PittPatt

for **Pittsburgh International Airport**

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Executive Summary

As Pittsburgh sheds its Steel City title and embraces its new identity as a robotics hub, Pittsburgh International Airport (PIT) seeks to mirror the city's reputation. With its state-of-the-art 1.82 million-square-foot new terminal, PIT is being reimagined as the "airport of the future." The transformation is not just a response to the city's growth but also a remedy for the underutilization of its gates and terminals.

Once a major US Airways hub for connecting flights, PIT lost its status after the airline's merger with American Airlines in 2013. Today, PIT has become a preferred choice for low-cost carriers like Southwest Airlines and Allegiant Air, with a lower emphasis on servicing routes with layovers. Within the brief presented to the team, we identified accessibility, navigation, and information provision as the central themes.

Through our research, we uncovered that the demand for air travel has been on the rise since the pandemic, and PIT is open to integrating technology to address this demand. This is facilitated by Pittsburgh's thriving startup and technology presence, which provides a conducive environment for innovation and experimentation.

Some of our key insights include:
- Airports are VUCAA (Volatile, Uncertain, Complex, Ambiguous, and Apathetic) environments.
- Passengers feel like they are being processed as they navigate the airport.
- Airports are perceived as disruptors of the passenger journey rather than connectors of services, with passengers not being included in the information loop.
- Airports and airlines should assume shared responsibility for ensuring that passengers actually board their flights.
- Navigation at the airport is not optimized for situational constraints that passengers often encounter.

We arrived at a solution that lets passengers complete their desired tasks at the airport while feeling at ease and reassured. The PittPatt band delivers personalized notifications to passengers, filtering out the overwhelming noise of the airport and providing them with the three most essential flight-related updates: Boarding time, Boarding gate, Delays & cancellations.

PittPatt gives passengers a gentle 'Patt' when it is time to check flight-related updates.

PART 01

Overview

To simplify the jargon above; In this section, you will [1.1] Meet Mia, a passenger at PIT. Next, we will walk you through how [1.2] We studied passenger stories like Mia's to identify opportunities for innovation, and how [1.3] Diving into this opportunity space gave us our big idea. Finally, you'll get to see [1.4] Mia's airport journey with PittPatt unfold.

Meet Mia

Mia is a 32-year-old lawyer traveling with her kids, Josh (10 yrs) and Jessica (5 yrs). She is generally worried about air travel and always arrives at the airport very early to ease her anxiety. But, she becomes frustrated by the long, unproductive waits at the gate, which prevent her from doing what she wants to do

Mia arrives at Pittsburgh International Airport at 8:30 am on a bright Monday morning, as she usually does for her 11:05 am flight. As a seasoned traveler, she knew that arriving early does not ensure a smooth journey to the boarding gate.

Mia encounters long queues at the TSA security, causing her to wait for approximately 12 minutes with her restless daughter, Jessica. Once they reach the security checkpoint, Mia struggles to juggle her laptop and other electronics while keeping an eye on her children. As she is about to move on from the security trays, her phone vibrates. Worried that it might be a gate change notification, she checks her phone, which delays the security line, much to the annoyance of the passengers behind her. However, it turns out to only be a text message from her husband. Mia apologizes to the passengers and proceeds with the security check.

LONG QUEUES

Delay Line
INSPECT NOTIFICATION
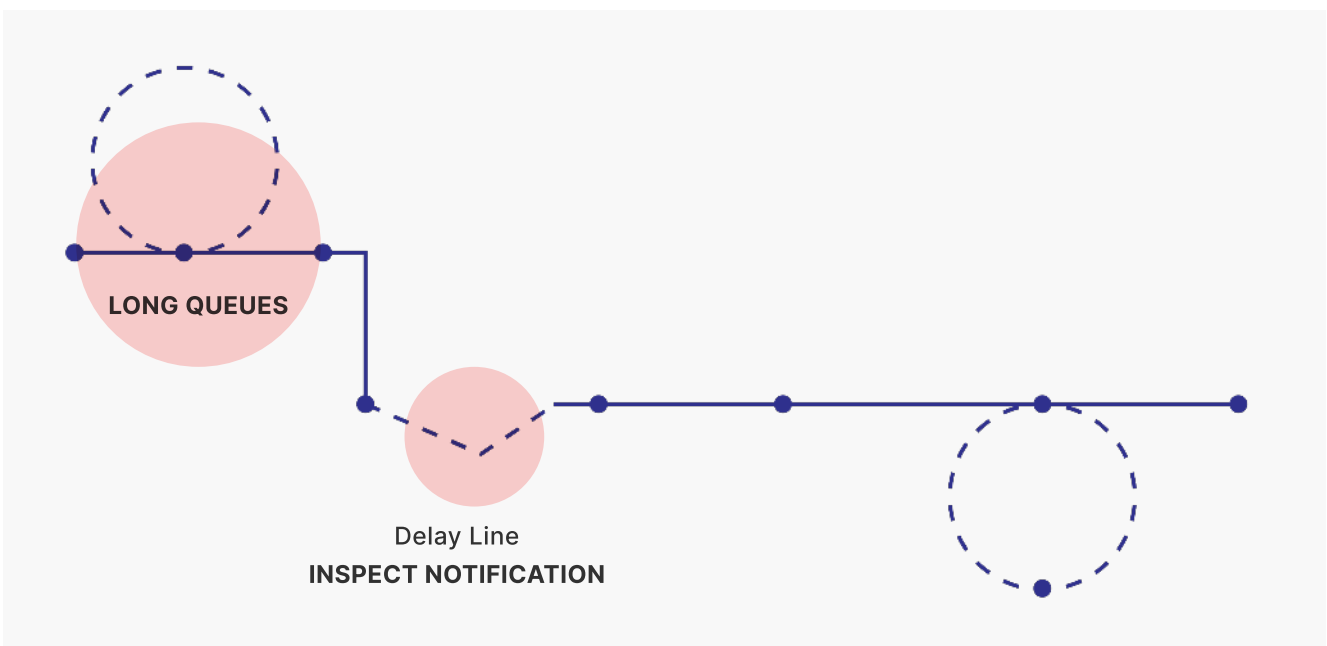
Mia's journey inside the Pittsburgh International Airport

After passing through TSA, Mia and her children arrive at Gate 47, where they sit next to the flight information screen to get a clear view of flight details. While waiting to board, Mia begins to work on a crucial presentation deck for her client. However, her children begin to feel hungry and ask her to get food. Mia checks her watch and realizes there are still 45 minutes until boarding time. But she doesn't know how far the food options and how long she will have to wait in line once she gets there.

Mia decides to take her children to Chick-Fil-A for a snack despite her worries about missing any flight updates while away from the gate. She continues to check her phone for updates while at the restaurant, and feels anxious about losing her seat next to the screen. They finally finish their meal and return to the boarding gate by 10:10. She sighs in relief as she sees an empty spot next to the information screens.

Mia tries to focus on her presentation but cannot help constantly glancing at the flight information screen for any updates on the boarding time or gate. After about 20 minutes, the boarding announcement is made, and Mia feels frustrated because she could not finish her presentation as planned due to all the distractions. She makes her way to her flight, feeling irritated and annoyed.

View detailed *User Journey Maps* in Exhibit 02 in the Appendix
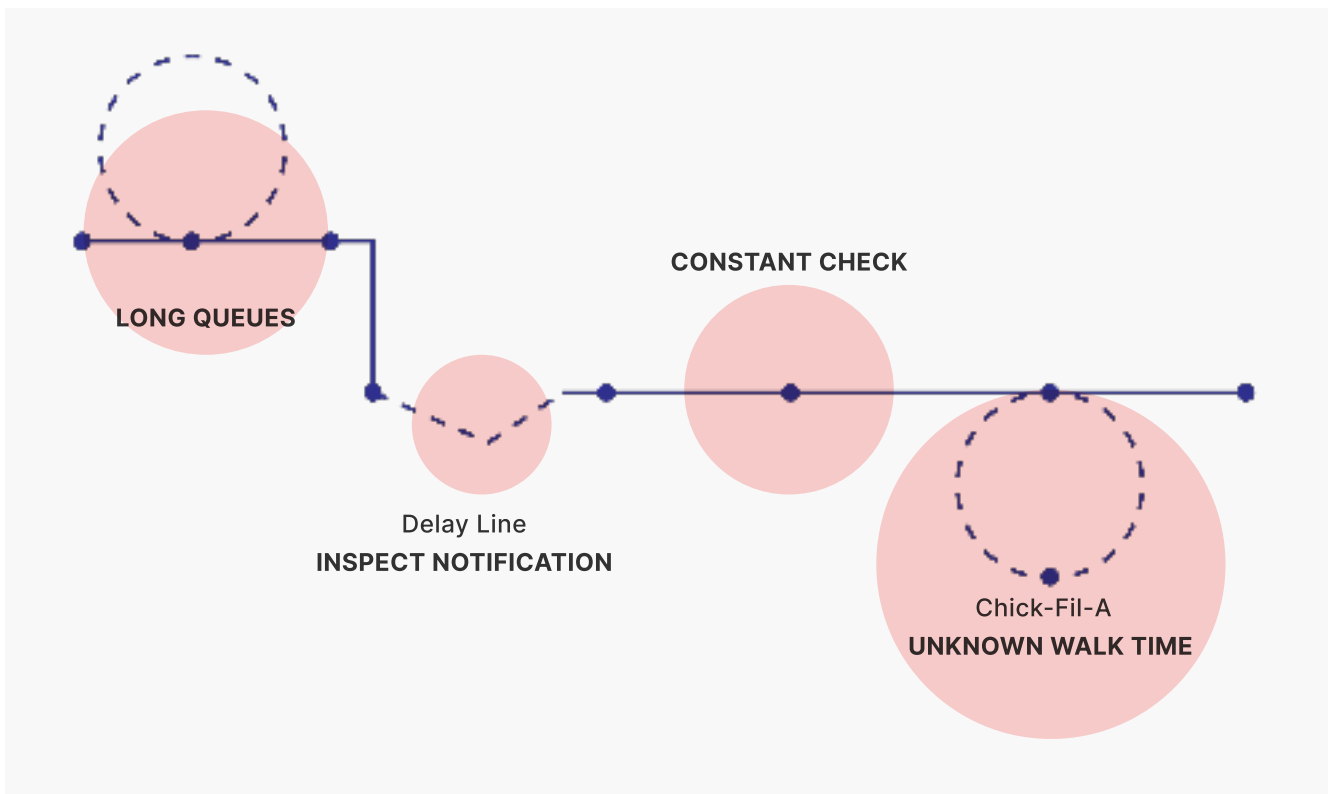
Mia's journey inside the Pittsburgh International Airport

We studied passenger stories like Mia's to identify opportunities for innovation

Our target audience at the Pittsburgh International Airport are **Millennial families** and **Gen X** who **tend to arrive early** and **have more time** to spend at the airport.

> How might we help **early bird passengers** like Mia **make the most of their time** at the airport?

When considering how to spend time at the airport, this group is driven by the need to minimize the worry of missing flights. This results in them staying close to the gate for a long time before boarding.

They expect the airport experience to be subpar and range from slightly stressful to very stressful. They would love to relax, eat, sleep, or stroll around the airport, but their fear of missing flight-related updates limits their options.

2	**5**	**100+**	**30+**
DIARY STUDIES	AIRPORT VISITS	SURVEY RESPONSES	INTERVIEWS CONDUCTED

View detailed *Opportunity Mapping* in Exhibit 03 in the Appendix

Diving into this opportunity space gave us our big idea

PittPatt — a **simple** and **reliable** reminder service that **isolates** notifications related to the passengers' flight and make them **reasily discernible**.

Without PittPatt, early bird passengers...

‣ Sit near gates to ensure they don't miss boarding announcements.
‣ Sit around screens to be updated about flight information.
‣ Check their phones every time it buzzes, anticipating a flight delay or gate change.

With PittPatt, early bird passengers...

‣ Spend time at the airport doing what they want.
‣ Stop repeatedly checking for flight updates.
‣ Know they will be updated when there is a change in critical flight-related information.

Mia's airport journey with PittPatt

Mia arrives at Pittsburgh International Airport at 8:30 am on a bright Monday morning, as she usually does for her 11:05 am flight. As a seasoned traveler, she knew that arriving early does not guarantee a smooth journey from the airport to the boarding gate.

During Mia's check-in for her Southwest flight, she discovers PittPatt on the kiosk. She decides to try the solution to reduce stress caused by the airport's overwhelming environment. Mia gets a PittPatt band instead of a boarding pass and downloads the app to receive personalized information.

(above) Passenger scanning their ticket QR code
(left) Receiving the PittPatt band

Mia then indicates on the app that she would like to arrive at the boarding gate 5 minutes before the boarding start time, and proceeds to security. Her phone starts buzzing with notifications just as she drops it into the security tray at TSA. However, she does not feel the need to check it immediately as she knows the notifications are not critical flight-related updates, and her PittPatt band will remind her of that.

The PittPatt band

Then, Mia proceeds to work at a Starbucks outlet on a vital presentation deck that she needs to send out before boarding. However, her children start to get hungry and asks for food. Mia checks the PittPatt app and sees that the closest food vendor, a Chick-Fil-A, has a wait time of only 3 minutes. They quickly grab a snack, and as her kids finish eating, Mia returns to work on the presentation with the assurance that her band will alert her when it's time to board.

Mia receives a buzz from the PittPatt band just in time for them to walk to the boarding gate, arriving exactly 5 minutes before boarding, just as she had set on the app.

pitt patt

9:41

Monday, June 6

9:41

pitt patt

Boarding in

10 mins

START WALKING NOW

Go to **Gate 25**

Walk time from your current location is **4 mins**

---

pitt patt

Your flight has been **delayed**

10:45 AM is your new boarding time

Walk time from your current location is 8 **mins**

---

pitt patt

Your **Boarding Gate** has been **changed**

28 is your new gate number

Walk time from your current location is 6 **mins**

(above) Notification on lock screen for boarding flight
(below left) Notification on lock screen for delayed flight
(below right) Notification on lock screen for change in boarding gate

To simplify the jargon above; In this section, we will explain how [2.1] Mia is just one of many passengers and that [2.2] We know all this about passengers because of the detailed user research we did. From that, [2.3] Some common themes emerged. We also thought about [2.4] The different entities that we would need to consider. The most important of the lot are the passengers. So, we doubled down on finding out [2.5] Why passengers would choose PittPatt. The biggest reason was getting only [2.6] Crucial, airport-exclusive Reminders with the PittPatt Band apart from the [2.7] Added value from the app & kiosk.

Mia is just one of many passengers

We identified four major passenger groups at Pittsburgh International Airport.

> After analyzing and understanding the differences between the following groups, we decided to focus on **early bird passengers.**

Gen X Leisure Travelers

- ‣ Value a stress-free airport experience
- ‣ Have higher purchasing power compared to younger travelers
- ‣ Comfortable with new technology and adapt well to smartphones

Business Travelers

- ‣ Prioritize a stress-free airport experience and highly value efficiency
- ‣ Want to be productive in everything
- ‣ Have limited time to spare
- ‣ Desire a personalized airport experience

Millennial Leisure Travelers

- ‣ Prioritize convenience and a seamless travel experience
- ‣ Rely heavily on tech for travel planning
- ‣ Millennial family travelers
  - ‣ Prefer to plan
  - ‣ Willing to pay extra for travel
- ‣ Millennial Solo Travelers
  - ‣ Value independence and adventure
  - ‣ Prefer budget-friendly options

Gen Z adventure seekers

- ‣ Typically students who look for unique experiences, willing to try new things
- ‣ Prioritize budget-friendly options
- ‣ Seek out free or low-cost activities.

Why Early Bird Passengers?

These passengers have higher purchasing power and more time to explore and consume at the airport, which aligns with Pittsburgh International Airport's business objectives.

Behaviors

‣ More likely to stay close to their gate and not explore the airport

‣ Anxious about missing their boarding time or important flight updates

‣ Organized and prepared, arriving well in advance of scheduled departure to avoid unforeseen situations

‣ Comfortable using technology to plan trips and stay socially connected

‣ More likely to utilize the airport's retail, food, and entertainment options

High Purchasing Power

EARLY BIRD
PASSENGERS

Low Time to Explore   High Time to Explore

Low Purchasing Power
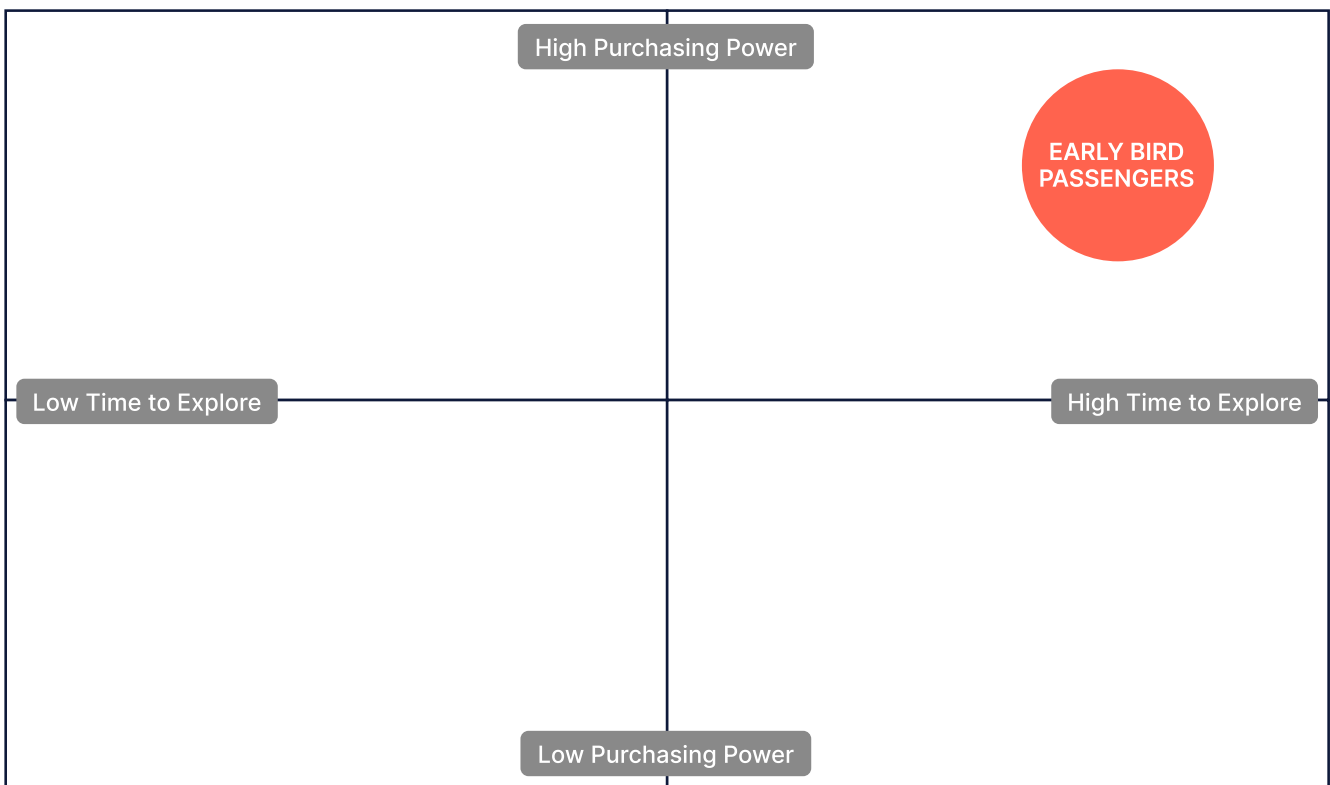
App screen - isolated elements

USER RESEARCH

We know all this about passengers because...
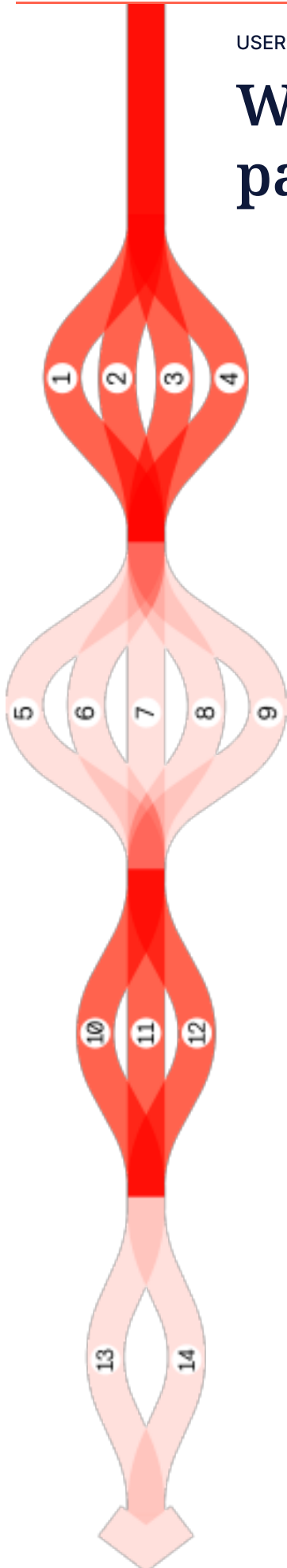
1	PESTLE
2	Stakeholder mapping
3	Service blueprint
4	Literature reviews

Secondary Research

‣ PESTLE* analysis of Pittsburgh International Airport and the general aviation industry
‣ Mapped these findings onto a stakeholder map to further understand stakeholder interests.

*Political, Economic, Social, Technology, Legal, Economic: Method for macro trend analysis. View detailed *PESTLE analysis* in Exhibit 04 in the Appendix

5	User journey map
6	Survey
7	User interviews
8	Codesign
9	Value Opportunity Analysis

Primary Research

‣ Two surveys & 30+ interviews with key stakeholders to gain insights into the airport environment and passenger preferences
‣ Divided into 3 phases: trend discovery, insights from airport staff, and passengers.

View *Task Analysis* in Exhibit 05 in the Appendix
View *Interview Qs* in Exhibit 06 in the Appendix
View *Survey Qs* in Exhibit 07 in the Appendix

10	SCAMPER
11	Crazy 8
12	Build-a-thon

Ideation

‣ Conducted brainstorming sessions via SCAMPER# and Crazy 8 to generate diverse ideas
‣ Drew inspiration from analogous sources for valuable insights
‣ Explored these ideas through a Build-A-Thon

#Substitute, Combine, Adapt, Modify, Put to another use, Expand and Reverse): Used to approach a problem from different perspectives.

13	Codesign
14	Prototyping

Testing and Prototyping

‣ Conducted co-design sessions to validate ideas
‣ Participant feedback refined the final solution
‣ Conducted additional co-design sessions with airport passengers to contextually assess the usability and effectiveness of our solution

Secondary Research

A macro-trend analysis was performed on Pittsburgh International Airport and the general aviation industry, revealing significant trends and challenges that affect the airport's operations and overall performance. To gain a deeper understanding of stakeholder interests, we utilized these findings to create a stakeholder map. This mapping exercise shed light on the intricate nature of the ecosystem and provided valuable insights into the interconnectedness of various factors.
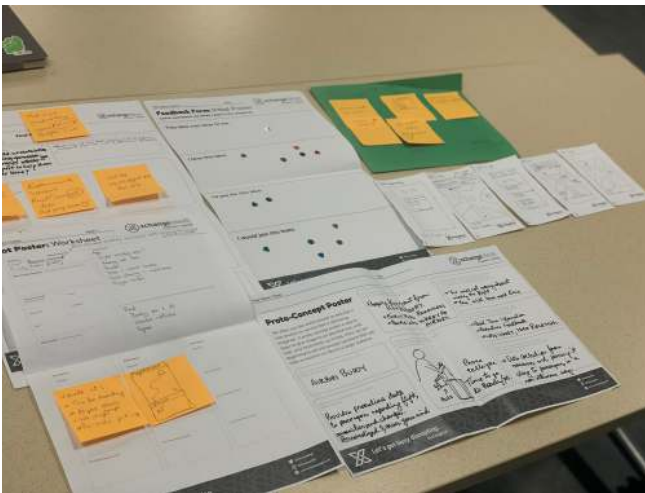
Concept and idea validation through co-design and feedback sessions

Primary Research

We conducted surveys to gain insights into pain points and issues and recruit participants for phase one passenger interviews. These interviews provided valuable insights into various aspects, such as flying habits, emotions during the airport journey, and experiences with airport amenities. Phase two interviews focused on airport stakeholders, revealing three main themes: a lack of clear information, many gate huggers at Pittsburgh, and an increased inclination to use amenities after TSA. Additionally, a diary study helped us understand the detailed emotions and thought processes occurring at different stages of travel, including the line of sight, the bandwagon effect, and the overwhelming amount of information.

Ideation

In our pursuit of a final solution, we participated in multiple brainstorming sessions such as SCAMPER and Crazy 8. These sessions were designed to encourage generation of innovative ideas from different viewpoints while considering our key insights and target audience. Furthermore, we drew inspiration from analogous sources to gain valuable perspectives. The ideas from these processes underwent extensive exploration and expansion during the Build-A-Thon, developing a comprehensive and resilient solution. Throughout this phase, we identified the solution's essential, desirable, and optional features to ensure its effectiveness.

Testing

To validate our ideas, we initiated co-design sessions in which we simulated airport scenarios and collected participant feedback regarding their experiences with and without the proposed solution. This iterative process allowed us to refine the solution based on their reactions and insights. Subsequently, we tested in-context to strengthen PittPatt's value proposition for passengers.

Some common themes emerged

Information Overload

Airports are complex entities that receive large amounts of information from various sources, which can often cause passengers to feel overwhelmed and lead to confusion. To address this challenge, flexibility is essential for airports to adapt to the constantly changing needs of passengers and the travel industry.

Information Deficiency

Critical information is missing at key points in passengers' journeys despite the abundance of data. To enhance their experience, passengers need prompt and detailed information regarding airport features, amenities, and services.

Early Birds with Significant Time

With an average age of 40, Pittsburgh residents usually arrive at the airport earlier than necessary to accommodate for unexpected circumstances. Thus, they often spend a considerable amount of free time waiting at the gate.

Lack of Shared Responsibility

With passengers feeling solely responsible for their journey at the airport, they often experience a general lack of control in the airport environment. This can lead them to feel disengaged and with limited control over their experience.

Adoption of Technology

The startup, technology, and robotics presence in Pittsburgh plays a vital role in promoting the adoption of innovative technologies, such as smart systems, which can improve operational efficiency and enhance passenger experience at the airport.

Check-in + Baggage drop	Security/ TSA	Waiting for flight	Boarding
🧳	🛡️	⏳	🪜 ✈️
Bored **Agitated** **Over-simulated**	**Flustered** **Stressed**	**Tedious** **Annoyed** **Tired** **Hyper-alert**	**Excited** **Stressed**
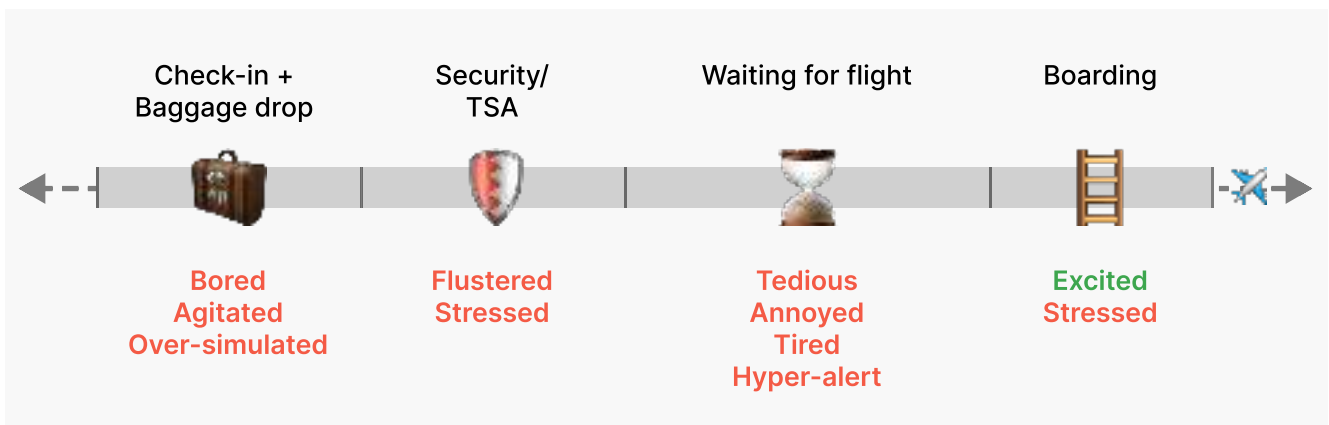
The different entities that we would need to consider

Airports are complex entities that encompass numerous stakeholders, each with a distinct interest and concern. Among the key stakeholders, everyone belongs to one of these subsets — airport, airlines, passengers, government agencies, or local communities. To ensure that any integration or change does not negatively impact or have any ripple effect, it is crucial to carefully evaluate and consider the potential impact on each individual or subset of stakeholders.

> The three key entities for our solution are:
> the **passengers**, the **Allegheny County Airport Authority (ACAA)**, and the **Airlines**.
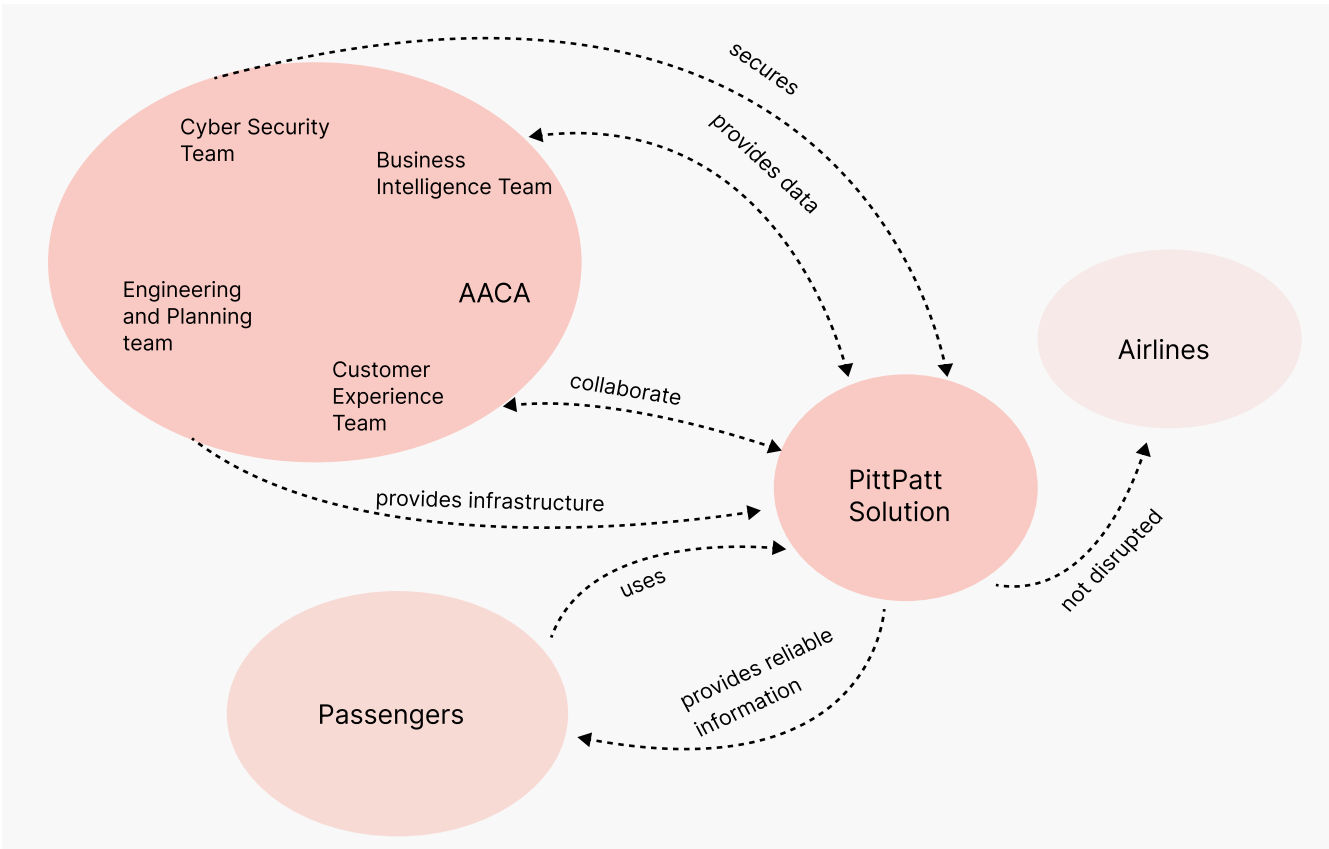
Stakeholder map

View a detailed *Stakeholder Map* in Exhibit 10 in the Appendix

Allegheny County Airport Authority (ACAA)

The ACAA has two main priorities:
- Improve passenger experience
- Increase revenue through aeronautical and non-aeronautical sources

The **Business Operations team** is responsible for collecting and generating intelligence reports about the airport premises, such as wait times, amenity listings, and flight statuses.

> By leveraging this data, we can provide valuable insights critical to efficient airport navigation.

The **Customer Experience team** is responsible for ensuring a positive customer experience.

> Our solution should seamlessly integrate and expand upon the existing functionalities provided by the team.

The **Cyber Security Team** protects the airport's information technology systems from cyber attacks.

> Their expertise and assistance are invaluable in ensuring that our system's implementation and design prioritize data security and integrity.

The **Engineering and Planning Team** is vital in planning and implementing new solutions.

> Important to collaborate with to deploy the switches and gateways required across the airport.

Airlines

The airlines have two main priorities:
- Safety is crucial, particularly in aviation, where the risks associated with working around aircraft are high
- Having the right number of personnel in place is essential for ensuring timely and efficient operations

The solution should in no way disrupt any of the airlines' operations. Instead, it should enhance their existing functionalities.

Passengers

Passengers have two main priorities:
- To board their flight with ease while accessing only the most vital information
- Have a comfortable and hassle-free experience at the airport

This may include offering access to relevant and useful information and providing comfortable amenities and facilities for passengers to enjoy while waiting for their flights.

By prioritizing the needs of passengers, airports can enhance the overall travel experience and ensure customer satisfaction.

Why passengers would choose PittPatt

PittPatt is a **simple** and **reliable** reminder service that **isolates** notifications related to the passengers' flight and make them **easily discernible**.

‣ **Make most of the time while feeling assured**

With the PittPatt band, early bird passengers at the airport can fulfill multiple objectives without worrying about missing flight updates. Our research shows that early birds experience stress and worry about airport updates and missing their flight. With PittPatt, they can explore the airport, rest, or enjoy a book while staying informed about vital information.

‣ **Proactive flight update information**

Our research shows that early birds often sit near the gates to stay updated on their flights despite airline apps. However, PittPatt ensures that passengers receive essential notifications from the airport or airline. This eliminates their concerns about missing important updates about gate changes, flight updates, and boarding times.

‣ **Receive only relevant and personalized airport updates**

Passengers are bombarded with overwhelming amounts of information from multiple sources. Finding relevant information amidst this flood of data becomes challenging, leading to constant phone-checking, seeking assistance, and screen monitoring. PittPatt solves this problem by filtering out unnecessary information and delivering only personalized, flight-related updates and reminders based on passenger location through haptic feedback.
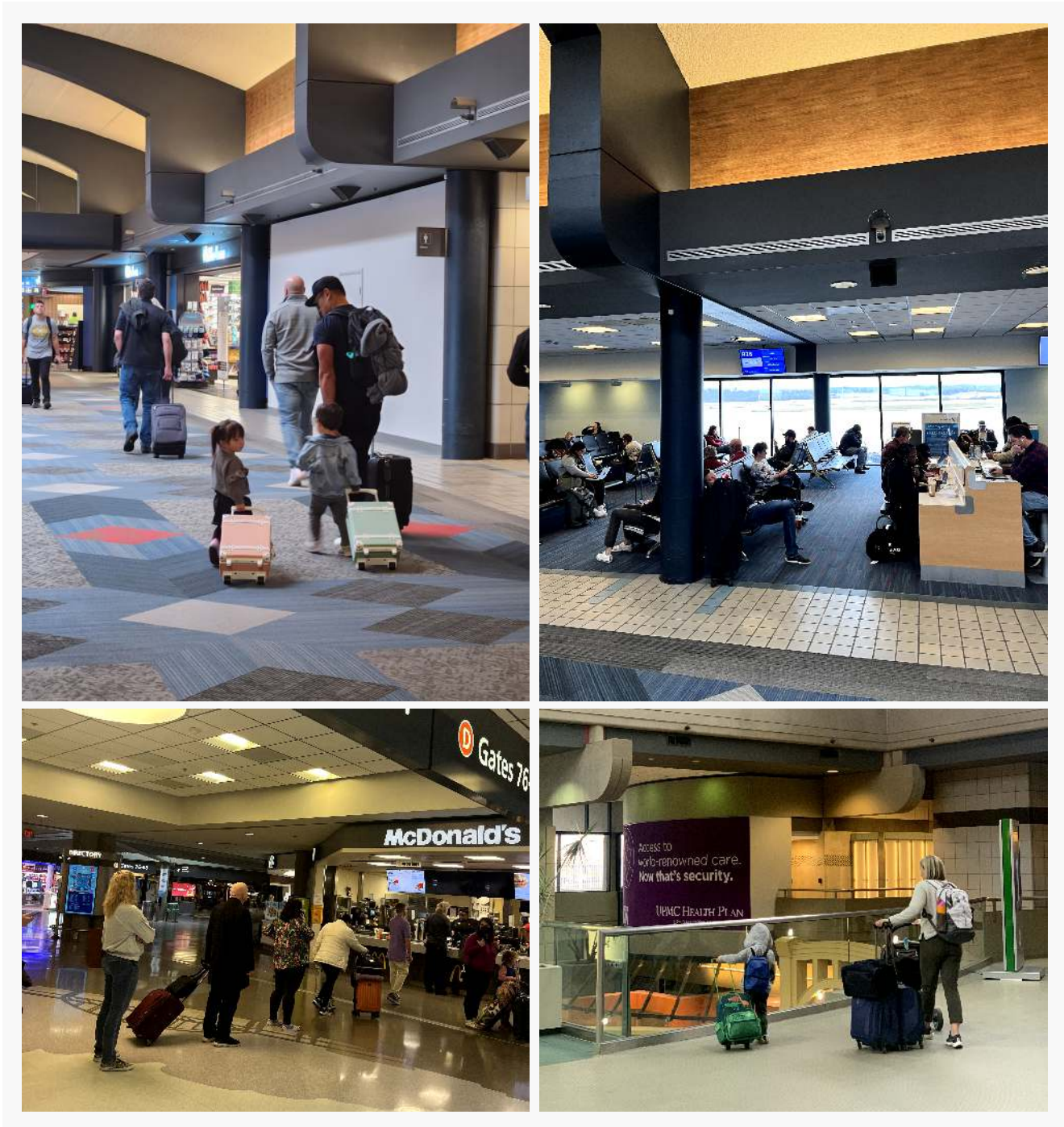
Passengers at the Pittsburgh International Airport displaying pain points identified in the primary research phase

Crucial, airport-exclusive Reminders with the PittPatt Band

> "I'm going to finish my burger and wait for PittPatt to buzz me."
>
> — 26 years, Male passenger during a usability testing session conducted with an early-stage PittPatt band prototype.

The PittPatt Band synchronizes with the most up-to-date flight information and draws your attention to three crucial, airport-exclusive updates.

‣ **Boarding time:** The band buzzes when it is time for the passenger to walk to the gate. This notification is personalized based on the passenger's current location.

‣ **Change in flight time:** The band buzzes when there is a flight delay, prompting the passenger to check for more information on the kiosk or web app.

‣ **Change in boarding gate:** The band buzzes when there is a boarding gate change, alerting the passenger to check the kiosk or web app for further details.

The PittPatt Band

‣ It is made from reinforced paper and is 70% recyclable.
‣ It can be paired with the PittPatt App and/or the PittPatt Information Kiosk.
‣ It fits seamlessly into the current airport ecosystem and can be integrated with existing information screens or airline apps.

Added value from the app & kiosk

9:41

Anything else we might need to know?

We will tailor our recommendations to your exact needs

Child	**Disabilities**
Extra Luggage	**Long Layover**

GET STARTED
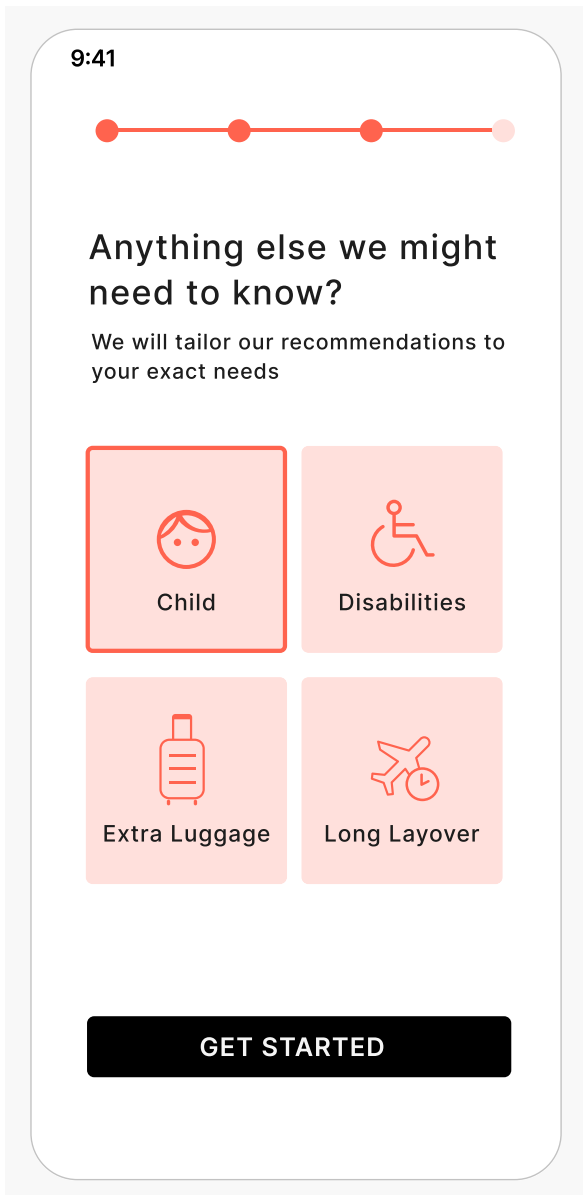
> "...such a long line at this coffee shop, is there another one nearby with a shorter line and wait time?"
>
> — 32 years, Female passenger during a user research shadowing session conducted at the Pittsburgh International Airport.

(left) PittPatt app screen for passengers to set preference

The PittPatt App provides added value with airport-specific information:

‣ **Hyper personalized recommendations**
  ‣ **Preferred Gate Arrival Time**
  Using the app, passengers can set their preferred arrival time at the gate, and the band will buzz accordingly based on this preference.
  ‣ **Proactive and personalized amenity lists**
  The app uses user preference and location to filter and display amenity lists proactively, presenting options that are open, closest, and have the shortest wait time based on boarding time.

‣ **Airport Map**

The app displays an updated airport map that includes all available amenities, along with wait time information and navigation instructions that is specific to the Pittsburgh International Airport. We do this using data collected from LIDAR sensors at the airport.
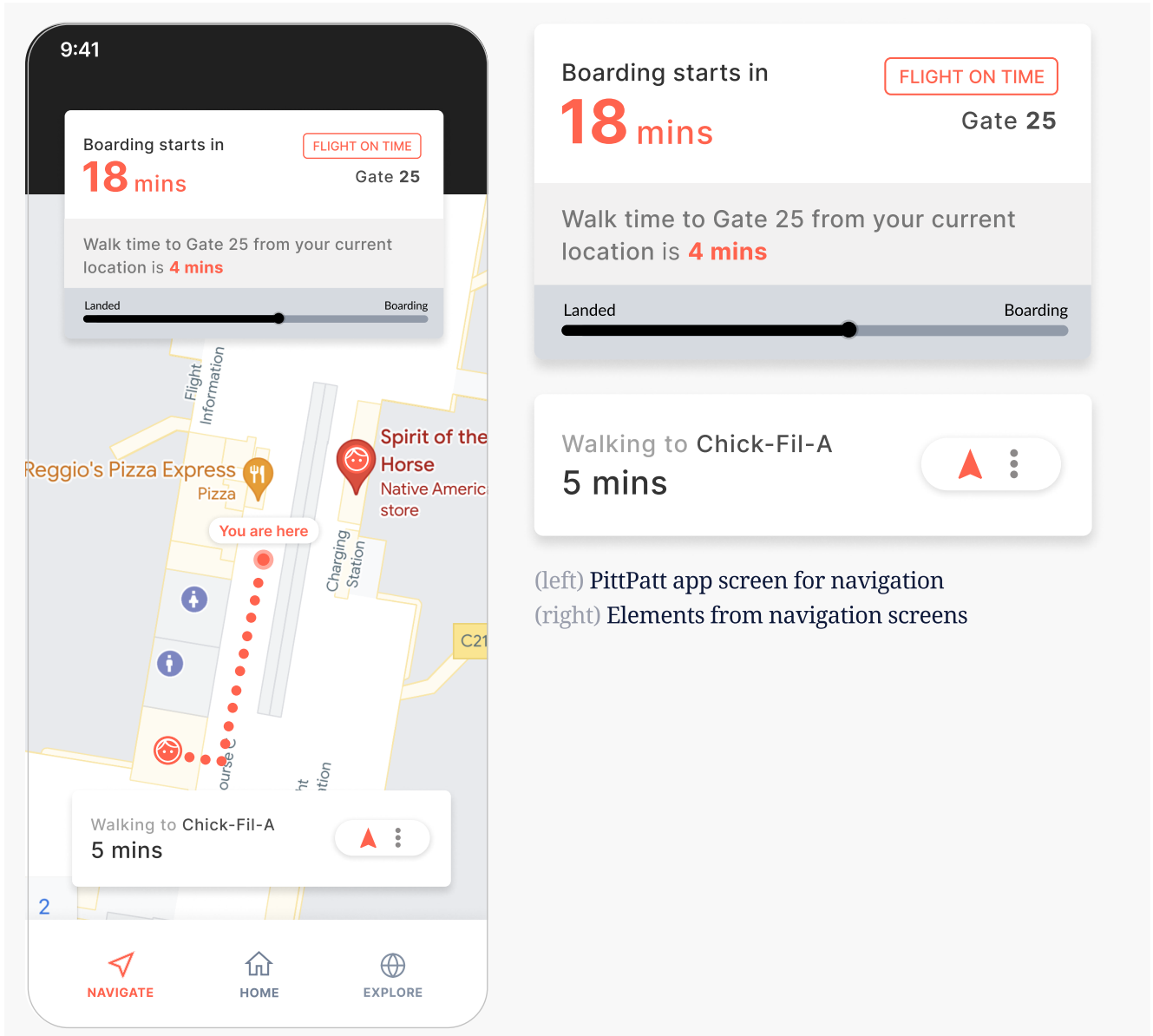
(left) PittPatt app screen for navigation
(right) Elements from navigation screens

The PittPatt Kiosk

‣ Users who do not want to download the app can tap their PittPatt band at Information Kiosks throughout the airport to view personalized notifications.

‣ Tapping the PittPatt band at the kiosk grants users access to personalized flight information as well as an airport map with amenities and their respective wait times.
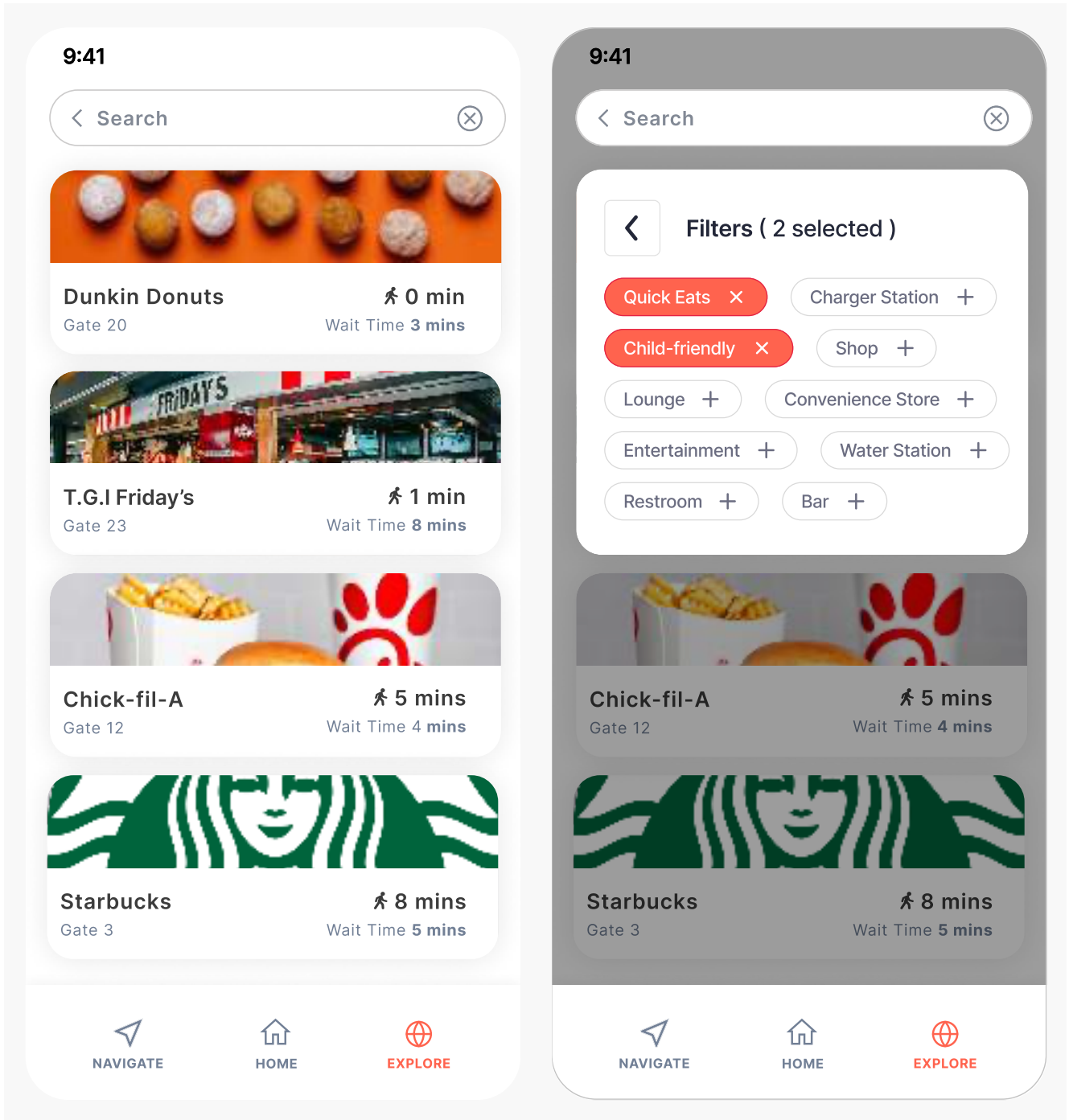
(left) PittPatt app screen for exploring available amenities
(right) Search and filter functionality

Feasibility

To simplify the jargon above; In this section, we first look at what goes into [3.1] Building the PittPatt ecosystem. After we understand the solution at the granular level, we go on to learn about [3.2] How components function and interact, with focus on data that is required to make it work. Finally, we outline [3.3] Things to keep in mind before we roll-out PittPatt to passengers.

Building the PittPatt ecosystem

Interface	Component	Description
Band	IoT Pixel	Sends and receives data and drives the vibrating actuator
	Paper band	Physical attachment of the band
	Vibrating actuator	Produce the mechanical vibration
Band Infrastructure	Bridges	Generate radio frequency signals to power up the IoT pixel and serve as the primary means of information exchange with the device
	Gateway	Higher-level device that transfers data from the bridges to the server
	Server	Serves as the foundation for exchanging information and making decisions after receiving data from all stakeholders
Kiosk Infrastructure	Touchscreen display	An interactive screen that provides visual information, instructions, or options to the user allowing them to select options or input data
	Computer hardware	Process the input given by the user and perform the computation
	Printer	Print the boarding information on the band
	Band reader	Read information from the band

How components function & interact
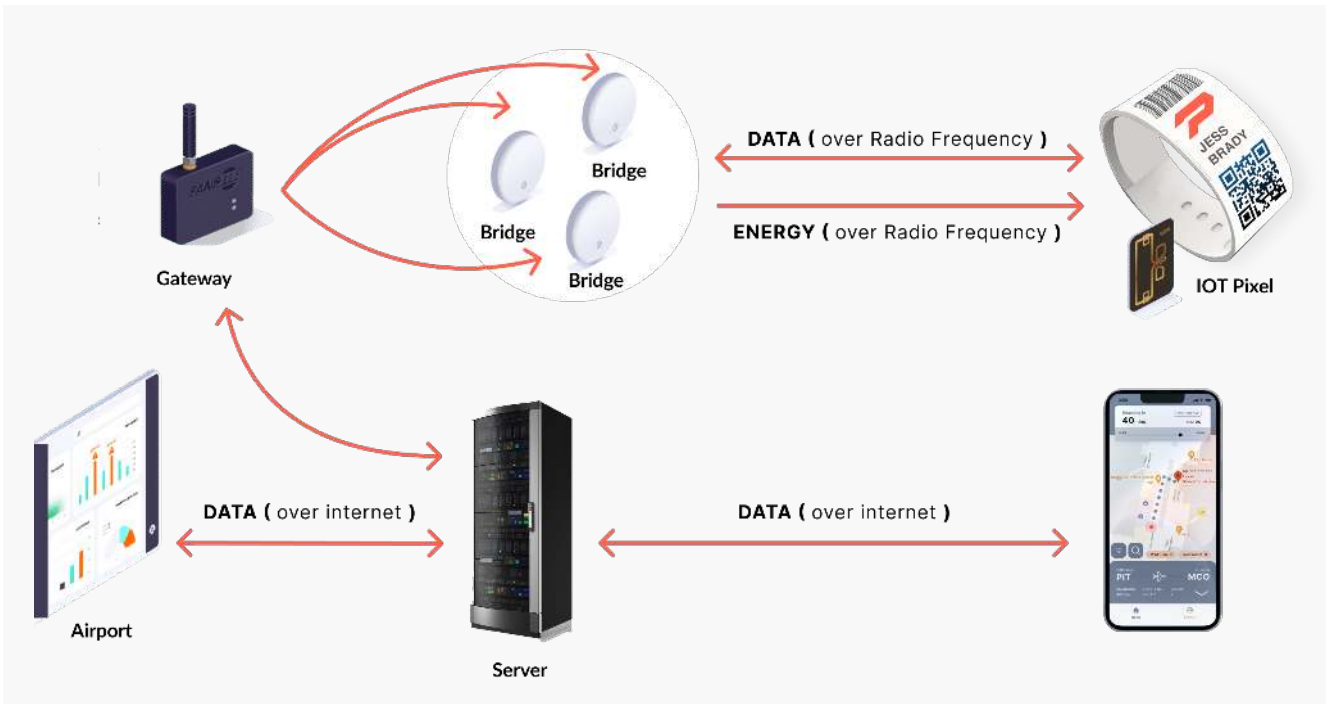
Technology ecosystem and interaction for PittPatt

How does the PittPatt Band work?

The band is powered by an IoT pixel that interfaces with a vibrating actuator to generate haptic feedback based on the signal the IoT pixel receives.

How does the PittPatt Band communicate?

The band communicates with the server through bridges using radio frequencies, and data is sent to the server through a gateway. When there's an update or change in information, the data travels from the server to the IoT pixel in the same path.

How does the PittPatt band power up?

The IoT pixel primarily harvests energy from the radio frequency generated by the bridges, and it can also augment itself with a tiny printed battery on the pixel.

How does the PittPatt App connect to the band?

The PittPatt app connects to the server, communicating with the IoT pixel through bridges using radio frequencies for updates and changes.

The essential requirement for PittPatt was to ensure that passengers receive haptic feedback, but many technologies that could achieve this did not meet our criteria due to high costs and the physical limitations of the band. We aimed to not burden the user with overly complicated features.

After exploring various options, we discovered IoT Pixel – a tiny, intelligent microchip capable of transmitting and receiving signals. The chip can harvest radio waves to power itself, eliminating the need for batteries.

IoT Pixel chip

By integrating this technology, our wristband can have a simple paper-like structure with a vibrating actuator attached, as opposed to a complex and intricate device.

Data Required

Stakeholder	Data	Why we need the data
Passenger	PRN number	To retrieve flight details, including boarding gate and boarding time.
	Location	To provide passengers with real-time updates on their walking time to the gate based on their current location.
Airport	Wait time	To acquire information on the queue/wait time at different eateries.
	Maps and navigation details	To provide directions to amenities and stores.
Airlines	Flight status	To retrieve flight-related information, such as flight status (on time, delayed, or cancelled).
	Boarding gate	To inform passengers of their walking time to the gate and any changes to their boarding gate.

Read about *Technical Constraints & Possible Failures* in Exhibit 01 in the Appendix

Things to keep in mind before we roll-out PittPatt

To implement PittPatt, all three components of the ecosystem, which consist of the band, app, and kiosks, to operate harmoniously. However, it may not be feasible to construct all three components at full scale during the initial phase, as specific tasks must be completed first.

‣ App, Band, and Kiosk Implementation

A different supplier provides each component of the three interfaces. For instance, Wiliot produces the IoT Pixel, while companies such as IDC Bands manufacture the paper band. However, a challenge arises because we cannot purchase a pre-made band with all the necessary components embedded. Instead, we may need to depend on a third-party vendor who will gather all the components needed to construct the band, manufacture it, and deliver it to the airport.

‣ Launch it for a limited set of people

To identify any potential bottlenecks in the solutions after implementation and to gradually scale them, we plan to introduce the solution to a limited number of passengers at the airport. This approach will also allow us to identify additional opportunities for improvement that could further enhance the overall passenger experience.

Visibility

4.1 Reaching the first 100 customers

    4.1.1 Hook (Video advertisements)

    4.1.2 Hype (Weekly Raffle)

    4.1.3 Highlight (Vendor discounts)

To simplify the jargon above; In this section, we will first let you in on how we plan on [4.1] Reaching the first 100 customers for PittPatt. We do that with a three-step marketing plan. First, we [4.1.1] Hook passengers at PIT with short-form videos to grab their attention and introduce the existence of Pittpatt to them. Then, we create [4.1.2] Hype around PittPatt to increase adoption. Finally, we [4.1.2] Highlight the ability of passengers to make the most of their time at the airport by giving discounts for airport purchases.

Reaching the first 100 customers

We identified reaching the first 100 customers as a critical milestone for PittPatt. The feedback from early adopters willing to try a new service will be invaluable in refining the service, identifying issues, and ensuring that it meets passenger needs.We have devised a three-part campaign to provide proof of concept, early revenue, word-of-mouth marketing, and build confidence in the team and investors.

01 Hook - Video Advertisements

We will air short videos on airport premises that convey the value imparted by PittPatt using popular travel destinations from the airport. For ex., for travelers to New York, we use a message that PittPatt allows them to choose what they do with their time at the airport — PittPatt at PIT lets you sleep before you arrive at the city that never sleeps.

Intended Passenger Behavior

‣ Travel destinations as context to intrigue passengers and generate curiosity about PittPatt.

Watch the full advertisement here

A still from one of the hook video "PittPatt for the City that Never Sleeps"

Part 02 - Hype (Weekly Raffle)

We will offer PittPatt band users the option to enter a bi-weekly raffle to win concession items from airport retailers. This promotion will only take place during the first three months after pilot launch.

Intended Passenger Behavior

‣ Incentivize passengers to adopt the band and expand our user base.
‣ Create a high-value anchor that may influence customers' perception of PittPatt's value.

Part 03 - Highlight (Vendor discounts)

Offering discounts for services at the airport to early adopters of PittPatt will make them more likely to try the paid service if they know they can enjoy discounted meals, shopping, or other services provided by airport vendors.

Intended Passenger Behavior

‣ Passengers may be more willing to experiment with PittPatt if they perceive it as a low-risk opportunity due to the associated discounts.
‣ Principle of loss aversion to motivate passengers with the fear of losing an opportunity to avail of a discount.

This campaign will be supplemented with consistent advertising efforts across various channels such as email, YouTube, physical in-airport banners and dioramas, and intercept marketing. These channels will help us target audiences based on demographics, interests, and behaviors at different moments in their airport journey.

Viability

To simplify the jargon above; In this section, we start with explaining [5.1] Why we need to pilot PittPatt. We do this with Southwest. You're probably wondering "[5.2] What makes Southwest the ideal first partner?" To answer that, [5.3] We have numbers that help the Southwest case. The next natural question is [5.4] How much will this all cost? Next we uncover [5.5] What people will pay to use PittPatt. And yes, we do address [5.5] How we will recover this money [5.6] And when we will finally start turning a profit.

PILOT PHASE

Why we need to pilot PittPatt

‣ **Running iterations before complete product launch**

A pilot phase allows for testing and refining of the product or service before it is launched on a larger scale. This can help identify and fix any issues or shortcomings that may have been overlooked during the development process, ensuring that the final product is high quality and meets the target audience's needs.

‣ **Reducing risk of failure before an investment is made**

Launching a product or service on a large scale without proper testing can be risky financially and in terms of reputation. A pilot phase allows for a more controlled rollout, minimizing the risk of major failures or setbacks that could impact overall success.

‣ **Gathering feedback from concerned stakeholders**

A pilot phase provides an opportunity to gather valuable feedback from early adopters and other stakeholders. This feedback can be used to make further improvements to the product or service before it is launched on a larger scale, helping to ensure that it meets the needs and expectations of the target audience.

What makes Southwest the ideal first partner?

‣ **Age demographics**

Majority of Southwest Airline passengers are Millennials or Gen-X*, which aligns with our target user base.

Amongst all Southwest passengers

27%	24%	18%	31%

▮ 18 - 29 yrs   ▮ 30 - 39 yrs   ▮ 40 - 49 yrs   ▮ 50 - 64 yrs

‣ **Income levels**

Just like airline customers in general, Southwest Airlines passengers are relatively likely to have a high income*, which aligns with our target user base.

Amongst all Southwest passengers

54%	30%	16%

▮ High income   ▮ Middle income   ▮ Low income

pitt
patt 𝙋
Southwest ♥

‣ **Consumer lifestyle**

Food and dining* are relatively prevalent interests of Southwest Airlines customers.

‣ **Internet usage by device**

Southwest Airlines customers access the internet via a laptop more often than the average airline customer*.

We have numbers that help the Southwest case

The PittPatt ecosystem is available to all passengers at the Pittsburgh International Airport. Within PIT, we identified Southwest passengers as the primary market we can realistically capture and will benefit the most from our solution.

Our research indicates that innovation adopters within Southwest's passenger base are most likely to adopt our solution due to their openness to new technology and desire for a stress-free experience.

TAM
600k

SAM
150k

SOM
45k

Total footfall at the Pittsburgh International Airport

Southwest passengers at PIT (25% of total number)
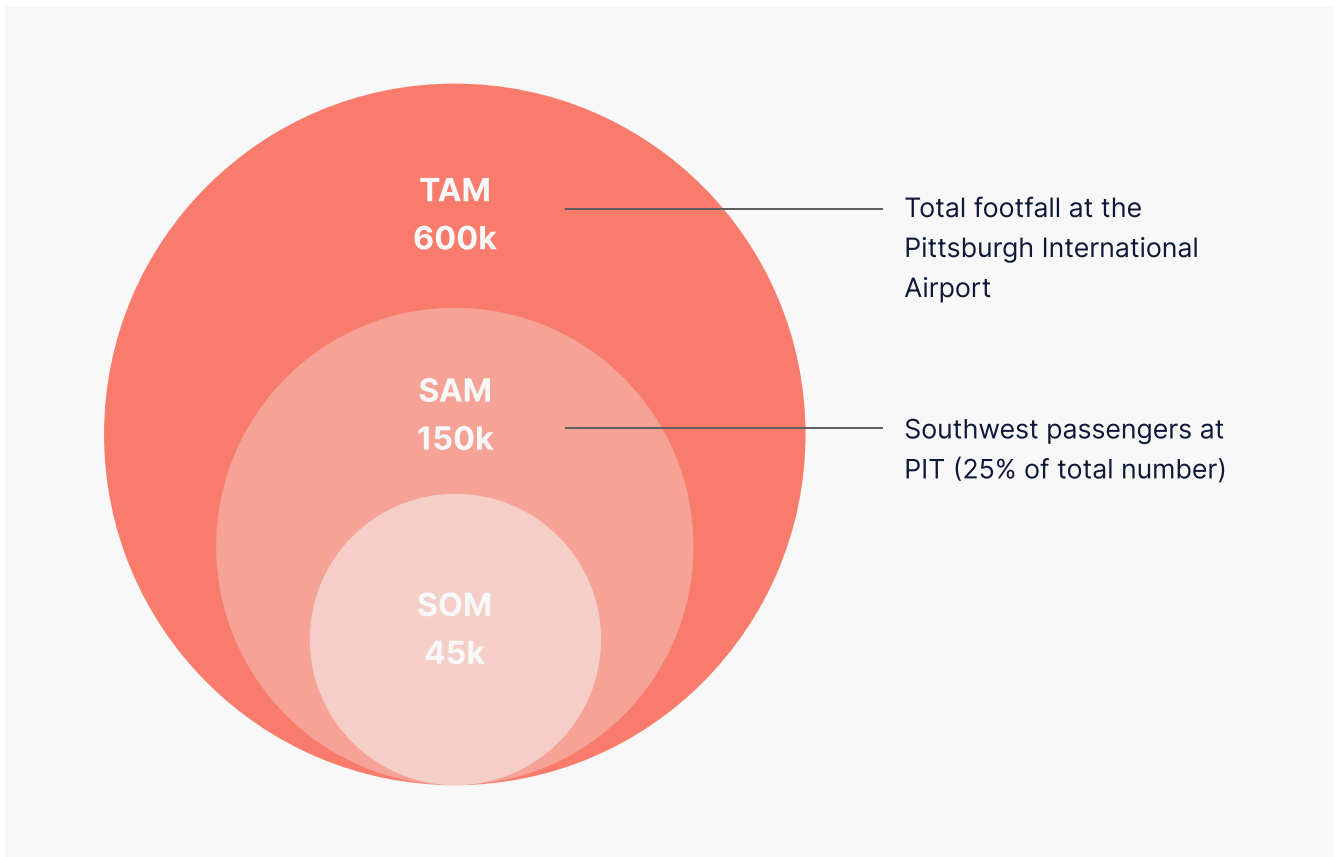
Market sizing for PittPatt

How much will this all cost?

Year 1 ($857,000 – 1,076,000)

The bulk of the cost in the first year is associated with developing and setting up the infrastructure for the app, bands, and kiosks.

Employees ($541,000 – $602,000)
Based on salaries of 12 employees
‣ Project leader
‣ Designers and developer
‣ Support and maintenance staff
‣ Salespeople

Advertisement ($189,000 – $290,000)
‣ YouTube ads & email marketing
‣ Discount coupons & raffles
‣ In-airport physical ads

Bands ($11,000 – $27,000)
‣ Quarter 3: 9,000 – 18,000 bands
‣ Quarter 4: 14,000 – 27,000 bands

Infrastructure ($117,000 – $159,000)
‣ 10 dispensing kiosks
‣ 8 information kiosks
‣ Hardware and software components
‣ 200 bridges and 30 gateways
‣ 25 recycling bins

Year 2 ($910,000 – 1,184,000)

During the second year, the expansion to the entire PIT would result in increased bands and kiosks.

* Below are costs new to Year 2.

Bands ($29,000 – $150,000)
‣ 72,000 – 288,000 bands
(1 – 4% of PIT passengers)

Infrastructure ($73,000 – $103,000)
‣ 8 dispensing kiosks
‣ 8 information kiosks
‣ 25 recycling bins

Year 2 ($728,000 – 984,000)

As the adoption of the PittPatt band increases among passengers in the third year, there will be a corresponding rise in the band production cost.

* Below are costs new to Year 3.

Bands ($33,000 – $188,000)
‣ 144,000 – 576,000 bands
(2 – 8% of PIT passengers)

View a detailed *Cost Structure* in Exhibit 11 in the Appendix

What people will pay to use PittPatt

The PittPatt band has been priced using a **value-based pricing strategy**. We considered the perceived value it offers to passengers and how much they are willing to pay for it, rather than only the production cost or market competition.

‣ **Reference price**
$0, since indirect competing solutions such as airline apps and information screens at airports are available free of charge.

‣ **First-time use value to passenger**
    ‣ **Novelty ($0.80)*:** Price that a passenger is willing to pay to try an innovative service.
    ‣ **Simplified airport experience ($1.20)*:** Price that a passenger is willing to pay for a solution that reduces air-travel anxiety and lowers risk of missing their flight.

$ **1.99** / **PittPatt band**

Reference price	Novelty	Simplified airport experience
$0	$0.80	$1.20
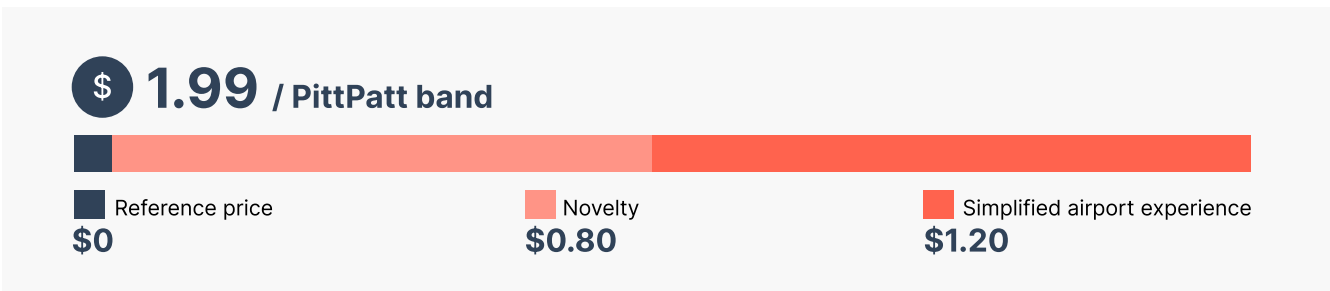
‣ **Repeat use value to passenger**
    ‣ **Habit & Dependency ($0.50)*:** Price that a passenger is willing to pay for a product or service that they are accustomed to.
    ‣ **Simplified airport experience ($1.50)*:** Price that a passenger is willing to pay for a solution that reduces air-travel anxiety and lowers risk of missing their flight.

$ **1.99** / **PittPatt band**

Reference price	Habit and dependency	Simplified airport experience
$0	$0.50	$1.50
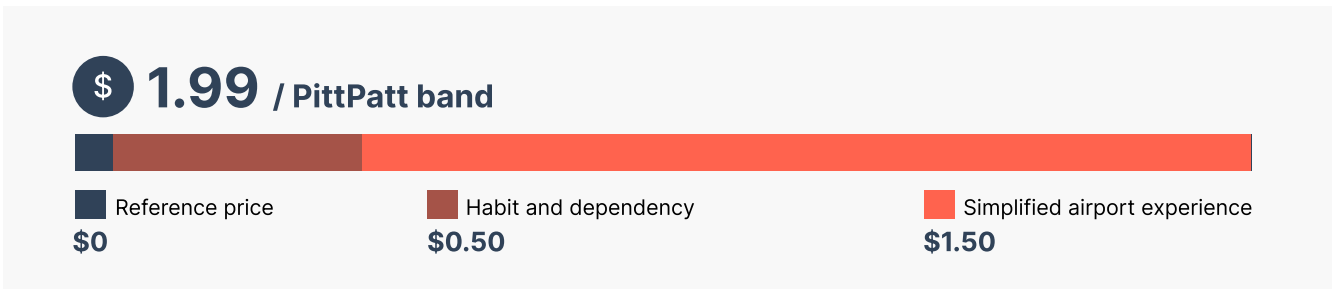
* These numbers are sourced from a survey we conducted with target passenger audience

How we will recover this money

Aeronautical revenue streams

Satisfied passengers are more likely to choose PIT over nearby airports or transportation options, incentivizing airlines to invest in their operations at PIT and increase the percentage of passenger fares directed to airport fees. PittPatt can also result in fewer passengers missing their flights, reducing the burden on airlines to accommodate or handle such situations.

Non-aeronautical revenue streams

PittPatt's primary revenue sources stem from advertising and the sale of bands, with revenue expected to increase annually as the solution expands across PIT and attract more adoptions.

Year 1 ($236,000 – 321,000)

The bulk of the cost in the first year is associated with developing and setting up the infrastructure for the app, bands, and kiosks.

Advertisement ($176,000 – $236,000)
Targeted ads from in-airport vendors and off-airport businesses would be run across the app and kiosk screens.
‣ Kiosk screens
‣ In-app ads

Bands ($60,000 – $85,000)
‣ 30,000 – 43,000 bands
(70% – 95% of bands produced are sold)

Year 2 ($766,000 – 1,435,000)

Advertisement ($66,000 – $890,000)
‣ Kiosk screens
‣ In-app ads

Bands ($100,000 – $544,000)
‣ 50,000 – 274,000 bands
(70% – 95% of bands produced are sold)

Year 3 ($900,000 – 1,986,000)

Advertisement ($671,000 – $897,000)
‣ Kiosk screens
‣ In-app ads

Bands ($230,000 – $1,090,000)
‣ 115,000 – 547,000 bands
(80% – 95% of bands produced are sold)

View a detailed revenue *Analysis* in Exhibit 12 in the Appendix

And when we will finally start turning a profit

The **optimistic projection** for PittPatt shows that it will achieve a break-even point in the beginning of the second year, while a more realistic projection shows it will occur by the end of that year.

The **realistic projection** assumes that PittPatt would need to sell 330,000 bands in Year 3, which is equivalent to roughly 5% of PIT's total footfall. This estimation assumes a conservative approach to costs and revenue.

	Cost	Revenue	Profit
Year 01	$966,815	$278,286	-$688,529
Year 02	$1,047,250	$1,100,776	$53,526
Year 03	$856,048	$1,443,172	$587,124

PittPatt is expected to breakeven by Year 2
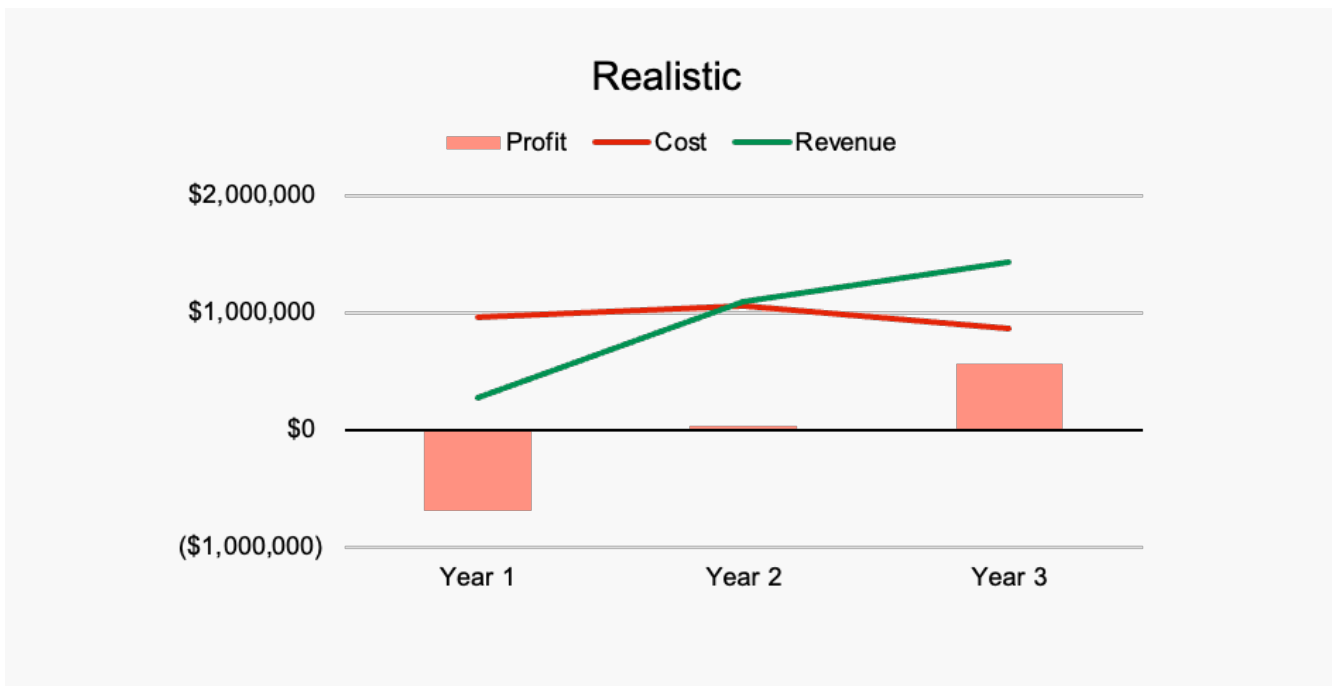
Breakeven analysis

View a detailed Br*eakeven Analysis* in Exhibit 13 in the Appendix

Conclusion

To simplify the jargon above; In this section, now that we have discussed the nitty-gritties, we will explain [6.1] How we measure success. We will also help you understand [6.2] What success means for PittPatt in different scenarios. Finally, [6.3] To sum it all up, we will remind you of all the important bits.

How we measure success

Key performance indexes to track the success of PittPatt by the **end of Year 3:**

Metric	Indicator	Why we measure this
App adoption rate	5-8% of PIT passengers use the PittPatt app	This can determine if the marketing and promotional efforts are effective if the app is meeting the needs of its target audience, and if it is providing enough value to encourage usage.
Band sales	Band sales equivalent to 5-8% of PIT passengers	This would indicate the adoption rate of our solution and can be used to evaluate the effectiveness of sales and marketing efforts. It can also indicate the band's popularity among PIT passengers.
Annual profits	Profit of over $500,000 at the end of Year 3	Achieving an annual profit of $500,000 by the third year would indicate that PittPatt has successfully met its business objective and generated sustained revenue.
Partner airlines	Increase in the number of airlines operating at PIT	An increase would show that PittPatt has effectively helped the airport provide passengers with timely updates, increasing satisfaction and loyalty, attracting more passengers, and generating increased revenue for the airport and its partners.

What success means for PittPatt in different scenarios

Best-case scenario

‣ Preferred boarding pass of Pittsburgh International Airport passengers

‣ Migrates to mid-sized airports in the U.S.

Realistic scenario

‣ Adopted by over 5% of passengers at the Pittsburgh International Airport in Year 3

‣ Profit-making by the end of Year 2

Worst-case scenario

‣ PittPatt is adopted by less than 2% of all PIT passengers

‣ Not profit-making by end of Year 3

To sum it all up

The prosperity of the Pittsburgh region is intricately linked to the success and growth of the Pittsburgh International Airport (PIT). Through its new Terminal Modernization Program (TMP), the airport is taking great strides towards becoming a high-tech and more efficient facility. This evolution prioritizes enhancing the passenger experience, providing value to the community, and better representing Pittsburgh as a region. However, there remains a pressing issue that needs to be addressed, particularly for the core passengers of PIT – the early birds.

Early bird passengers often experience anxiety and uncertainty at the airport, leading them to stay near their gate for fear of missing critical flight announcements. This, in turn, hinders their ability to utilize their time effectively, despite arriving at the airport early and having personal tasks complete. Without addressing these airport-related anxieties, passengers may not fully enjoy the benefits of PIT's new terminal, in spite of the airport's efforts to modernize and improve the passenger experience.

PittPatt provides a solution to this issue by using haptic feedback to isolate flight-related notifications, making them easily discernible. Through personalized notifications, the PittPatt band cuts through the airport noise and help passengers stay on top of the most important flight-related updates. This ensures that passengers can enjoy a worry-free airport experience and fully utilize their time, whether they need to focus on last-minute work or take advantage of the airport's amenities without the worry of missing important flight updates.

By leveraging the PittPatt ecosystem, PIT can become the preferred mode of travel for passengers. It will benefit passengers and help the airport increase revenue at retail outlets, gather data to drive operational efficiency, and manage crowds in waiting lines.

With the help of PittPatt, passengers can have peace of mind and confidently enjoy everything that the new Pittsburgh International Airport will have to offer.

Appendix

Exhibit 01
Technical Constraints & Possible Failures

Issue	Description	Ways to mitigate
Dead Spots	The communication of IoT pixels is restricted to proximity with bridges, which may not be evenly placed throughout the airport. Therefore, it is possible for the pixels to encounter delays or not receive information under certain circumstances.	Identify areas with weak RF signal strength and Install more bridges to increase the coverage.
Interoperability Issues	The communication among components could involve proprietary protocols that are not compatible with the current infrastructure.	Ensure cross-functionality of the individual components before installation and look for Open Source protocols-based devices.
Power Issues	The IoT pixel needs to be connected to a low-power vibrating actuator, as a standard vibrating actuator requires more power to operate, which may be difficult to drive. However, sourcing the low-power vibrating actuator may also be difficult, and integrating it with the system could be complex.	Testing various versions of vibrating actuators to evaluate their power consumption and selecting the one with the least power usage can help in optimizing the power requirements of the systems.
Location Determination	Triangulating the passenger's location within the indoor environment may be difficult, as the signals may be weak and not yield accurate navigation paths.	Instead of relying on a single technology, like GPS, for location tracking, integrating several techniques like Bluetooth and WiFi could be considered for more accurate results.

Exhibit 02
User Journey Maps

We arrived at the main persona's journey based on multiple journey maps that were informed by research.

	Transport to Airport	Arrive at Airport	Check-In for Flight	Pass Through TSA	Wait Before Boarding	Board the Flight
ACTION	• Check Google Map for travel time • Gets a ride to the airport from son	• Locate airport's short term parking lot • Park car • Unload luggages • Walk from parking lot to departure terminal	• Find airline check-in counter • Line up for counter • Check in bags • Obtain physical boarding passes	• Find security gate • Wait in a long line • Go through security screening • Find the gate for their flight • Take train to the boarding gate	• Sit near boarding counter • Go to Starbucks that's within line of sight to purchase food and beverage • Constantly check boarding screen for updates	• Stand in line with the assigned boarding group • Scan boarding pass at departure gate to enter the aerobridge
ACTION	• Check bus schedule • Takes bus from home to airport	• Walk from bus station to departure terminal	• Check airline app for boarding time and gate		• Check bag against bag sizer • Repack bag if bag is oversized • Walk around airport looking for options under $10 • Wait at boarding gate for flight	• Scan mobile boarding pass • Listen closely for boarding group call
ACTION	• Takes an Uber that she scheduled a day prior	• Find a trolley for the luggages	• Find airlines check-in counter • Check in baggage using kiosk • Check airline app for boarding time and gate	• Go through metal detector	• Locate and rest in Lounge • Go to the restroom • Find the family-friendly restaurants	• Board with priority boarding for family with kids

FEELINGS & EMOTIONS (Persona 1)

- **Apprehensive** that something bad or unpleasant will happen
- **Worried** about not finding the parking lot or spot
- **Frustrated** seeing the long line
- **Anxious** forgetting to remove required items and lose personal items
- **Relieved** after passing the security screening
- **Tense** about missing any gate announcements
- **Eager** to start boarding the flight

FEELINGS & EMOTIONS (Persona 2)

- **Cautious** not to miss the bus
- **Relived** that he arrived at the airport in time
- **Glad** that he can skip the physical check in process
- **Anxious** forgetting to remove required items and lose personal items
- **Relieved** after passing the security screening
- **Nervous** about having to repack if bag fails to pass size check
- **Eager** to start boarding the flight

FEELINGS & EMOTIONS (Persona 3)

- **Content** that Uber arrived according to planned schedule
- **Frantic** that she cannot find and rent trolley carts
- **Anxious** having to tag bags herself while handling kids
- **Relieved** that they don't have to take shoes off
- **Worried** about kids and baggage getting lost
- **Tense** about missing any gate announcements
- **Delighted** to have priority to board the flight

PAIN POINTS

	Transport to Airport	Arrive at Airport	Check-In for Flight	Pass Through TSA	Wait Before Boarding	Board the Flight
PAIN POINTS	• Being late to check-in due to traffic	• Confusing signages and directions in the parking lot • Cannot find available parking spot during peak travel times	• Check-in counter is hard to find • Long wait time at counter		• Lack of information about desired restaurant's expected waiting time • Lack of information about length of restroom line • Last minute gate changes • Missing gate announcements due to distractions	• Carry-on stored in overhead space not adjacent to seat
PAIN POINTS	• Unreliable public transit • Inconvenient pickup/dropoff location	• Confusing direction from bus station to departure terminal		• Long wait times at security • Forgetting to remove required items from bag • Being flagged for additional screening • Losing personal items	• Inconsistency in the enforcement of baggage size limit • Lack of food and beverage options within close proximity under $10	• Insufficient overhead space for luggage if boarding with later group • Possibility of paying extra fees for oversized carry-on • Unsure which boarding group is currently boarding
PAIN POINTS	• Unpredictable traffic and Uber-related issues	• Difficulty finding and renting trolleys	• Difficulty handling multiple baggages and her two kids		• Difficulty finding club lounges through airport app • Difficult using restroom with children and carrying baggages	• Unaware of designated time or group number for boarding

Exhibit 03

Where did we see opportunity?

After gathering mixed-method research through various means such as interviews, surveys, and diary studies, we synthesized the data and honed our insights through analogous inspirations. As a result, we identified several gaps in product opportunities, which we grouped into the subcategories listed below:

Passenger Experience
‣ How might we improve the experience for business travelers in the airport?
‣ How might we make the airport experience more intuitive for first-time or infrequent flyers?

Personalization
‣ How might we allow users to tailor their airport experiences according to their personal needs and preferences?

Efficiency
‣ How might we better capitalize on passenger's free time in the airport?

Accessibility
‣ How might we ensure that passengers have uninterrupted access to information, communication and entertainment ?
‣ How might we make the passengers feel less physically constricted and crowded in an airport?

Navigation
‣ How might we optimize intra-airport mobility to reduce cognitive load for the airport users?
‣ How might we transform the airport experience from an endurance test into a moment of indulgence?

Exhibit 04
PESTLE Analysis

Political

Factor	Classification	Description
More investment from the government in the Pittsburgh Airport	Opportunity	The Department's Economic Development Administration (EDA) is awarding $3 million to Allegheny County Airport Authority for the construction of a warehouse, taxiway extensions, and utility upgrades at Pittsburgh International Airport.
Bipartisan Infrastructure Law Funding Airport Terminals	Opportunity	The Biden Administration announced nearly $1B in Bipartisan Infrastructure Law funding the improvement of airport terminals across the U.S. in July 2022. These projects will increase airport capacity, energy efficiency and accessibility, with funding going to communities of all sizes across the country, including Pittsburgh International Airport ($20 million to construct a new 700,000-square-foot landside terminal).
Pittsburgh Airport received sizeable funding	Neutral	The Federal Aviation Administration (FAA) awarded the City of Philadelphia Division of Aviation a $24 million Airport Terminal Program grant for Philadelphia International Airport's (PHL) Restroom Renovation Program.
IRA promotes solar energy at airports	Opportunity	The Inflation Reduction Act (IRA) promises to be a boon to developing renewables in Pennsylvania, where photovoltaics account for just 0.5% of our statewide energy portfolio. Solar had already become a cost-competitive, market-ready alternative to carbon-sourced power, and the expanded incentives and expected newfound market stability brought by the legislation aim to ensure a solid foundation for the growth of sun-sourced energy.
PIT new terminal founding	Neutral	Costs for building the new terminal are fully covered by airport authority revenue and fees from airlines.
Increase flights to Pittsburgh	Opportunity	Pittsburgh lobbyists pushed for the increase of flights to Pittsburgh. British Airways would increase its flight frequency from four to six times a week.

Economic

Factor	Classification	Description
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Social

Factor	Classification	Description
Passengers ease in on the usage of biometrics	Threat	Passengers had privacy concerns regarding the use of biometrics and other identification technology.
Increase in the brand retention at airport	Opportunity	Passengers are exposed to only just few activities at the airport, resulting in a longer attention span.
Wheelchair assistance	Opportunity	About 162,000 of the 9.2 million passengers who traveled through PIT in 2018 requested wheelchair assistance
Rise in "Bleisure" Travel	Opportunity	This segment of passengers combines business with leisure and is willing to spend more for extras. Addressing the needs of these premium customers forced airlines to rethink the travel experience. That is why some airlines opted to get rid of its first-class cabin on international long-haul flights in order to offer more business-class seating.
Passengers display higher attention span at airports	Opportunity	Travelers at an airport have an overall higher attention span than in everyday activities or situations, which allows for advertising to have a higher impact. Passengers also exhibit heightened perception while waiting or queueing.
Pittsburgh population media age	Opportunity	Like the nation, the seven-county Pittsburgh Metropolitan Statistical Area (MSA) is getting older, with an increasing proportion of the population aged 65 and over. In 2019, the population age 65 and over made up an estimated 20.5% of the regional population, an increase from 17.3% in 2010.
Passengers acceptance of usage of biometric data	Opportunity	While privacy appears to be a major concern for passengers' regarding the use of biometrics, most passengers were willing to trade some rights to their privacy and support the use of biometrics when the results are used to improve the airport travel experiences.
Increase in automation due to labor shortages	Opportunity	"The biggest shift that has happened from 2018 to now is that we've literally run out of human beings to do the things that we need to do," said roboticist Siddhartha "Sidd" Srinivasa, a professor at the University of Washington's Allen School of Computer Science & Engineering in Seattle who founded Carnegie Mellon University's Personal Robotics Lab during his 18-year tenure in Pittsburgh.
Pittsburgh ranks No. 13 in the world's emerging startup economies	Opportunity	Startup Genome ranked Pittsburgh 13th among the world's emerging startup ecosystems in a study released Tuesday, up from 23rd place last year. If Pittsburgh can capture more of those gains, it will attract a more dynamic range of businesses that can pull more workers into the region.

Technology

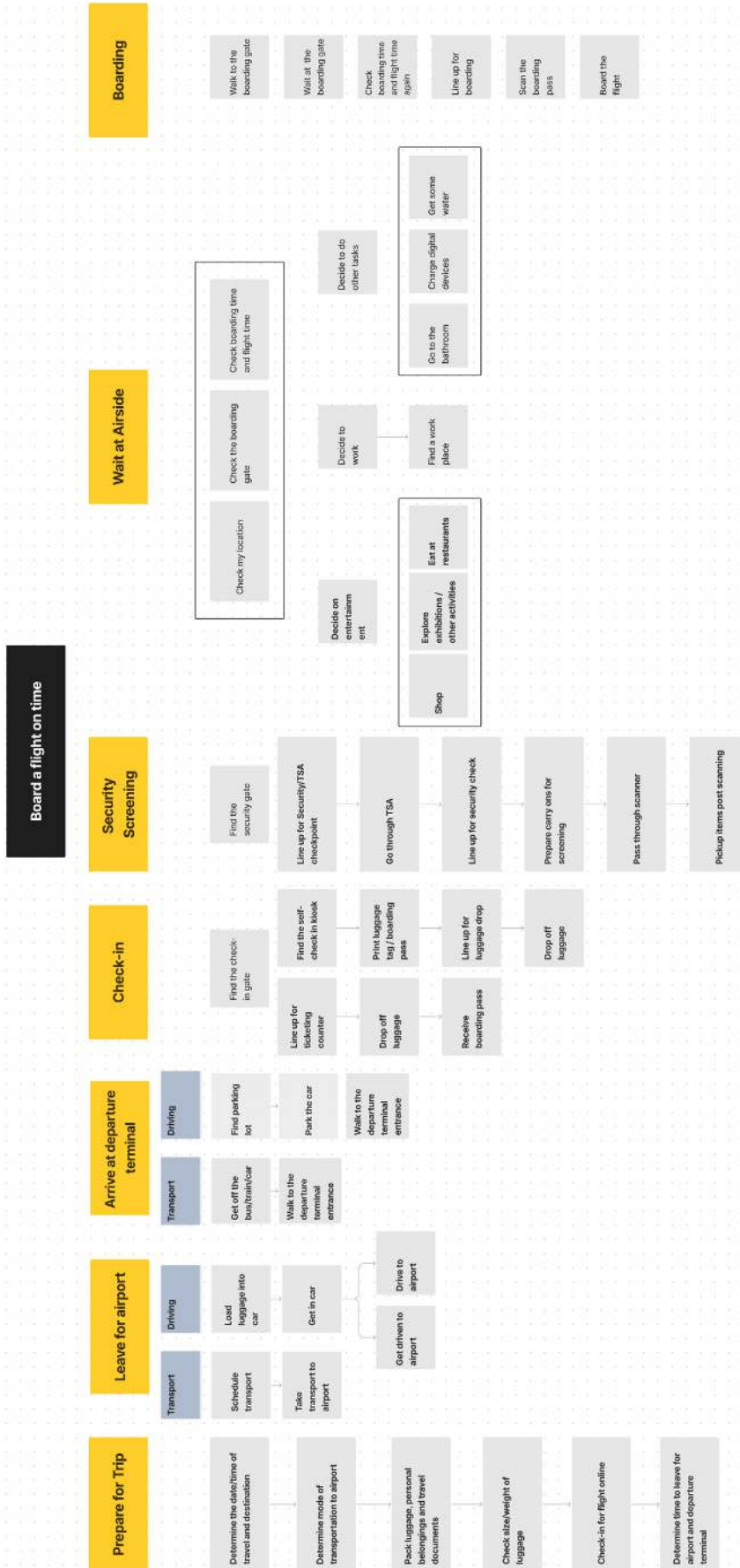| Factor	Classification	Description
Demand for incorporating cyber security into airport	Opportunity	Innovation for Cyber Security in the airports has increased
Developing data hubs	Opportunity	Using Artificial Intelligence, digital twins and predictive analytics allows for holistic views of airport operations.
High investment priority for touchless technology	Opportunity	COVID-19 has accelerated investment in seamless and touchless travel. Biometric technology, crowd monitoring, AI for bag tracking, voice control, Virtual queueing as-well as other innovations are all being rolled out globally to ensure a contactless journey. Contactless technologies have proven to be a game-changer as a 2020 report by SITA on Air Transport IT Insights revealed and airports have accorded high investment priority for touchless technology between now and 2023.
Sensory-friendly & Assistive technology in PIT	Opportunity	"Presley's Place" at Pittsburgh International Airport was the world's most advanced sensory suite for special needs travelers. It addresses issues of diversity and social responsibility, making travel more accessible for persons and families with autism or other neurological disorders by providing a sensory room and a family restroom with adjustable adult changing table and sink.
AR and VR technology	Opportunity	The retail sector and major airlines have been using VR and AR to help consumers digitally try on clothes and accessories and help people visualize their upcoming trips. E-commerce and super-apps have a big part to play here. The airline has diversified its offering to create a unified e-commerce platform, powered by technology and data.
Digital Twin (DT)	Opportunity	digital replica of a physical-world asset or process that integrates data from both the digital and material worlds, enabling companies to run virtual simulations before committing to physical-world actions". Based on this description, you can see how digital twin can be an attractive technology for complex airport operations.
Sustainable in-flight Services	Opportunity	The role of advanced technologies also is playing a vital part in helping airlines achieve more sustainable in-flight services. Advanced software, powered by Artificial Intelligence and Machine Learning, can provide airlines with valuable data and data analytics that enable in-flight catering services to better predict passengers' food preferences and consumption patterns. This, in turn, enables the caterer to plan better and reduce food waste.

Legal

Factor	Classification	Description
Convenient air travel with children leading to increased usage of airports by minors	Opportunity	A notice has been released encouraging US Airlines to enforce policies that children be seated adjacent to accompanying adults at no additional cost.
Expanded definition of personal information to open avenues for data usage	Opportunity	As per Senate Bill 696, the definition of personal information includes information about medical and health insurance amongst other data pieces.
Lobbying for accessible lavatories on aircrafts could lead to increased usage of airports by disabled people	Opportunity	In a joint DOT and U.S. Access Board meeting about access to lavatories on single-aisle aircraft, it was announced that they'd host a public meeting on the difficulties faced by wheelchair-bound travellers during air travel. This would also mean that airports also need to be better prepared to accommodate their needs.
REAL ID-compliant identification compulsory to board a domestic flight	Neutral	Beginning May 7, 2025, Pennsylvanians will need a REAL ID-compliant or another form of federally-acceptable identification to board a domestic commercial flight or be permitted to enter the TSA checkpoint and will not be allowed to fly.
Bill that allows regulation and operation of autonomous vehicles in Pennsylvania	Opportunity	Governor Wolf signed a bill in November that allows for the regulation and operation of "highly automated vehicles with or without a driver," resulting in economic development benefits across Pennsylvania and in controlled ecosystems like airports.
Reliance of airport management to generate revenue from sources tied to passenger counts	Threat	Airports need to reevaluate their dependence on legacy sources of revenue (e.g., airline rates and charges; in-terminal and passenger-related concessions). There is value in reassessing the relationship with concessionaires and seeking more diversified revenue that is not directly tied to passenger counts.

Environmental

Factor	Classification	Description
Net zero emissions	Neutral	There is a global push for decreased reliance on fossil fuel and net zero emissions by 2050.
Sustainable Aviation Fuel deficiency	Threat	There is not enough Sustainable Aviation Fuel (SAF) resource, an alternative that is 80% less carbon intensive than conventional jet fuel, to sustain even 10% the global fleet's fuel consumption.
PIT first airport microgrid	Opportunity	PIT houses the world's first airport microgrid, an initiative implemented in July 2021.
CO2 emission reduction through microgrid	Opportunity	CO2 emission has been reduced by 8.2 million annually, and the independent operation of the microgrid grants the airport protection from outages and cyberattacks.
Airport contribution to CO2 emission	Neutral	Air transport is responsible for 4.9% of human contribution to climate change. The aviation industry also accounts for 12% of CO2 emissions from all transportation sources.
New environmental trends in aviation	Neutral	New environmental trends in aviation: Solar airports, efficient technology, environmentally friendly material, smart buildings designs, climate change resilience, community engagement, sustainability reporting
Solar power market increased	Opportunity	"The solar PV market increased by 12% in 2019 to a record 115 GW (direct current), for a total of 627 GW."
S4FA solar systems as lighting solutions	Opportunity	"S4GA solar systems are cost-effective carbon-free airfield lighting solutions applicable for all types of airports. S4GA lighting system is compliant with ICAO requirements and meets the highest environmental standards available in the aviation industry.
Low energy consumption and emission	Opportunity	The shift from paper to digital, energy efficient IT. Use ML, data analytics, computer vision to reduce CO2 emission and reduce resource usage.
Minimize and eliminate the use of single use plastic	Opportunity	Many airlines like Air New Zealand and Etihad Airways are creating an in flight sustainable services ecosystem to minimize the use of plastic
More airports with environmental impact policies and frameworks	Opportunity	SITA's report states that by the end of 2024, 62% of airports will have an overall IT management policy or framework in place that includes environmental impacts.
Shift from paper to digital	Opportunity	Behavioral policies and controls to discourage paper consumption to favor environmentally responsible print materials will be commonplace in airports by 2024.

Exhibit 05
Task Analysis

Board a flight on time

Prepare for Trip
- Determine the date/time of travel and destination
- Determine mode of transportation to airport
- Pack luggage, personal belongings and travel documents
- Check size/weight of luggage
- Check-in for flight online
- Determine time to leave for airport and departure terminal

Leave for airport
- Transport
  - Schedule transport
  - Take transport to airport
- Driving
  - Load luggage into car
  - Get in car
  - Get driven to airport
  - Drive to airport

Arrive at departure terminal
- Transport
  - Get off the bus/train/car
  - Walk to the departure terminal entrance
- Driving
  - Find parking lot
  - Park the car
  - Walk to the departure terminal entrance

Check-in
- Find the check-in gate
- Line up for ticketing counter
- Find the self-check in kiosk
- Drop off luggage
- Print luggage tag / boarding pass
- Receive boarding pass
- Line up for luggage drop
- Drop off luggage

Security Screening
- Find the security gate
- Line up for Security/TSA checkpoint
- Go through TSA
- Line up for security check
- Prepare carry ons for screening
- Pass through scanner
- Pickup items post scanning

Wait at Airside
- Check my location
- Check the boarding gate
- Check boarding time and flight time
- Decide on entertainment
  - Shop
  - Explore exhibitions / other activities
  - Eat at restaurants
- Decide to work
  - Find a work place
- Decide to do other tasks
  - Go to the bathroom
  - Charge digital devices
  - Get some water

Boarding
- Walk to the boarding gate
- Wait at the boarding gate
- Check boarding time and flight time again
- Line up for boarding
- Scan the boarding pass
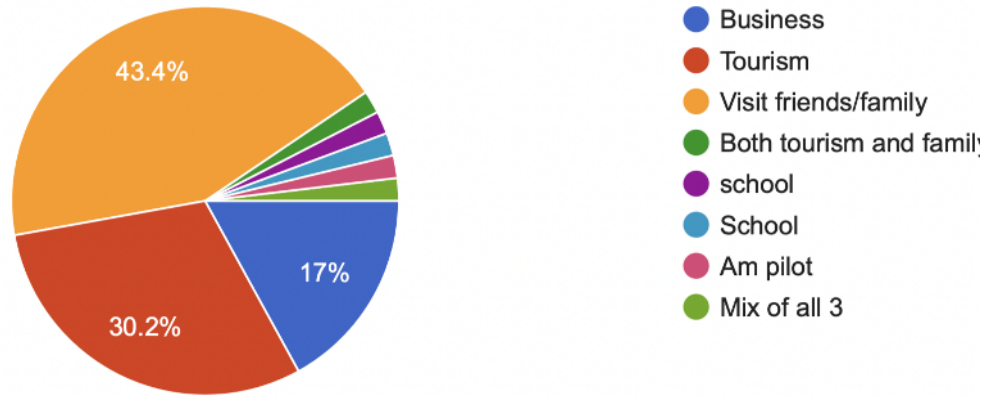- Board the flight

Exhibit 06
Interview Phase 01

List of questions asked:

‣ Can you tell me about your general experience with flight travel and how it makes you feel?

‣ Can you describe the best airport experience you've had? What are some elements that made that experience great?

‣ Have you seen or used anything at the airport which made your journey convenient and pleasant?

‣ What are some of your favorite features that you've encountered?

‣ Can you tell me about a time when you had to handle a difficult situation? What elements made the experience terrible?

‣ How familiar are you with navigating within airports? Can you tell us about a good and bad experience?

‣ Have you used any accessibility features in the airport?

‣ Can you tell me about any experiences you have had with customer service personnel (airline or airport) while traveling?

‣ Have you ever had a positive experience while waiting in queues anywhere? Where? Why?

‣ How do you handle and manage your carry-on baggage?

‣ Have you seen/used anything that surprised you at an airport?

‣ What are some changes that you would like to see in airports?

‣ What is something that the airport doesn't currently offer that can make your flight travel experience better?

‣ How do you stay informed about and check for flight updates?

‣ What do you do during waiting periods?

Exhibit 07

Survey Results

What is generally the purpose of your flight?

53 responses

- ● Business
- ● Tourism
- ● Visit friends/family
- ● Both tourism and family
- ● school
- ● School
- ● Am pilot
- ● Mix of all 3

43.4%

30.2%

17%

How do you spend your time at the airport?

53 responses

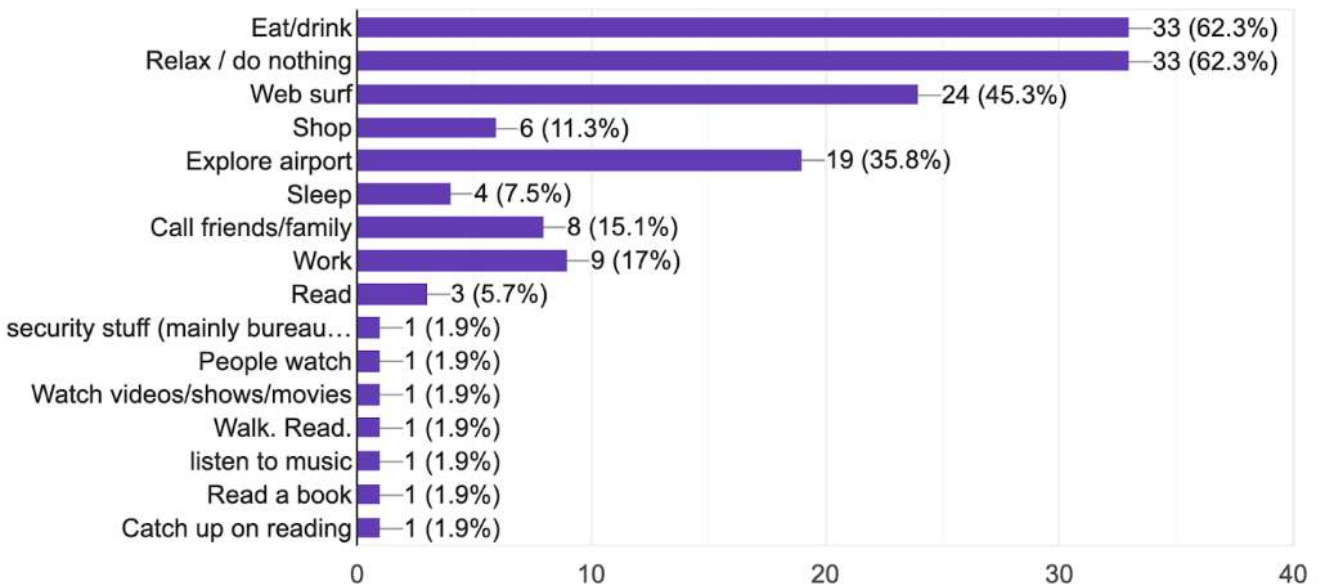| Activity	Count
Eat/drink	33 (62.3%)
Relax / do nothing	33 (62.3%)
Web surf	24 (45.3%)
Shop	6 (11.3%)
Explore airport	19 (35.8%)
Sleep	4 (7.5%)
Call friends/family	8 (15.1%)
Work	9 (17%)
Read	3 (5.7%)
security stuff (mainly bureau…	1 (1.9%)
People watch	1 (1.9%)
Watch videos/shows/movies	1 (1.9%)
Walk. Read.	1 (1.9%)
listen to music	1 (1.9%)
Read a book	1 (1.9%)
Catch up on reading	1 (1.9%)

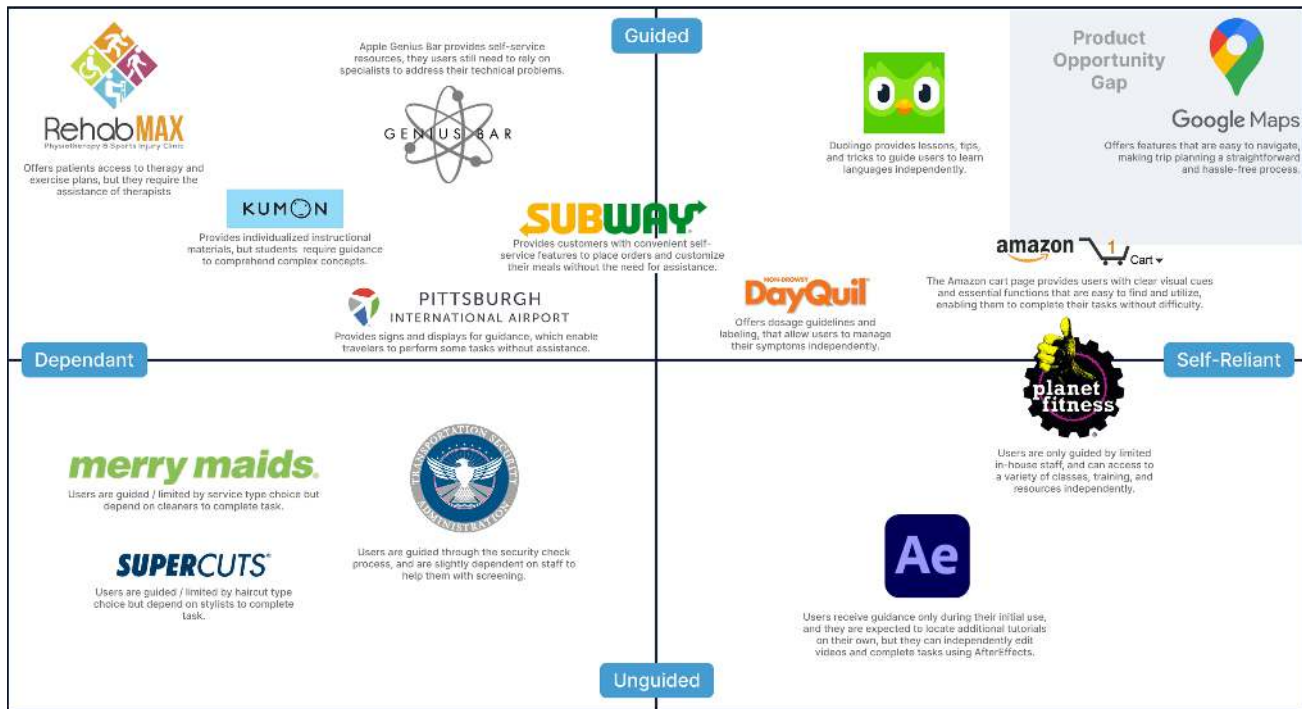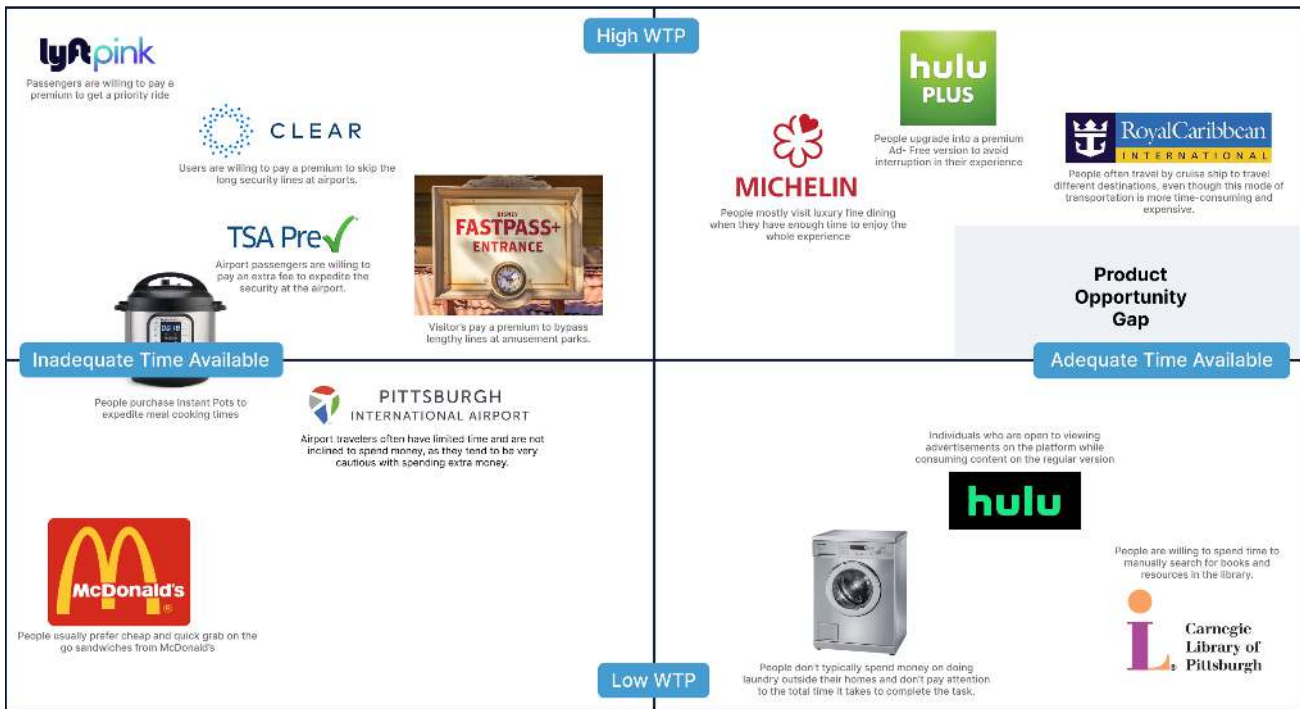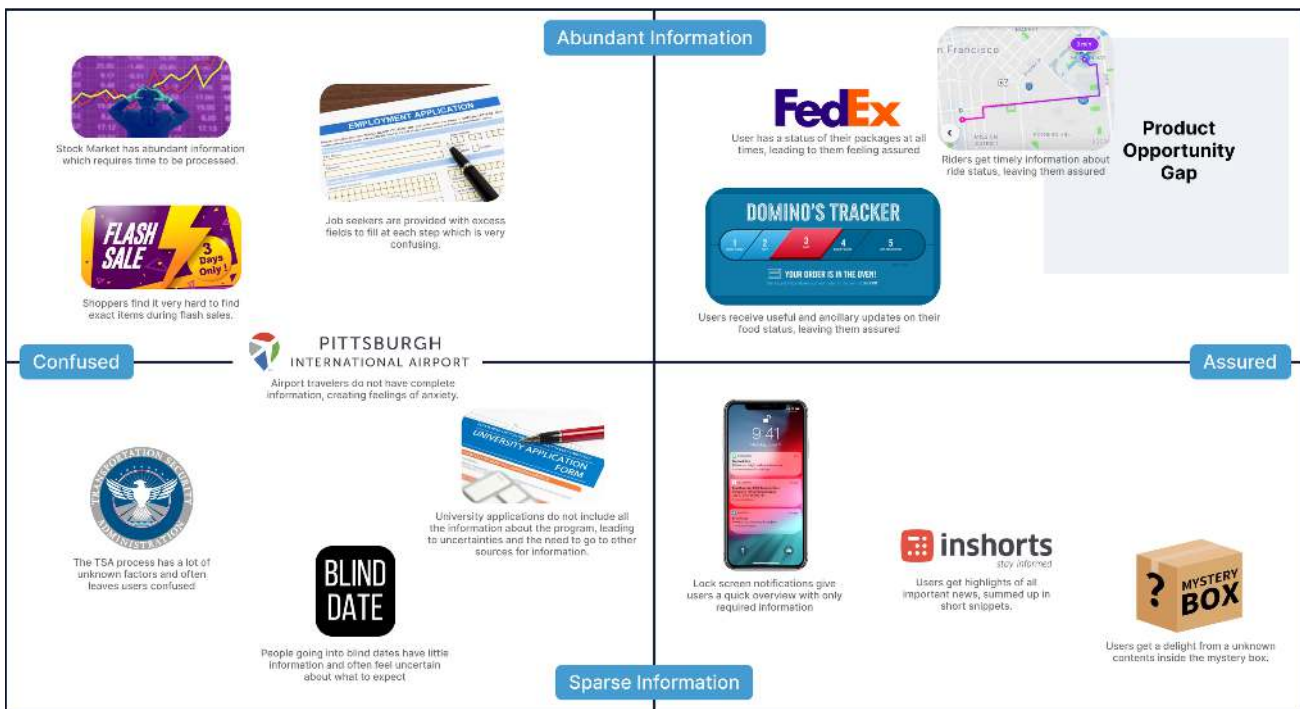Exhibit 08
Position Maps
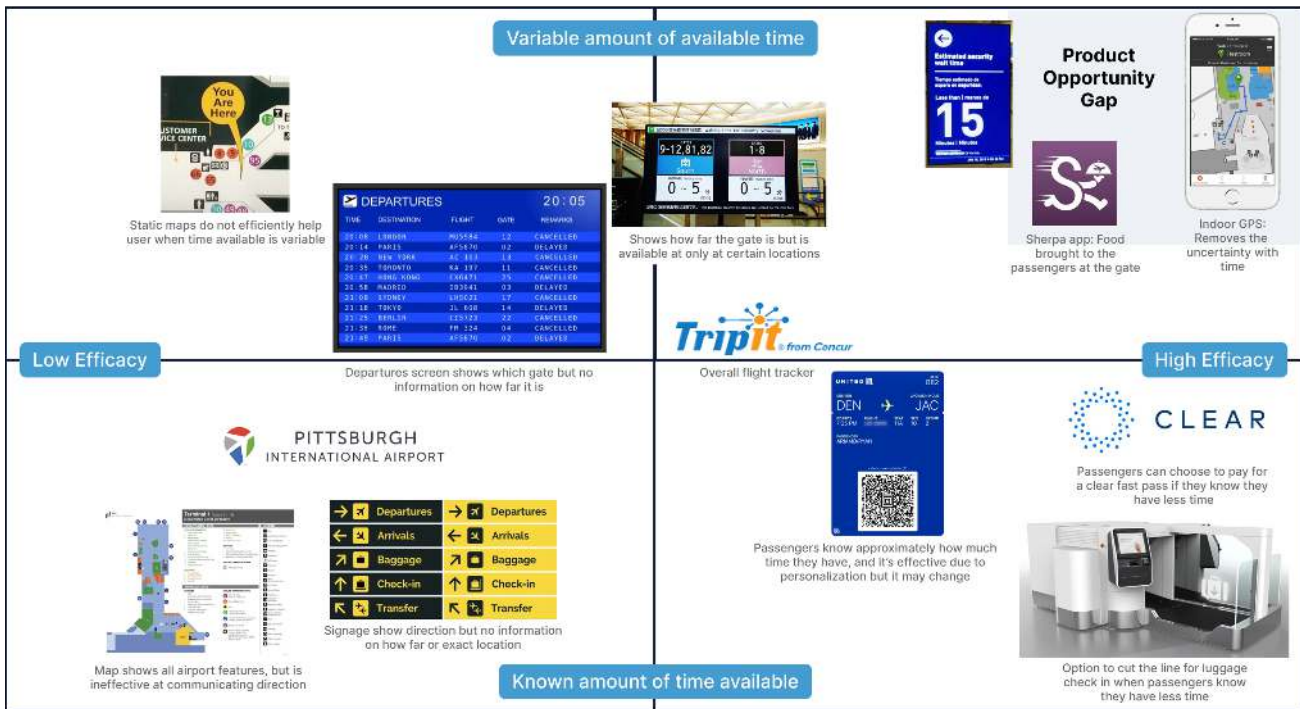

Position Map 01: Guidance vs Dependency

Position Map 02: Exploration vs Adequate Time

Position Map 03: Willingness to Pay (WTP) vs Availability of Adequate Time

Position Map 04: Amount of Information vs Clarity

Position Map 05: Amount of time available vs Efficiency

Exhibit 09

PittPatt's Value to Stakeholders

| Value	Stakeholder	What it means?
Assurance	Passenger	Minimize the level of concern that passengers experience with regards to the possibility of missing their flight.
Convenience	Passenger	Passengers can now avoid the hassle of having to retrieve their boarding pass on their mobile device or constantly monitor their phone for updates on their flight status, as they no longer need to sift through all the notifications on their phone.
Maximum utilization of time	Passenger	Passengers can now make the most of their time at the airport by exploring it instead of waiting at the gate, while still keeping making their flight as their main goal
Awareness	Passenger	Passengers can now stay constantly informed about important notifications from the airport or airline, such as gate changes, flight updates, or boarding times, and no longer have to worry about missing out on them.
Satisfied Passengers	Airport	Improving passenger experience at PIT can increase retail revenue, as content and relaxed passengers are more likely to enjoy airport amenities, leading to increased sales.
Higher Efficiency	Airport	Passenger data can optimize airport staff and reduce bottlenecks in high footfall areas and during peak hours.

Exhibit 10
Stakeholder Map
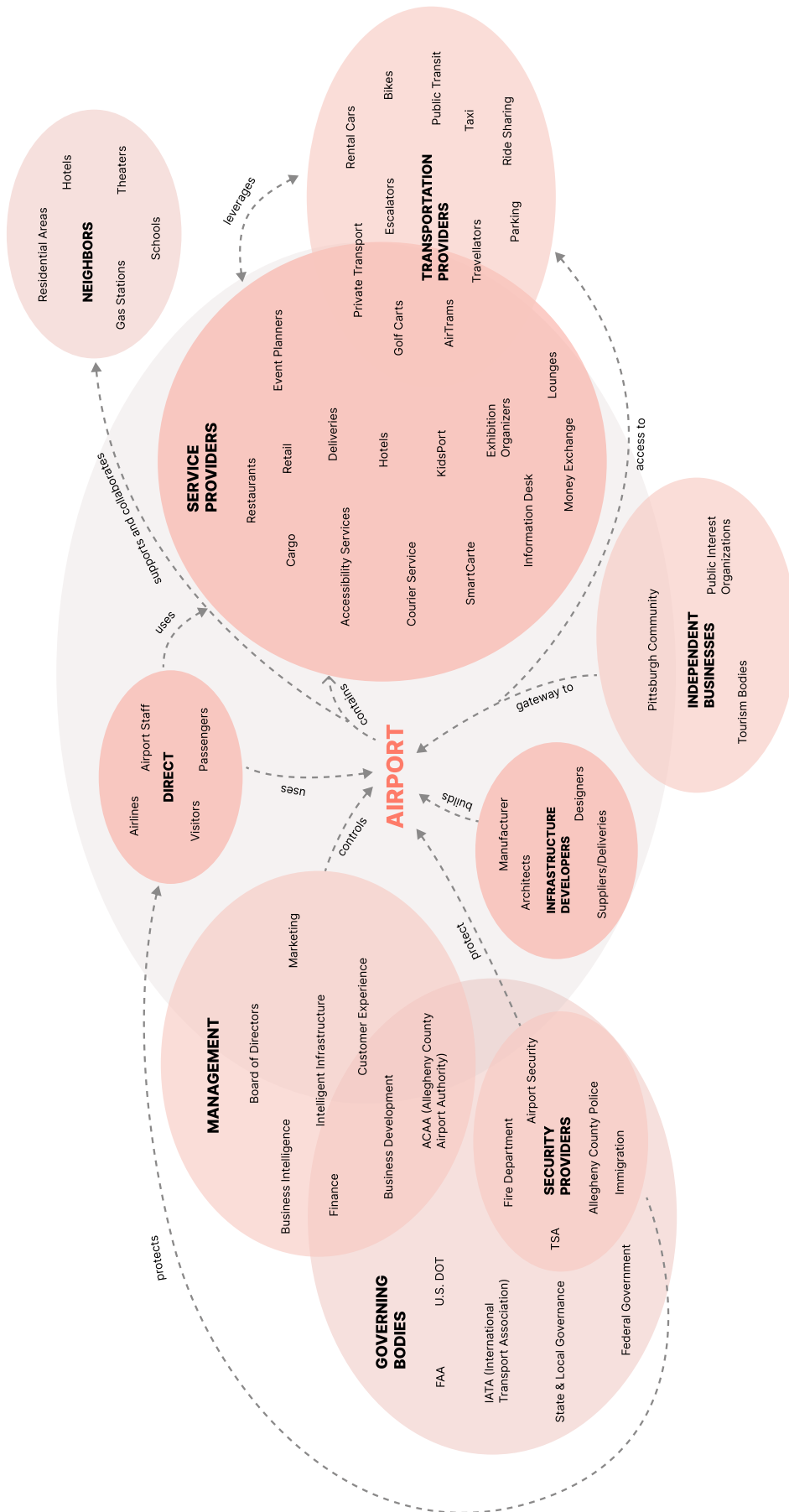
Exhibit 11

Year 01 Costs

Employment (Fixed Cost)

Job Title	Fraction of Year	# of Employees	Annual Salary Low ($)	Annual Salary High ($)	Cost Low ($)	Expected Cost ($)	Cost High ($)
Project Manager	1.00	1	85,000	95,000	85,000	90,000	95,000
UX/UI Designer	1.00	1	75,000	85,000	75,000	80,000	85,000
Software Developer	1.00	1	90,000	100,000	90,000	95,000	100,000
Hardware Engineer	1.00	1	100,000	110,000	100,000	105,000	110,000
Network Admin	1.00	1	70,000	80,000	70,000	75,000	80,000
Salesperson	0.50	1	25,000	27,000	12,500	13,000	13,500
Technical Support Staff	0.50	1	50,000	55,000	25,000	26,250	27,500
Cleaning & Maintenance	0.50	2	56,000	60,000	56,000	58,000	60,000
Graphic Designer	0.25	1	45,000	50,000	11,250	11,875	12,500
Installation Technician	0.10	2	80,000	90,000	16,000	17,000	18,000
TOTAL	-	12	-	-	$540,750	$571,125	$601,500

Advertisement (Fixed Cost)

Category	Ad Type	Cost Type	# of Unit	Cost Low ($)	Expected Cost ($)	Cost High ($)
YouTube & Email	Digital	Recurring	-	100,000	125,000	150,000
Discounts & Raffles	Physical	Recurring	-	2,400	3,000	3,600
Banner	Physical	One-time	20	60,000	80,000	100,000
Diorama	Physical	One-time	8	6,400	8,200	10,000
Spectacular	Physical	One-time	4	6,000	8,000	10,000
Wall wrap	Physical	One-time	2	14,000	15,000	16,000
TOTAL	-	-	-	$188,800	$239,200	$289,600

Band (Variable Cost)

Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units Low	# of Units High	Cost Low ($)	Expected Cost ($)	Cost High ($)
IoT Pixel (Q3)	0.25	0.30	9,000	18,000	2,250	3,825	5,400
Paper Bands (Q3)	0.03	0.04	9,000	18,000	270	495	720
Vibrating Actuator (Q3)	0.25	0.30	9,000	18,000	2,250	3,825	5,400
IoT Pixel (Q4)	0.25	0.30	13,500	27,000	3,375	5,738	8,100
Paper Bands (Q4)	0.02	0.04	13,500	27,000	270	675	1,080
Vibrating Actuator (Q4)	0.25	0.30	9,900	19,800	2,475	4,208	5,940
TOTAL	-	-	-	-	$10,890	$18,765	$26,640

Network Devices (Fixed Cost)

Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units Low	# of Units High	Cost Low ($)	Expected Cost ($)	Cost High ($)
Bridges	180	200	180	200	32,400	36,200	40,000
Gateway	90	100	25	30	2,250	2,625	3,000
TOTAL	-	-	-	-	$34,650	$38,825	$43,000

Dispensing Kiosk (Fixed Cost)

Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Touchscreen Display	800	1,000	10	8,000	9,000	10,000
Computer Hardware	1,000	1,500	10	10,000	12,500	15,000
Printer	200	400	20	4,000	6,000	8,000
Card Reader	100	200	10	1,000	1,500	2,000
Barcode Scanner	100	200	10	1,000	1,500	2,000
Enclosure & Stand	750	1,000	10	7,500	8,750	10,000
Wiring and Cabling	200	400	10	2,000	3,000	4,000
Software	1,000	1,200	10	10,000	11,000	12,000
Band Programmer	150	200	10	1,500	1,750	2,000
TOTAL	-	-	-	$45,000	$55,000	$65,000

Info Kiosk Cost (Fixed Cost)

Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Touchscreen Display	800	1,000	8	6,400	7,200	8,000
Band Reader	50	200	8	400	1,000	1,600
Computer Hardware	1,500	2,000	8	12,000	14,000	16,000
Enclosure & Stand	750	1,000	8	6,000	7,000	8,000
Wiring and Cabling	200	400	8	1,600	2,400	3,200
Software	1,200	1,500	8	9,600	10,800	12,000
TOTAL	-	-	-	$36,000	$42,400	$48,800

Recycling Bin (Fixed Cost)

Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Bin	50	70	25	1,250	1,500	1,750
TOTAL	-	-	-	$1,250	$1,500	$1,750

	Cost Low	Expected Cost	Cost High
TOTAL	$857,340	$966,815	$1,076,290

Year 02 Costs

Employment (Fixed Cost)						
Job Title	# of Employees	Annual Salary Low ($)	Annual Salary High ($)	Cost Low ($)	Expected Cost ($)	Cost High ($)
Project Manager	1	85,000	95,000	85,000	90,000	95,000
Software Developer	1	90,000	100,000	90,000	95,000	100,000
Hardware Engineer	1	100,000	110,000	100,000	105,000	110,000
Network Admin	1	70,000	80,000	70,000	75,000	80,000
Salesperson	2	25,000	27,000	50,000	52,000	54,000
Technical Support Staff	1	50,000	55,000	50,000	52,500	55,000
Cleaning & Maintenance	3	56,000	60,000	168,000	174,000	180,000
TOTAL	10	-	-	613,000	643,500	$674,000

Advertisement (Fixed Cost)						
Category	Ad Type	Cost Type	# of Unit	Cost Low ($)	Expected Cost ($)	Cost High ($)
YouTube & Email	Digital	Recurring	-	150,000	175,000	200,000
Retailer Discounts	Physical	Recurring	-	1,200	1,500	1,800
Banner	Physical	One-time	10	30,000	35,000	40,000
Diorama	Physical	One-time	4	3,200	3,600	4,000
Spectacular	Physical	One-time	2	3,400	3,700	4,000
Wall wrap	Physical	One-time	1	7,000	7,500	8,000
TOTAL	-	-	-	$194,800	$226,300	$257,800

Band (Variable Cost)						
Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units Low	# of Units High	Cost Low ($)	Expected Cost ($)	Cost High ($)
IoT Pixel	$0.20	0.25	72,000	288,000	14,400	43,200	72,000
Paper Bands	$0.02	0.03	72,000	288,000	1,440	5,040	8,640
Vibrating Actuator	$0.20	0.25	66,600	277,200	13,320	41,310	69,300
TOTAL	-	-	-	-	29,160	89,550	$149,940

Dispensing Kiosk (Fixed Cost)						
Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Touchscreen Display	800	1,000	8	6,400	7,200	8,000
Computer Hardware	1,000	1,500	8	8,000	10,000	12,000
Printer	200	400	16	3,200	4,800	6,400
Card Reader	100	200	8	800	1,200	1,600
Barcode Scanner	100	200	8	800	1,200	1,600
Enclosure & Stand	750	1,000	8	6,000	7,000	8,000
Wiring and Cabling	200	400	8	1,600	2,400	3,200
Software	1,000	1,200	8	8,000	8,800	9,600
Band Programmer	150	200	8	1,200	1,400	1,600
TOTAL	-	-	-	$36,000	$44,000	$52,000

Info Kiosk (Fixed Cost)						
Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Touchscreen Display	800	1,000	8	6,400	7,200	8,000
Band Reader	50	200	8	400	1,000	1,600
Computer Hardware	1,500	2,000	8	12,000	14,000	16,000
Enclosure & Stand	750	1,000	8	6,000	7,000	8,000
Wiring and Cabling	200	400	8	1,600	2,400	3,200
Software	1,200	1,500	8	9,600	10,800	12,000
TOTAL	-	-	-	$36,000	$42,400	$48,800

Recycling Bin (Fixed Cost)						
Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units	Cost Low ($)	Expected Cost ($)	Cost High ($)
Bin	50	70	25	1,250	1,500	1,750
TOTAL	-	-	-	$1,250	$1,500	$1,750

	Cost Low ($)	Expected Cost ($)	Cost High ($)
TOTAL	$910,210	$1,047,250	$1,184,290

View in detail here

Year 03 Costs

Employment (Fixed Cost)						
Job Title	# of Employees	Annual Salary Low ($)	Annual Salary High ($)	Cost Low ($)	Expected Cost ($)	Cost High ($)
Project Manager	1	85,000	95,000	85,000	90,000	95,000
Software Developer	1	90,000	100,000	90,000	95,000	100,000
Hardware Engineer	1	100,000	110,000	100,000	105,000	110,000
Salesperson	2	25,000	27,000	50,000	52,000	54,000
Technical Support Staff	1	50,000	55,000	50,000	52,500	55,000
Cleaning & Maintenance	3	56,000	60,000	168,000	174,000	180,000
TOTAL	9	-	-	543,000	568,500	$594,000

Advertisement (Fixed Cost)						
Category	Ad Type	Cost Type	Cost Low ($)	Expected Cost ($)	Cost High ($)
YouTube & Email	Digital	Recurring	150,000	175,000	200,000
Retailer Discounts	Physical	Recurring	1,800	2,100	2,400
TOTAL	-	-	$151,800	$177,100	$202,400

Band (Variable Cost)							
Components	Unit Cost Low ($)	Unit Cost High ($)	# of Units Low	# of Units High	Cost Low ($)	Expected Cost ($)	Cost High ($)
IoT Pixel	$0.10	0.14	144,000	576,000	14,400	47,520	80,640
Paper Bands	$0.01	0.01	144,000	576,000	1,440	3,600	5,760
Vibrating Actuator	$0.15	0.22	115,200	460,800	17,280	59,328	101,376
TOTAL	-	-	-	-	33,120	110,448	$187,776

	Cost Low ($)	Expected Cost ($)	Cost High ($)
TOTAL	$727,920	$856,048	$984,176

View in detail here

Exhibit 12

Year 01 Revenue

Kiosk Advertisement Revenue							
Category	Fraction of Year	# of Units	Annual Revenue Low ($)	Annual Revenue High ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
Kiosk	0.5	18	$19,500	$26,000	175,500	204,750	234,000
TOTAL	-	-	-	-	$175,500	$204,750	$234,000

App Ad Revenue							
Category	Type	# of Users Low	# of Users High	Per Unit Revenue ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
App	CPM Banner	36,000	72,000	5	180	270	360
App	CPM Video	36,000	72,000	15	540	810	1,080
App	CPC	144	432	0.5	72	144	216
TOTAL	-	-	-	-	$792	$1,224	$1,656

Band Revenue						
Category	# of Units Low	# of Units High	Unit Price High ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
Band	29,925	42,750	1.99	59,551	72,312	85,073
TOTAL	-	-	-	$59,551	$72,312	$85,073

TOTAL	$235,843	$278,286	$320,729

Year 02 Revenue

Kiosk Advertisement Revenue							
Category	Fraction of Year	# of Units	Annual Revenue Low ($)	Annual Revenue High ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
Kiosk	1	34	$19,500	$26,000	663,000	773,500	884,000
TOTAL	-	-	-	-	$663,000	$773,500	$884,000

App Ad Revenue							
Category	Type	# of Users Low	# of Users High	Per Unit Revenue ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
App	CPM Banner	144,000	288,000	5	720	1,080	1,440
App	CPM Video	144,000	288,000	15	2,160	3,240	4,320
App	CPC	576	1,728	0.5	288	576	864
TOTAL	-	-	-	-	$3,168	$4,896	$6,624

Band Revenue						
Category	# of Units Low	# of Units High	Unit Price High ($)	Revenue Low ($)	Expected Revenue ($)	Revenue High ($)
Band	50,400	273,600	1.99	100,296	322,380	544,464
TOTAL	-	-	-	$100,296	$322,380	$544,464

TOTAL	$766,464	$1,100,776	$1,435,088

Year 03 Revenue

Kiosk Advertisement Revenue							
Category	Fraction of Year	# of Units	Annual Revenue Low ($)	Annual Revenue High ($)	Revenue Low ($)	Revenue Expected ($)	Revenue High ($)
Kiosk	1	34	$19,500	$26,000	663,000	773,500	884,000
TOTAL	-	-	-	-	$663,000	$773,500	$884,000

App Ad Revenue							
Category	Type	# of Users Low	# of Users High	Per Unit Revenue ($)	Revenue Low ($)	Revenue Expected ($)	Revenue High ($)
App	CPM Banner	360,000	576,000	5	1,800	2,340	2,880
App	CPM Video	360,000	576,000	15	5,400	7,020	8,640
App	CPC	1,440	3,456	0.5	720	1,224	1,728
TOTAL	-	-	-	-	$7,920	$10,584	$13,248

| Band Revenue						
Category	# of Units Low	# of Units High	Unit Price High ($)	Revenue Low ($)	Revenue Expected ($)	Revenue High ($)
Band	115,200	547,200	1.99	229,248	659,088	1,088,928
TOTAL	-	-	-	$229,248	$659,088	$1,088,928

TOTAL	$900,168	$1,443,172	$1,986,176

Exhibit 13

Break-Even Analysis

Worst Case

Worst Case	Cost	Revenue	Profit
Year 1	$1,076,290	$235,843	-$840,447
Year 2	$1,184,290	$766,464	-$417,826
Year 3	$984,176	$900,168	-$84,008
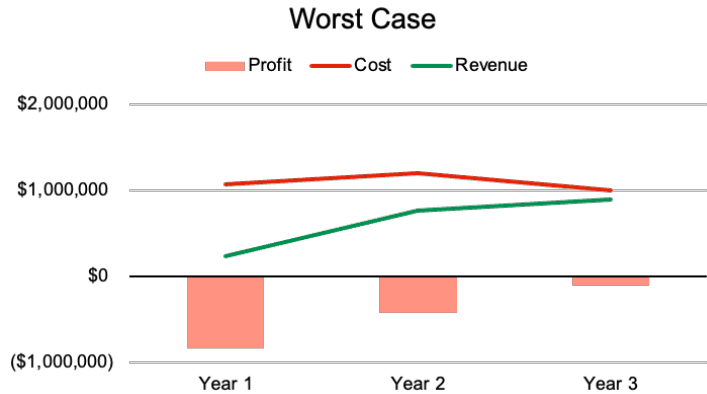
Realistic

Realistic	Cost	Revenue	Profit
Year 1	$966,815	$278,286	-$688,529
Year 2	$1,047,250	$1,100,776	$53,526
Year 3	$856,048	$1,443,172	$587,124
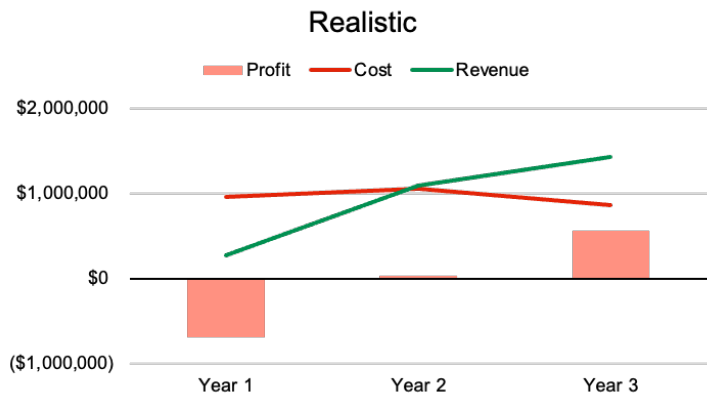
Best Case

Best Case	Cost	Revenue	Profit
Year 1	$1,076,290	$320,729	-$755,562
Year 2	$1,184,290	$1,435,088	$250,798
Year 3	$984,176	$1,986,176	$1,002,000