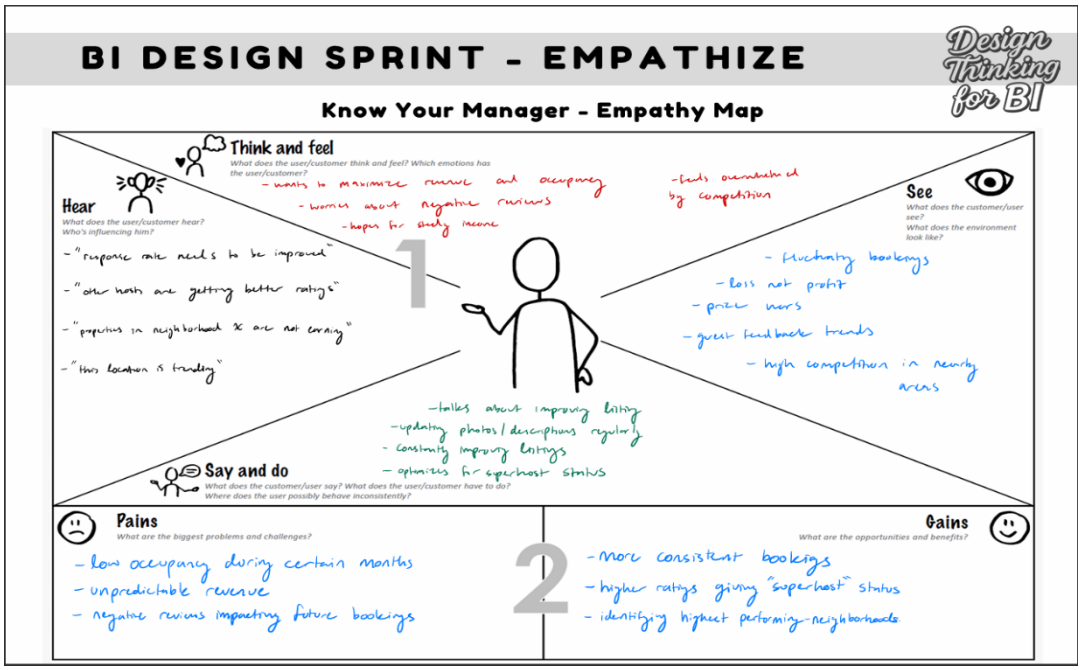
The market is dominated by entire-property listings, reflecting either professionalized hosting or travelers' preference for more private accommodations. Shared rooms are nearly obsolete, pointing to a shift in guest expectations toward more private and comfortable lodging.

Summary of Design Thinking Framework Implementation

1. Empathize Phase



Empathy Map



Says “Hosts want to feel supported and understand platform updates.”“Guests want clear and consistent information.”“Both groups want trust and transparency in listings.”

Thinks “We should focus on seamless communication between guests and hosts.”“Personalization can make the experience better, but we also need standardization in some areas.”“Safety and cleanliness are top priorities now.”

Does Works with product and engineering teams to build features that address both guest and host needs.Analyzes data from reviews, listings, and calendars to identify pain points and improvement areas.

Feels “I feel responsible for making sure both guests and hosts have a positive experience.”“I worry about how changes in policy or technology will affect small hosts.”“I’m excited by how data can shape better experiences.”

Stakeholder Goals:

Build trust across platform interactions

Ensure safety and booking clarity

Support hosts in remaining competitive

Frustrations:

Communication gaps between hosts and guests

Unclear policy guidelines

Pressure from pricing and competition

Motivations:

Positive experiences for users

Data-driven platform improvements

Opportunities for Improvement:

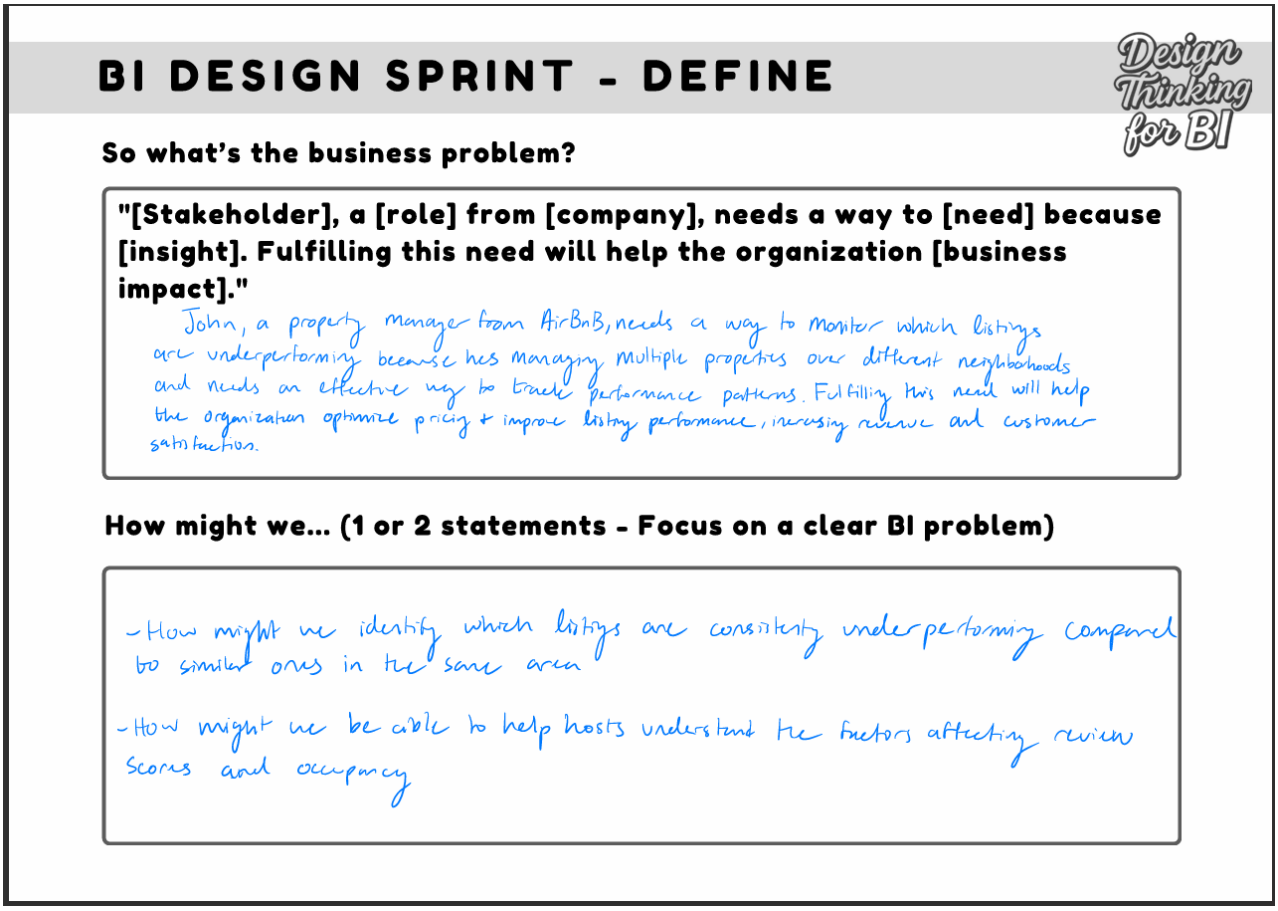
Richer messaging tools

Transparent policy support

Smarter pricing and performance dashboards

2. Define Phase

User Persona: John, Airbnb property manager overseeing multiple listings



Problem Statement:

John needs a way to monitor underperforming listings across neighborhoods to identify patterns and take corrective action. Meeting this need will help Airbnb optimize pricing, improve listings, and increase both revenue and user satisfaction.

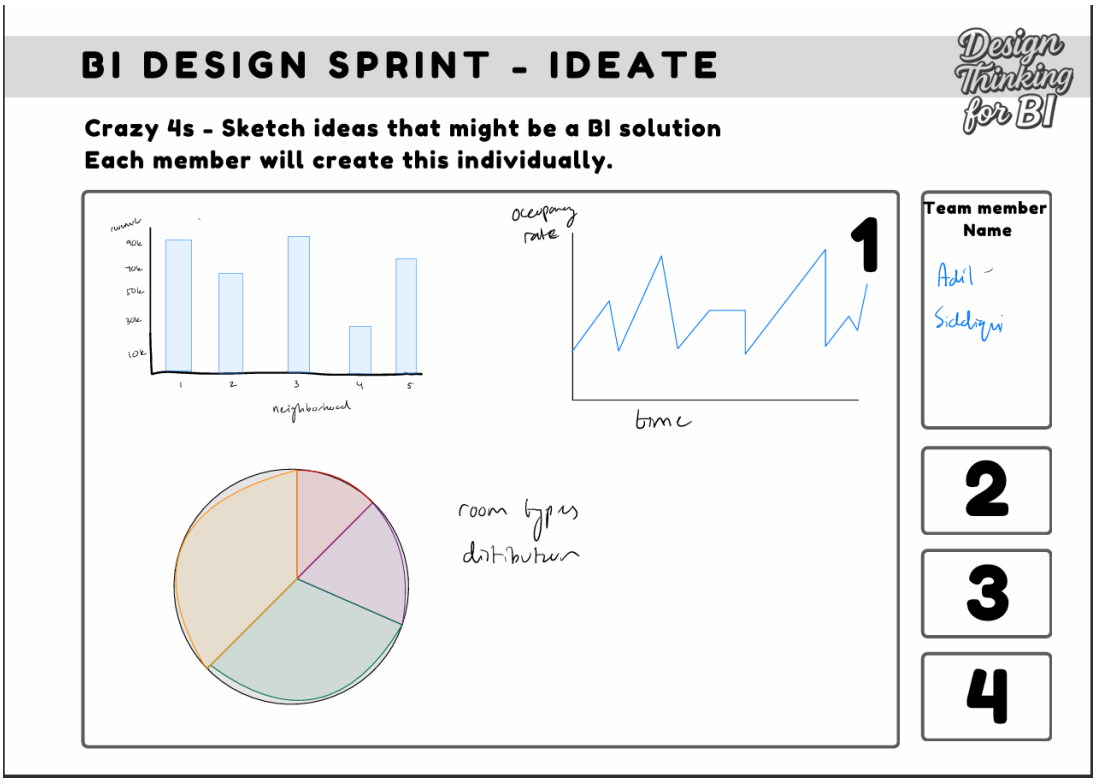
Key HMW Questions:

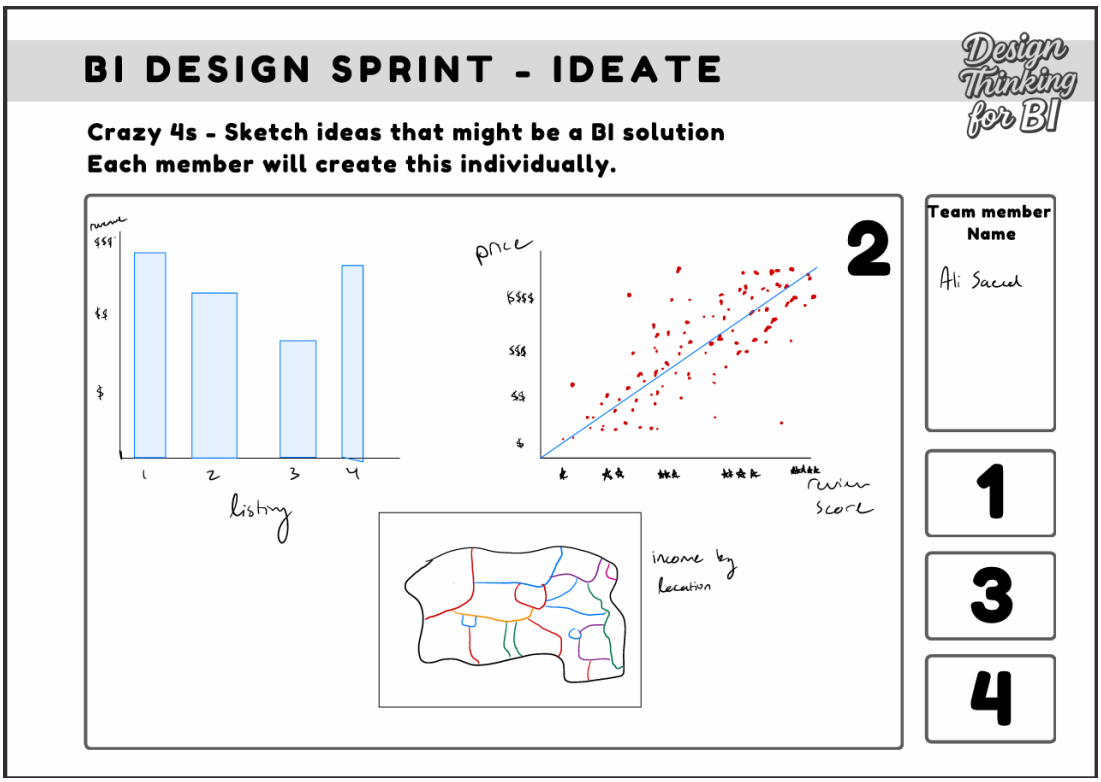
How might we identify underperforming listings?

How might we support hosts in understanding what affects reviews and occupancy?

How might we provide tools for optimizing listings based on real-time insights?

3. Ideate Phase





Key Data Points Identified:

Price per night

Number of bookings

Review ratings and guest feedback

Response and cancellation rates

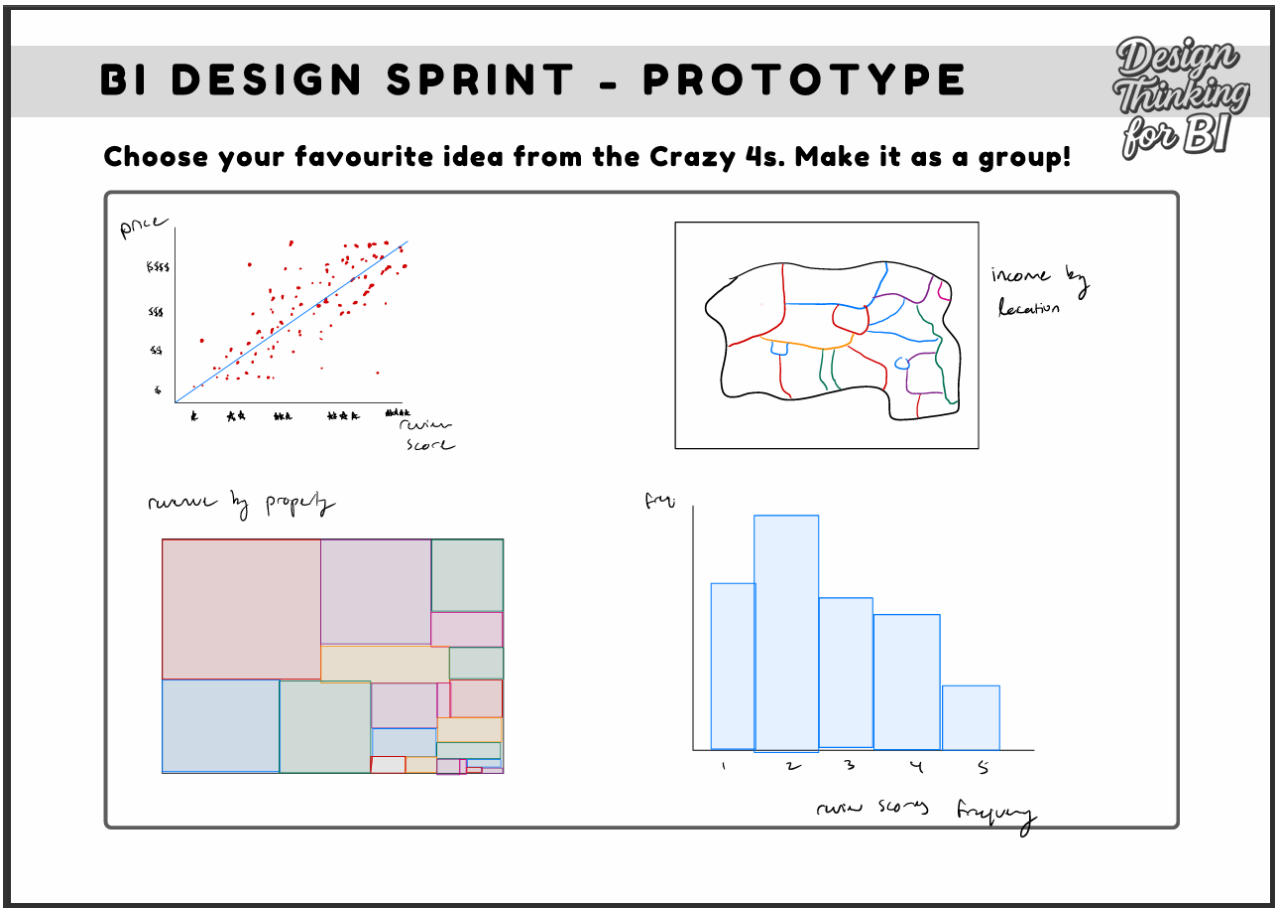
Days since the last booking

Superhost status

Occupancy trends

Revenue per listing and per neighborhood

4. Prototype Phase



Using the design sprint visuals from the PDF, a dashboard was built featuring:

Revenue & Occupancy Visualizations: Line graphs showing booking frequency and income trends

Scatter Plot: Shows correlation between ratings and price for visualizing outliers

Bar Charts by Neighborhood and Room Type: Compare performance across areas and types

Interactive Map: Identify high-revenue clusters

Filters: To segment data by property type, host, time, and location

Feedback & Suggestions:

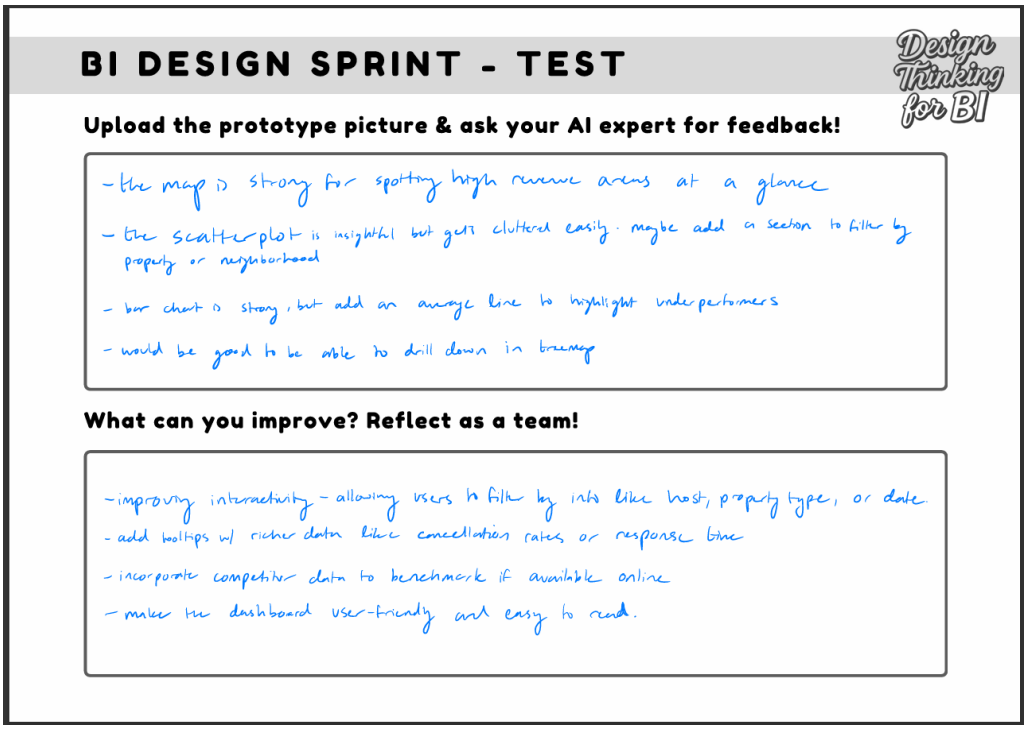
Add average performance indicators

Incorporate tooltips showing deeper listing metrics (e.g., response time, cancellation rate)

Integrate competitive benchmarking (if available)

Improve user interactivity and accessibility

5. Test Phase (Evaluation)



Users found the map tool effective in identifying high-revenue zones

Scatter plot was useful but cluttered suggested adding filters

Bar charts were praised for clarity; adding average lines was recommended

Requests for deeper drill-down capabilities and real-time responsiveness

Clear needs to prioritize communication metrics and market insights in dashboards

Conclusion:

By applying the Design Thinking framework, the team successfully pinpointed the core challenges faced by Airbnb property managers. The resulting prototype and dashboard provide a solid foundation for performance tracking, enhanced host support, and ultimately, increased user satisfaction. Integrating expert insights ensures the solution is grounded in real-world needs, making it both practical and impactful.