

CURRENTLY IN DEVELOPMENT

This project is an ongoing exploration of how connected technology can improve visibility, control, and reliability across the food-delivery journey.

PHASE 1

We track our food.

But we don't track what happens to it.

Rethinking the food-delivery journey through connected technology.

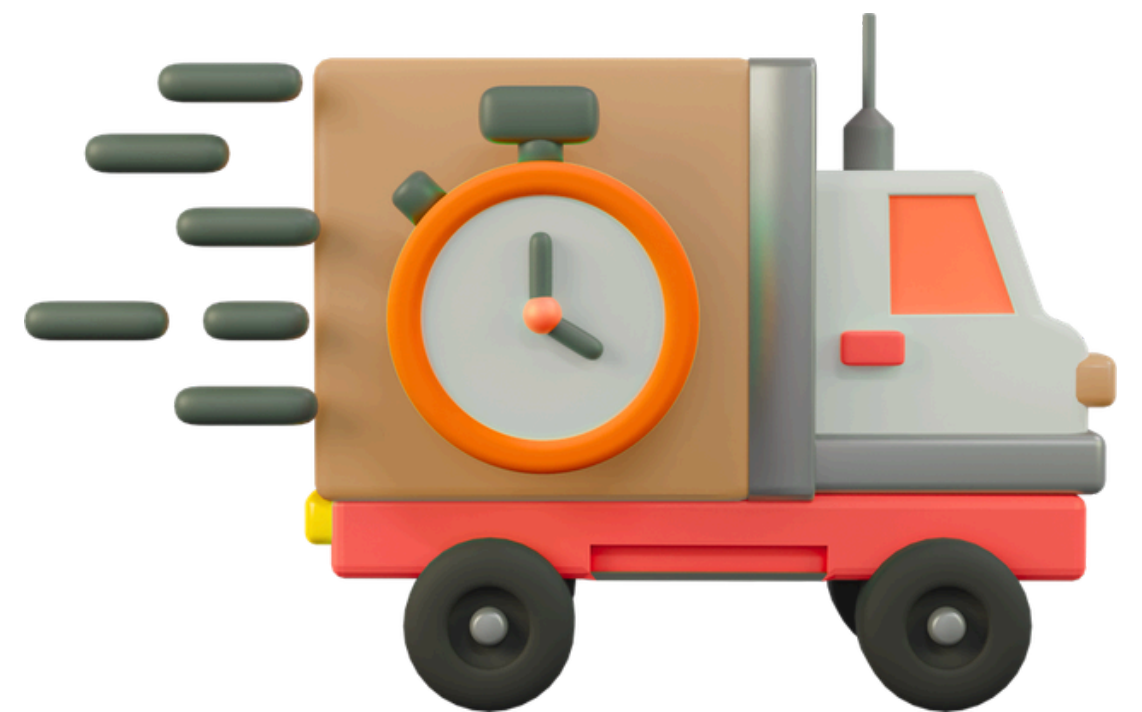


Kitchen → Packing → Pickup → Delivery → Customer

So what happens to the food in between?

So what happens to the food throughout the journey?

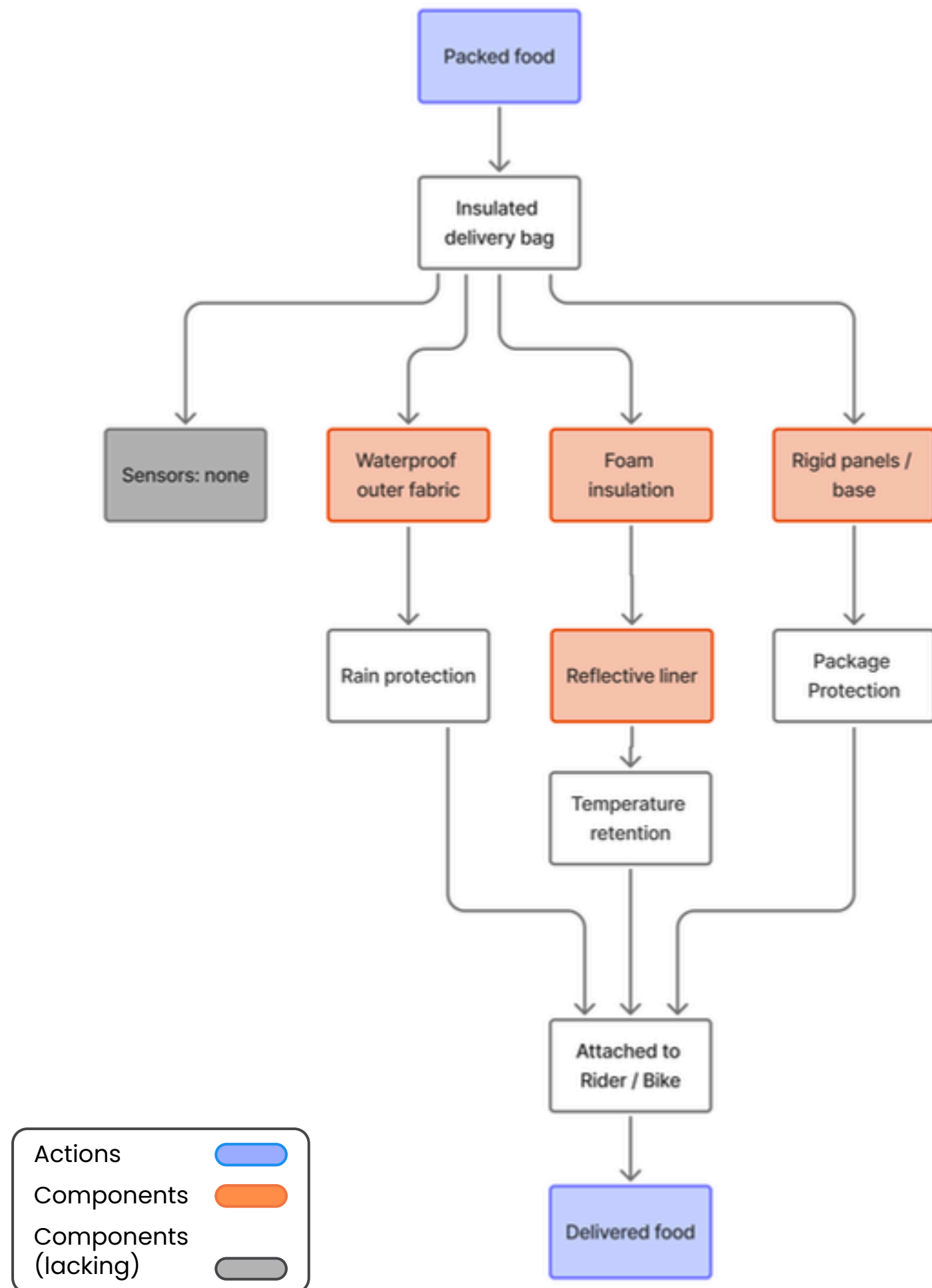
- 56% reported food being damaged, spilled, or distorted by delivery-agent handling more than once in the past year.
- Average urban delivery time: ~35 min
- 90% wanted best-before / temperature-safe-time information displayed.
- 88% wanted stricter mandated food-packaging standards.



The problem isn't that food isn't being delivered.
The problem is that its condition is invisible.



What happens in the 35 min?



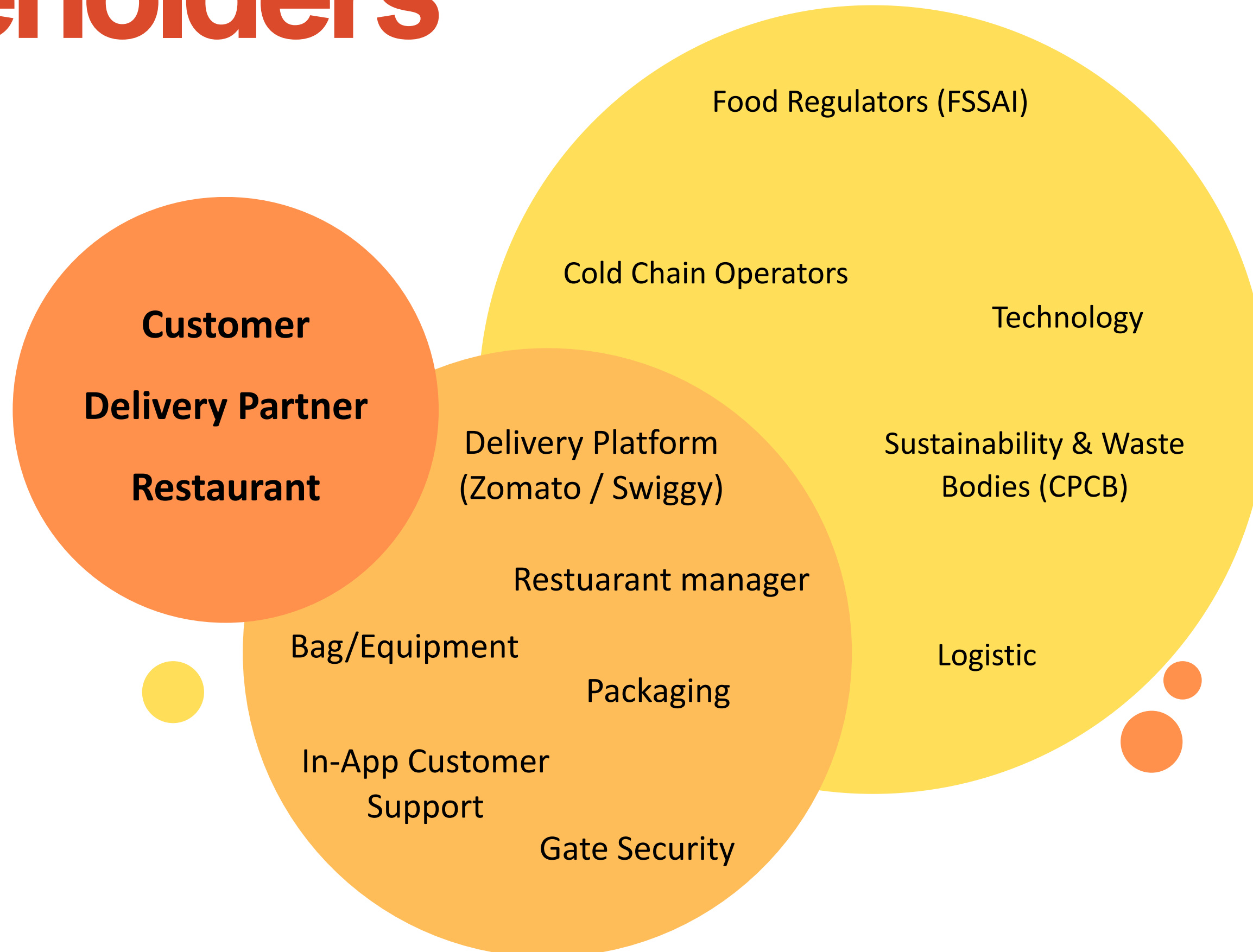
~35 min

average urban delivery time in India
— corroborated by both Indian
platform data and a peer-reviewed
EU study, which found this window
still lets >95% of meals arrive in the
bacterial danger zone (7–60°C).

(Vermeersch et al., 2026)



Stakeholders



So we asked: what actually matters to people?

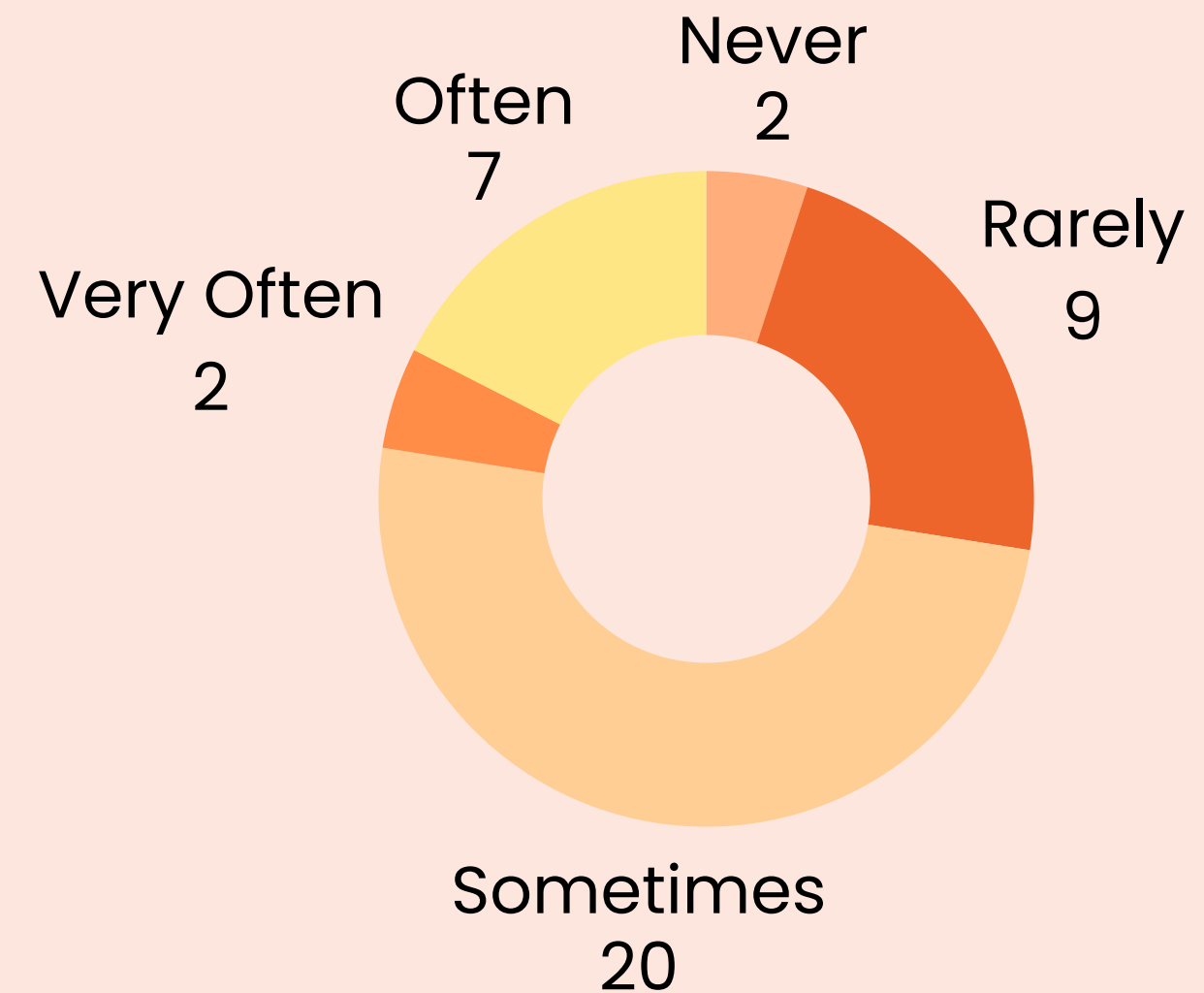
40 respondents; 79% aged 18–25; Zomato + Swiggy users

Food Temperature

- 9 out of 40 participants (22.5%) said their food arrived at the expected temperature.
- while 31 participants (77.5%) had almost never recieved the food in their expected temprature.

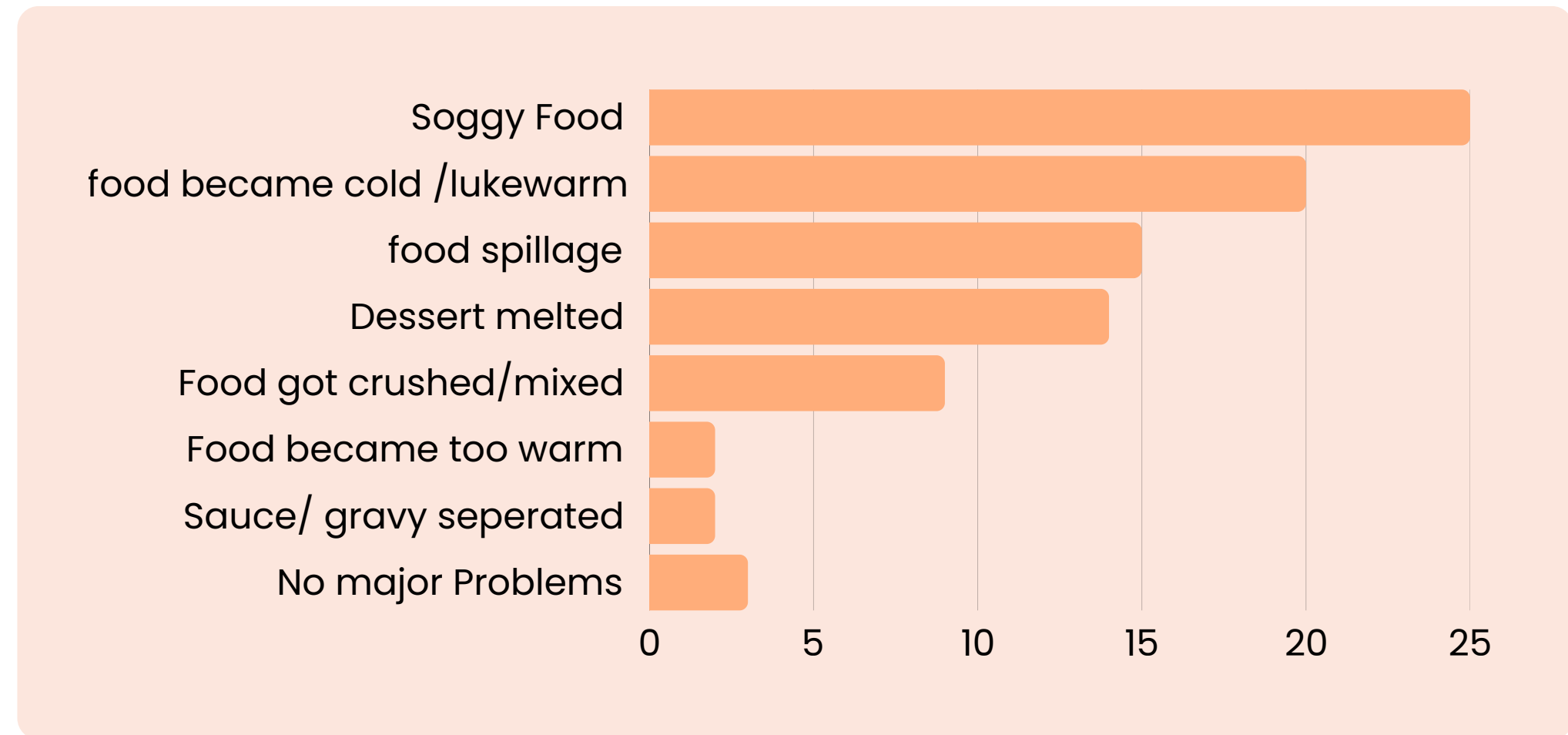
Food arriving at the expected temperature is not a consistent experience for most participants. This indicates that maintaining the desired food temperature during delivery remains a prominent challenge.

how often did your food arrive at your expected temprature



Which food-quality problems have you experienced after delivery?

- 37 out of 40 participants (92.5%) experienced their food becoming soggy after delivery, food arriving cold or lukewarm (50%), spillage (37.5%), and desserts melting (35%).
- Only 3 participants (7.5%) reported experiencing no major problems, indicating that changes in food quality and condition during delivery are common.

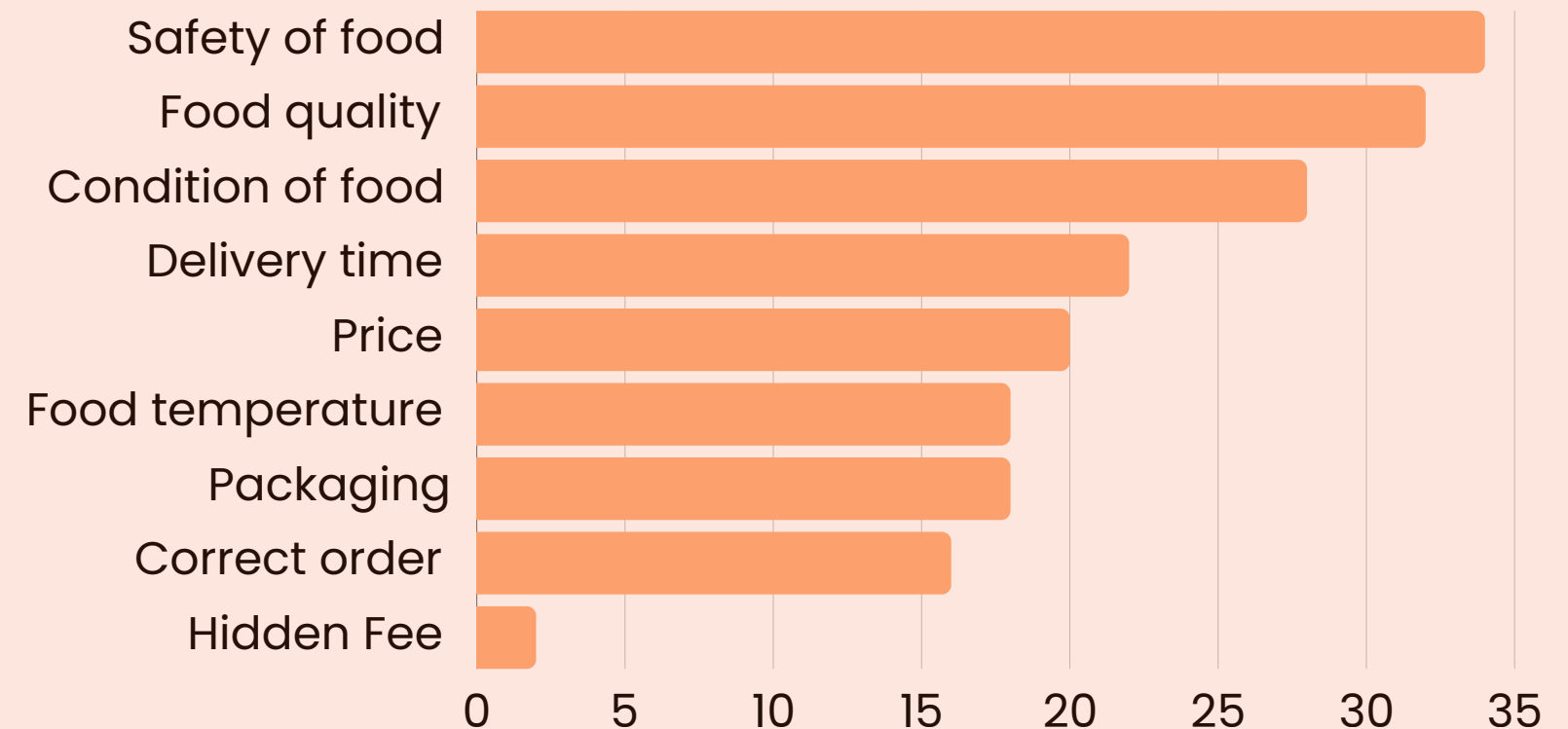
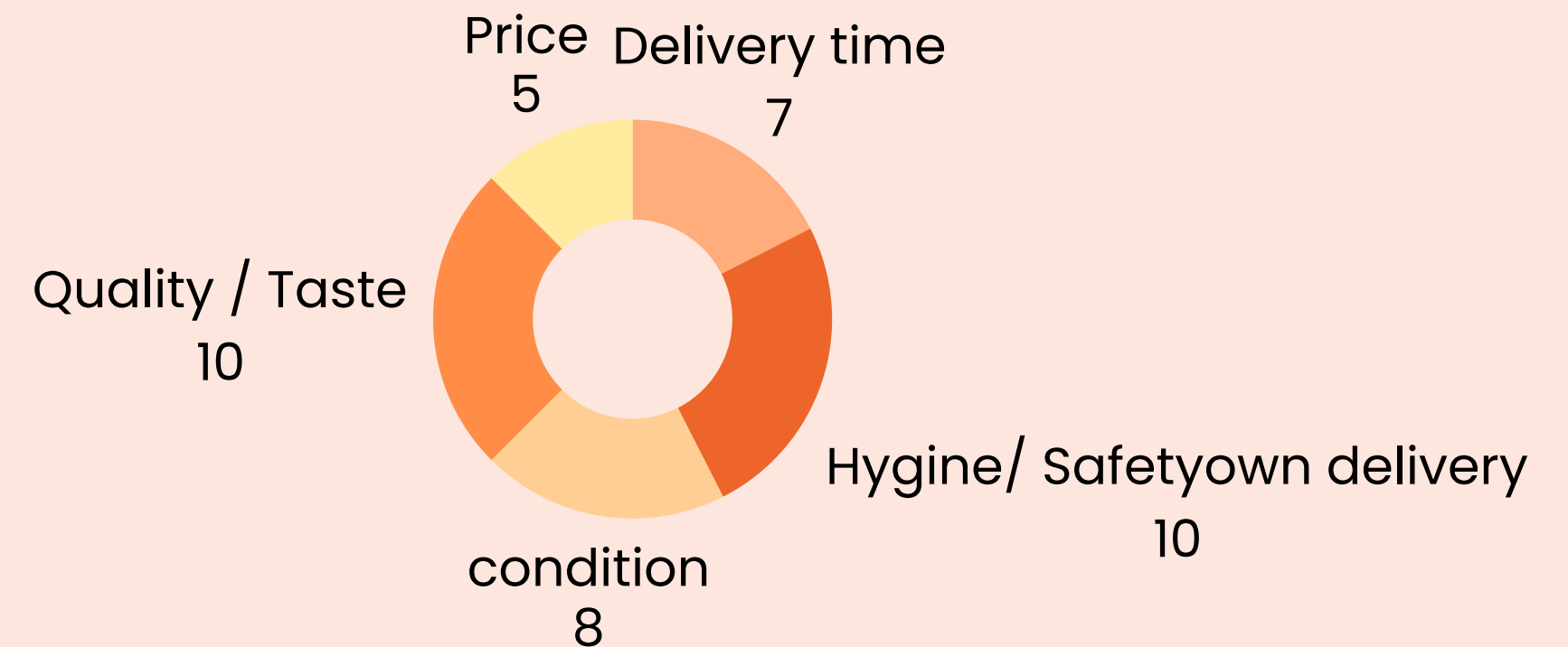


Food quality often deteriorates during delivery, with sogginess and loss of temperature being the most common issues. The low percentage of participants reporting no major problems highlights a broader challenge in preserving food quality and condition throughout transportation.

What matters most when receiving a food delivery?

- Food safety (85%) and quality/taste (80–85%) are the most critical factors for participants.
- Food condition upon arrival is also important to 67.5–70% of respondents.
- Delivery time (55%) and price (50%) rank lowest, showing that safety, taste, and food condition matter more than convenience or cost.

Food quality/taste and safety emerged as the strongest priorities, with 85% of participants selecting each. This suggests that customers place greater importance on the quality, safety, and condition of food than on price or delivery speed.



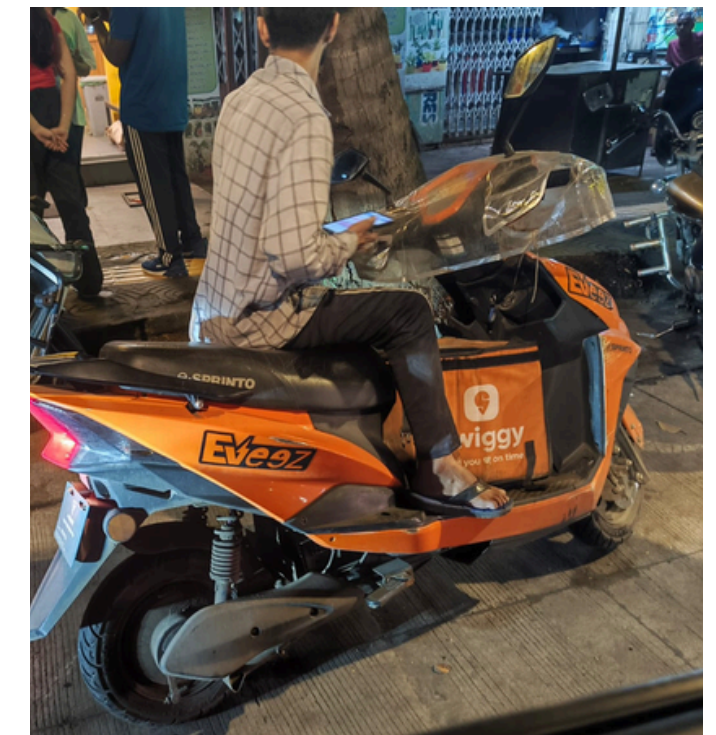
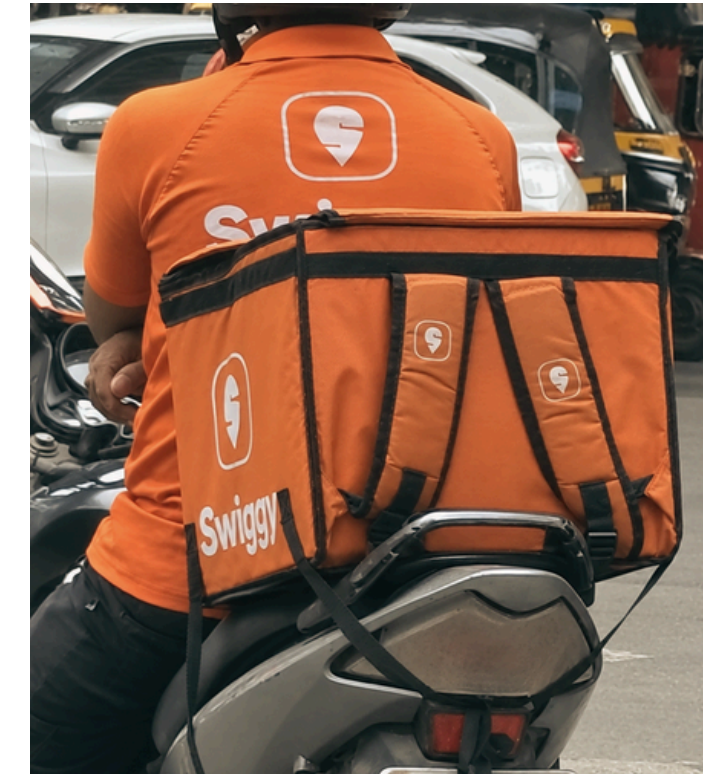
Camera study

The bag isn't always where we think it is.

Riders may place delivery bags on the scooter floorboard to reduce back strain — exposing the bag to shoe dirt and road splash.

Bag Placement & Hygiene Perception

Riders use different improvised ways to transport delivery bags across vehicles. On motorcycles, bags are often **tied down to the rear pillion seat using makeshift straps**, leading to noticeable tilting on uneven roads. On scooters, bags are frequently placed on the **front floorboard** between the rider's feet. Without standardized mounts, none of these methods offer a fully secure or stable hold for food packages during transit.



Primary Research Findings

Delays Affect More Than Time

Late deliveries were repeatedly mentioned in participants' worst experiences.

Several respondents described orders taking over an hour, with food arriving completely cold by the time it reached them.

Delivery Partner Interview

- They have detachable bags, but they do not prefer carrying them while **delivering the order to the doorstep**.
- They take the package out of the bag and carry it to the customer's home.
- They complete multiple orders in a day, and sometimes orders **do get mixed up**.
- During **rush hours**, food may get delayed, and riders may have to handle multiple orders at once.





Food Quality & Hygiene Matter Most

85%

34 of 40 participants identified food quality/taste and hygiene/safety as their top concerns when receiving a delivery.

Temperature Is Unpredictable

58%

17 of 40 participants experienced their food arriving at an unexpected temperature at least sometimes.

Food that arrives late is often not just late, it arrives cold, soggy or no longer in its intended condition.

Participants wanted clearer information about:

Where is my order?

When will it actually arrive?

How many deliveries are ahead of me?

What condition will my food be in when it arrives?

"Give me accurate ETA, not an optimistic ETA which keeps getting extended."

Food Condition Gets Compromised

67.5%

27 participants considered the physical condition of the food important.

Reported experiences included:

- Crushed pizza
- Spilled food and drinks
- Damaged packaging
- Missing items
- Foreign objects in food

Participants suggested improvements around:

Better packaging, Hygiene, Spill prevention, Food protection, Sustainable materials

One participant specifically highlighted that packaging should better protect food while avoiding unnecessary plastic and aluminium foil.

Why hasn't it been solved?

GrubPac



What It Addresses

- Active Dual-Zone Climate Control (70°C to -25°C) ([GrubPac](#))
- IoT Fleet & Food Hygiene Monitoring

GAPS

- Fixed compartments struggle to fit wide, oversized items like large pizzas.
- Built-in batteries and cooling hardware make the box heavy, tiring riders.
- Expensive unit cost and daily battery charging make mass rollout difficult. ([GrubPac Fleet Logistics Review](#))

Starship robots



What It Addresses

- Self-driving sidewalk delivery with insulated storage for hot/cold items and secure app unlocking. ([Starship Technologies](#))

GAPS

- Not made in urban cities like Mumbai
- Cannot climb stairs, use elevators, or reach apartment doorsteps.
- Restricted to walking speeds (6 km/h) and short-range distances.

Zomato/ Swiggy delivery boxes



What It Addresses

- Thermal Insulation & Temperature Retention (45–60 mins) ([IndiaMART](#))
- Weatherproof Protection & Structural Rigidity

GAPS

- Spills soak into foam and leave odor on future orders.
- Cannot separate hot/cold items; trapped steam makes food soggy.
- Hard-to-clean porous straps and zippers accumulate bacteria.
- Bag can sometimes tilt and food inside can spill.

Pizza bags



What It Addresses

- Wide 15 × 15 inch base and 4-way EPE foam insulation keep pizza boxes completely flat, preventing topping slides and heat loss.

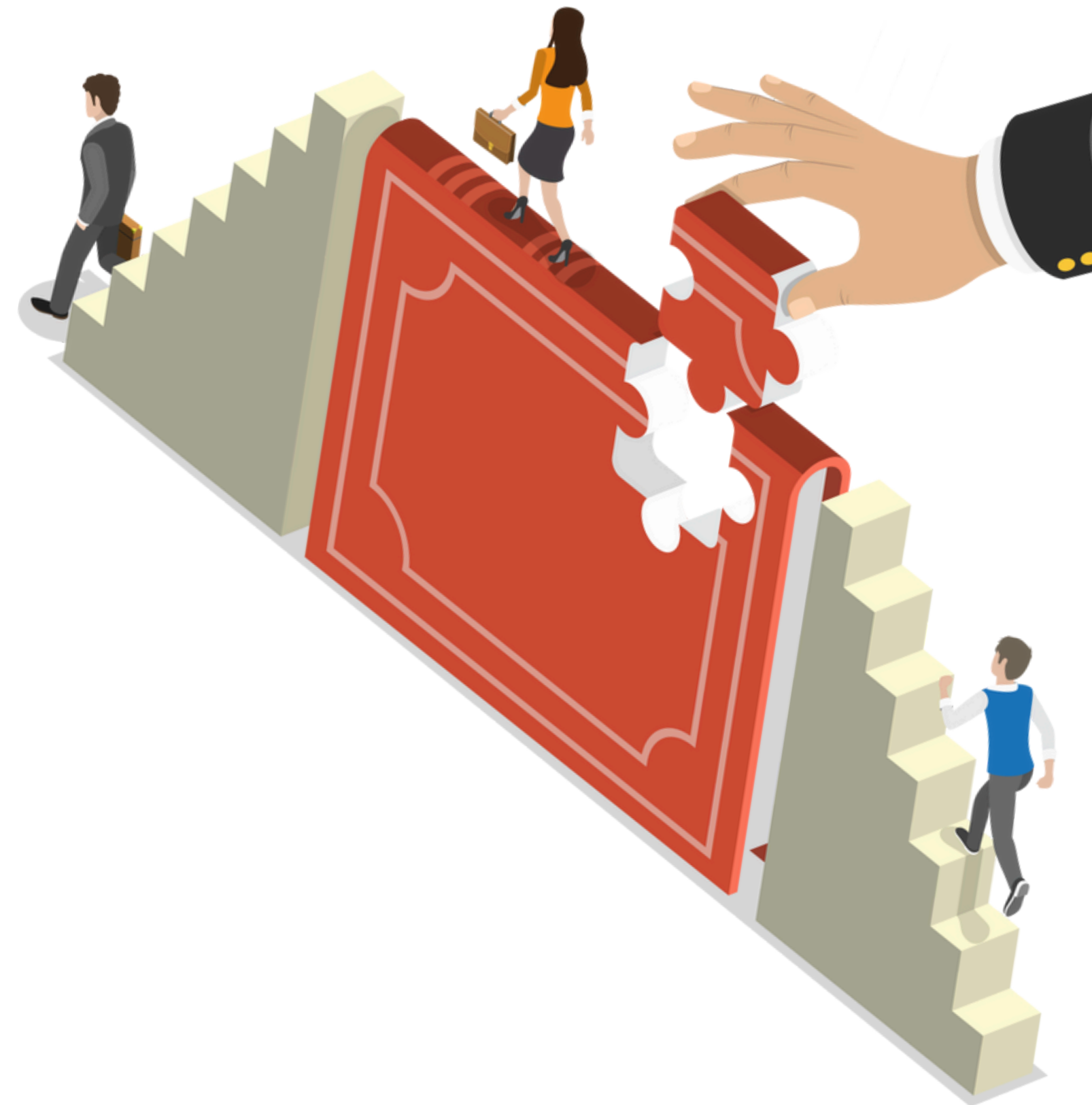
GAPS

- Flatter, wide shape cannot fit tall items, drink cups, or standard multi-restaurant orders.
- Bag would be worn vertically; not ideal for handling pizzas.
- Wide, handheld profile lacks stable backpack straps, making two-wheeler transit clumsy. ([IndiaMART](#))

Gap Analysis

Key challenges in food delivery include:

- Lack of **continuous temperature** monitoring from restaurant to customer.
- **Invisibility of hygiene practices** for food and delivery bags.
- **Mixing** of hot and cold items, affecting their ideal conditions.
- Difficulty in identifying **accountability** for damaged food.
- Inadequate **packaging stability** leading to shifting, spilling, or crushing.
- Standard packaging not catering to **various food** shapes and sizes.
- **Delays in coordination** between restaurants and riders increase exposure to changing conditions.



Opportunity Areas

Key features for improving food delivery include:

- **Real-time monitoring** of food conditions (temperature, etc.)
- Enhanced **temperature management** during waiting and transit
- Separate **compartments** for hot, cold, liquid, and fragile items
- Visible indicators for food handling
- End-to-end **transparency** on food conditions during delivery
- **Condition-based accountability** to identify responsibility for issues.



How might we transform the existing delivery bag
into a **connected system** that can
monitor, manage and communicate the condition of
individual food parcels throughout delivery?

*Continuous visibility across
the delivery journey*

*Maintain, track and
respond to changes in
food condition*

How might we transform the existing delivery bag
into a **connected system** that can
monitor, manage and communicate the condition of
individual food parcels throughout delivery?

*Parcel-level tracking instead of
treating the bag as one unit*

Each solves a piece.
None connects the whole journey.

MVP 1: Thermal Management & Weight Detection

A smart delivery box with dual thermal control, real-time weight monitoring and customer communication to ensure food quality, prevent tampering and create additional value.



HOW IT WORKS



MVP 2: Emergency Response Drone Attachment

Attachable drone module enables last-mile delivery in emergency and disaster situations when roads are inaccessible.



USE CASES



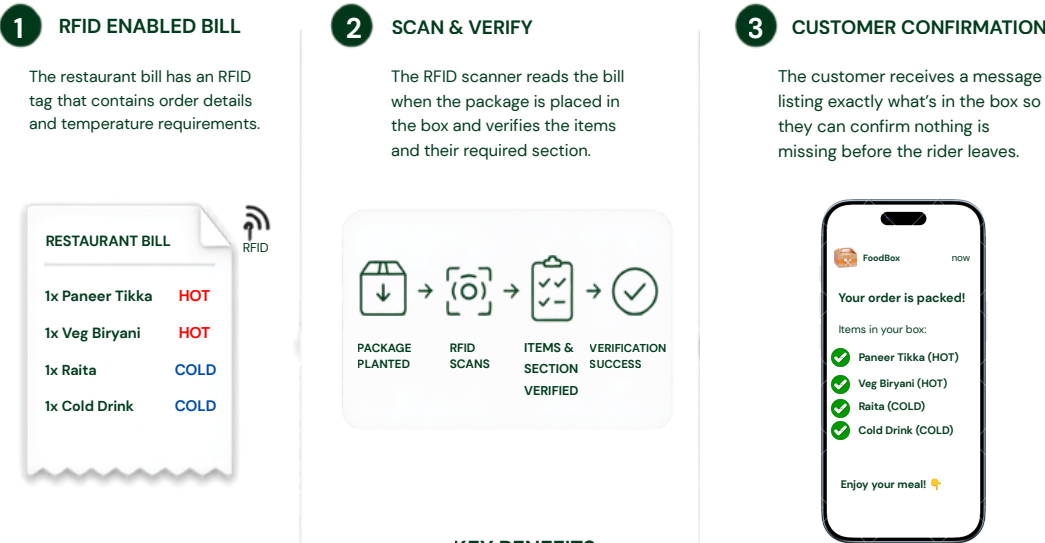
DELIVERS HOPE. ANYWHERE.
Bridging the last mile when the world is cut off.

MVP 3: RFID-Based Item Verification & Section Placement

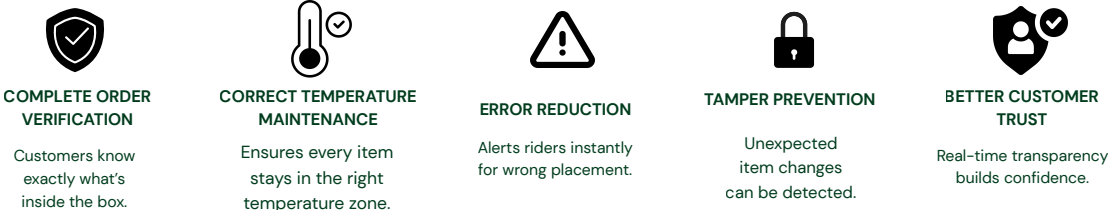
RFID technology verifies what's inside the box and ensures every item is placed in the correct section (hot or cold). Customers get instant confirmation so they know their full order is on the way.



HOW IT WORKS



KEY BENEFITS



FINAL CONCEPT

MVP 1

Thermal Management + Weight Detection



MVP 3

RFID Verification + Section Placement



Ensure that food reaches the customer in the condition it was prepared – correctly identified, properly placed, protected from temperature loss, and monitored throughout the delivery journey.

USER NEED

Reduce food-quality issues, order discrepancies, and delivery complaints by improving visibility and control between restaurant pickup and customer handover.

BUSINESS / SYSTEM NEED

Solving Problem

Food Quality + Delivery Reliability

A connected smart delivery box that combines RFID-based parcel verification with thermal and weight monitoring to maintain food quality and improve delivery transparency.

PRODUCT VISION

Smart Delivery Box — Product Overview

Problem It Solves

- *Hot food arrives cold and cold food arrives warm (no active temperature separation in current bags/boxes)*
- *Customers have no way to know if an item is missing until they open the bag at home*
- *No accountability for spillage or tampering during transit*
- *Delivery boxes today are a "dead" cost center with no secondary revenue potential*

The Smart Delivery Box is an IoT-enabled container for Indian platforms like Swiggy and Zomato that provides both customers and platforms real-time visibility into an order's condition and contents from kitchen to doorstep, effectively solving persistent last-mile problems like incorrect food temperatures, missing items, and in-transit tampering or spills.

Core Components

Dual Hot/Cold Compartments (Peltier Module)

Dual Hot/Cold Compartments Peltier module enables simultaneous heating and cooling. Maintains food at the required temperature.

Weight Sensor

Weight Sensor Tracks food load throughout delivery. Detects handover, spillage, or tampering.

RFID Scanner + RFID-Coded Bill

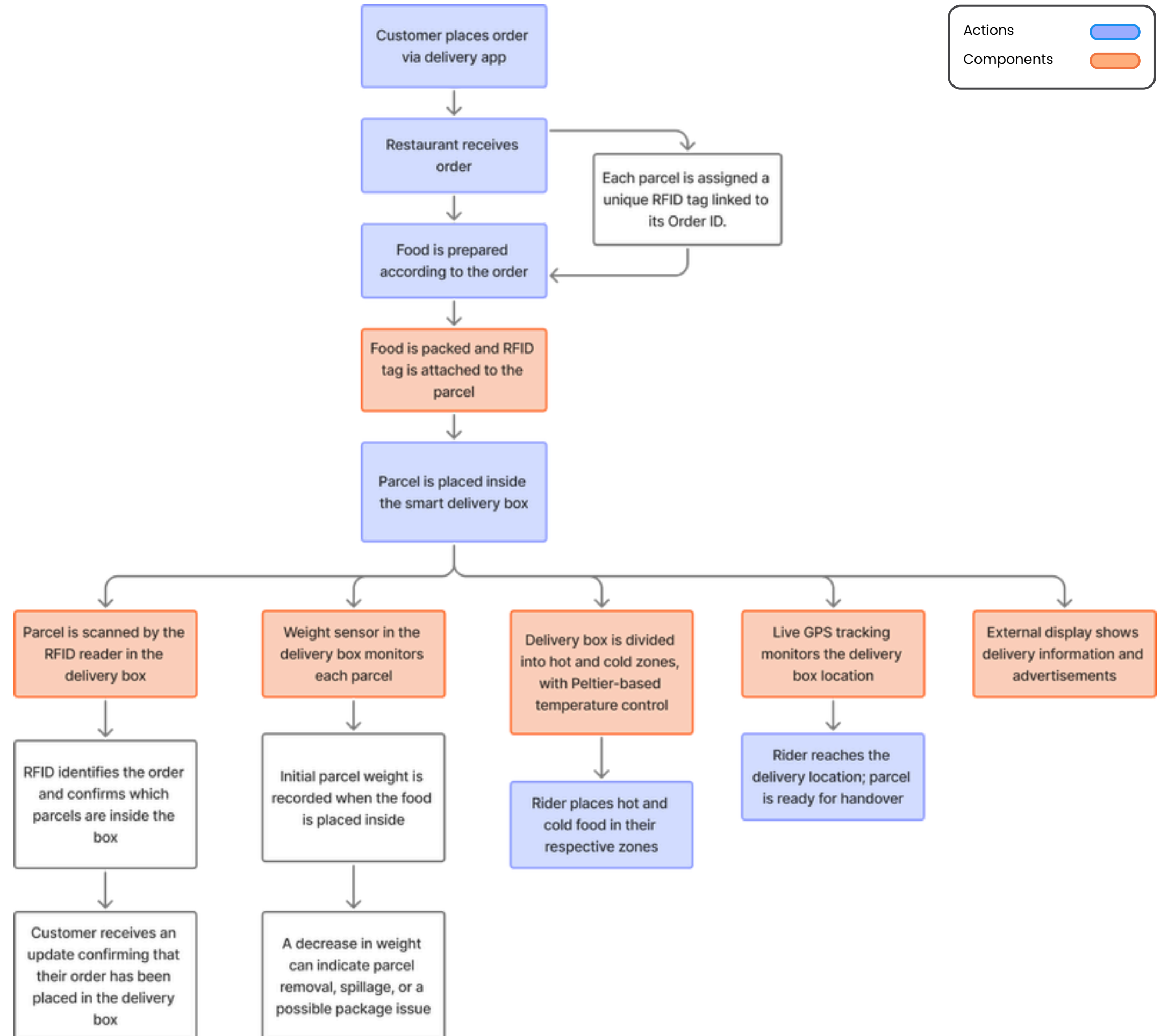
RFID Scanner + RFID Bill Verifies order contents and compartment placement.

Ad-Display Screens

Ad-Display Screens Displays advertisements during transit. Creates an additional revenue stream.



MVP System Architecture



Appendix

Digital Secondary Research mind Map -With References

403 ERROR

The request could not be satisfied.

Request blocked. We can't connect to the server for this app or website at this time. There might be too much traffic or a configuration error. Try again later, or contact the app or website owner.

If you provide content to customers through CloudFront, you can find steps to troubleshoot and help prevent this error by reviewing the CloudFront documentation.

Generated by cloudfront (CloudFront)

Request ID: j39Vqu9Jbp4nHfkyS9-m0VfmrWUf0rr3N5SSZRnc4vz6pcGr1-1N2w==

Survey link - In-depth *version*

From Restaurants to Doorstep: *Understanding the Food Delivery Journey*

This survey explores what happens to food between the restaurant and your doorstep. We're looking at delivery time, packaging, transportation, food temperature, handling, and the overall condition of your order when it arrives. Your responses will help us identify real-world challenges and opportunities to improve the food delivery experience.

[Sign in to Google](#) to save your progress. [Learn more](#)

* Indicates required question

Your Age *

☐ Below 18

—



Survey link - Short *version*

From Restaurants to Doorstep: *Understanding the Food Delivery Journey*

This survey explores what happens to food between the restaurant and your doorstep. We're looking at delivery time, packaging, transportation, food temperature, handling, and the overall condition of your order when it arrives. Your responses will help us identify real-world challenges and opportunities to improve the food delivery experience.

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* Indicates required question

Your Age *

☐ Below 18



Literature Review

#	SRNO.	Read by [insert name]	Link	Pages	Title	Year	Literature
	1	Manyata	https://www.sciencedirect.com/science/article/pii/S0168160526002035	13	Food safety assessment of last mile delivery as an alternative food distribution system for RTE multi-ingredient salad bowls	2026	
	2	Manyata	https://repository.lib.bcit.ca/islandora/delivering-disease-assessing-the-potential-for-time-temperature-abuse-in-online-food-delivery-services	15	Delivering Disease: Assessing the Potential for Time/Temperature Abuse in Online Food Delivery Services		

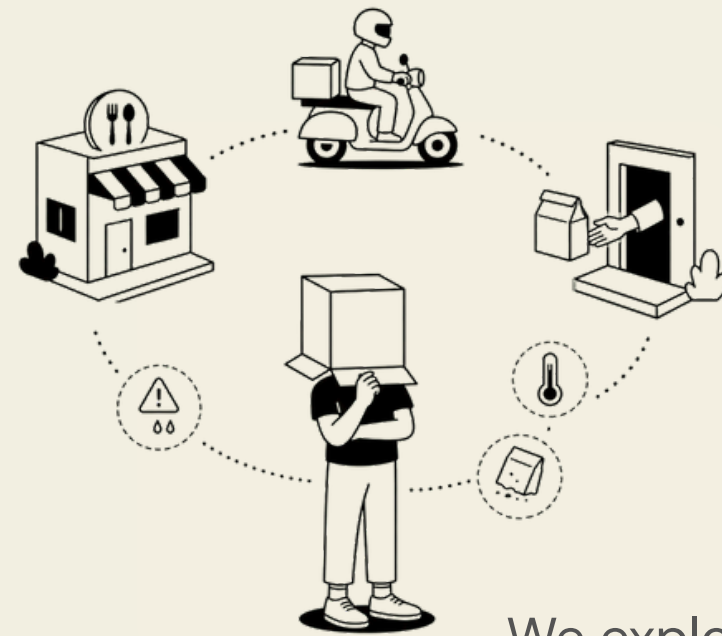
Sheet1

Sheet2

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- <https://www.figma.com/exit?url=https%3A%2F%2Fwww.google.com%2Fsearch%3Fq%3Dhttps%3A%2F%2Fwww.grubpac.com%2Ffleet-management>
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- How might we create a seamless delivery experience that ensures food stays safe, stable, and enjoyable throughout the delivery journey?
- How might we create a seamless delivery experience by improving how food is handled at every stage?
- Starship Technologies. (n.d.). Our robots. How might we create a connected food-delivery experience that keeps food safe, stable and at the right temperature from restaurant to doorstep?
- How might we create a seamless delivery experience that ensures food stays safe, stable, and enjoyable throughout the delivery journey?
- How might we create a seamless delivery experience by improving how food is handled at every stage?
- Domino's Pizza Enterprises Ltd. (n.d.). Domino's dXb: The future of delivery. How might we create a connected food-delivery experience that keeps food safe, stable and at the right temperature from restaurant to doorstep?
- How might we create a seamless delivery experience that ensures food stays safe, stable, and enjoyable throughout the delivery journey?
- How might we create a seamless delivery experience by improving how food is handled at every stage?
- RIVR. (2025, August 20). Just Eat Takeaway.com x RIVR: Bringing Physical AI food delivery robots to Europe. How might we create a connected food-delivery experience that keeps food safe, stable and at the right temperature from restaurant to doorstep?
- How might we create a seamless delivery experience that ensures food stays safe, stable, and enjoyable throughout the delivery journey?
- How might we create a seamless delivery experience by improving how food is handled at every stage?
- Wing. (2021, March 26). What do you want to know about Wing drone delivery? How might we create a connected food-delivery experience that keeps food safe, stable and at the right temperature from restaurant to doorstep?
- How might we create a seamless delivery experience that ensures food stays safe, stable, and enjoyable throughout the delivery journey?
- How might we create a seamless delivery experience by improving how food is handled at every stage?

PHASE 2



We explored the food-delivery journey from restaurant to customer and identified recurring issues in **food quality, safety and handling**.

RECAP

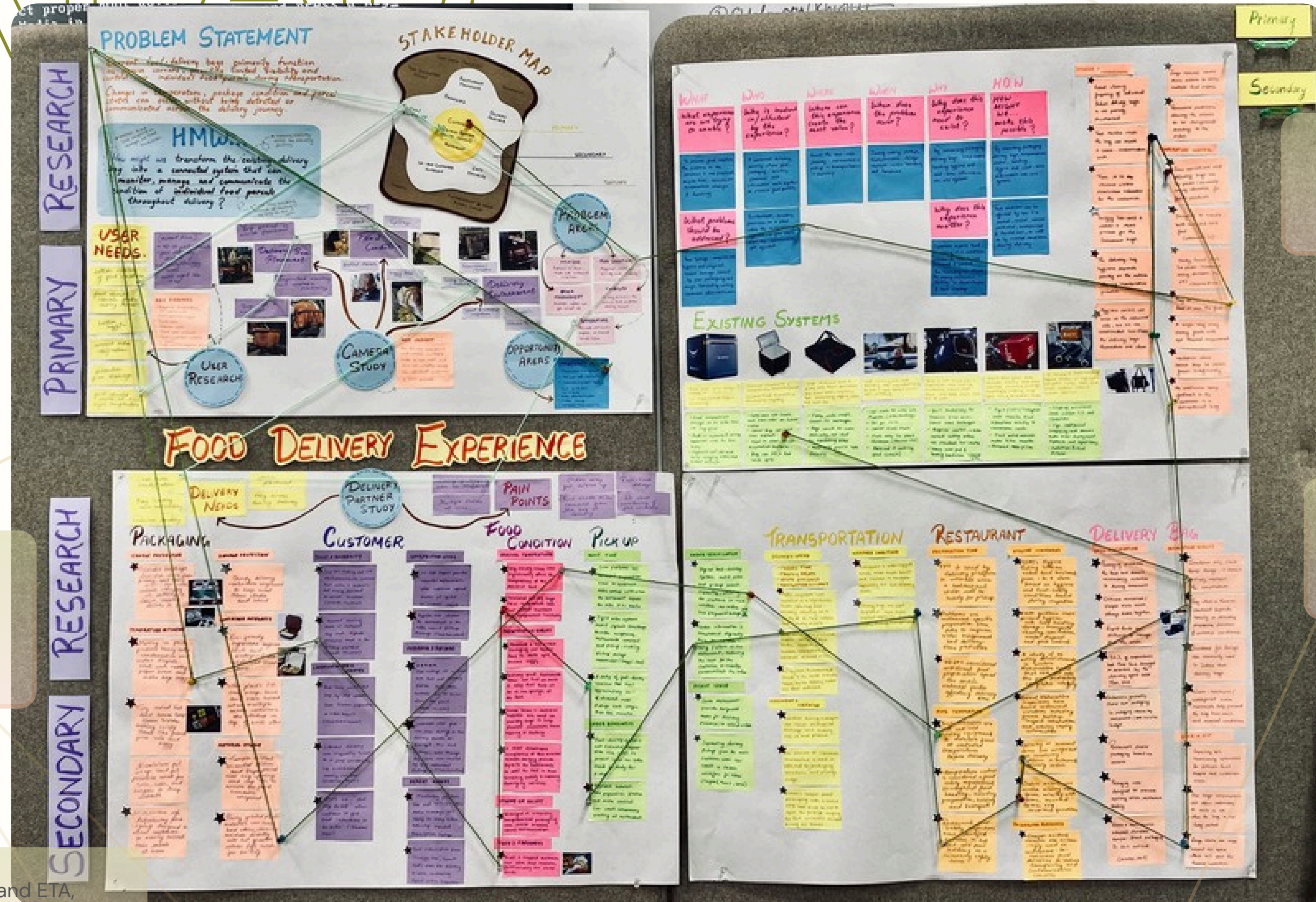
Transform the delivery bag into a connected system that can **monitor, manage and communicate food condition** throughout the journey.

OPPORTUNITY

Current delivery bags are passive carriers, with limited control or visibility over individual food parcels during delivery.

PROBLEM

THREAD



PREP-PICKUP DISCONNECT
Food readiness does not always align with rider arrival.

PASSIVE PROTECTION
Existing bags mainly contain and insulate food without active control.

Customers see location and ETA, but not the physical condition of their food during transit.

MULTIPLE-PARCEL HANDLING
Riders manage several orders with limited control over placement.

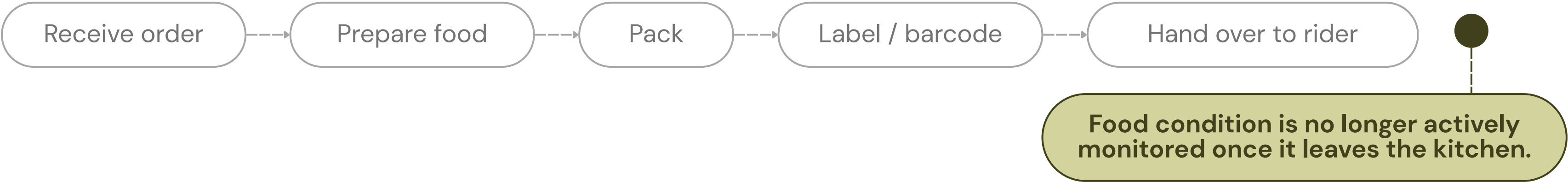
WIAPPING

CURRENT DELIVERY JOURNEY

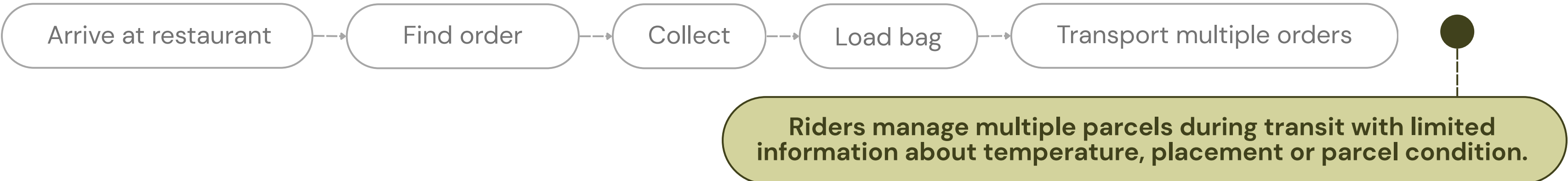
Current actions

gaps/insights

RESTAURANT – PREPARE & HANDOVER



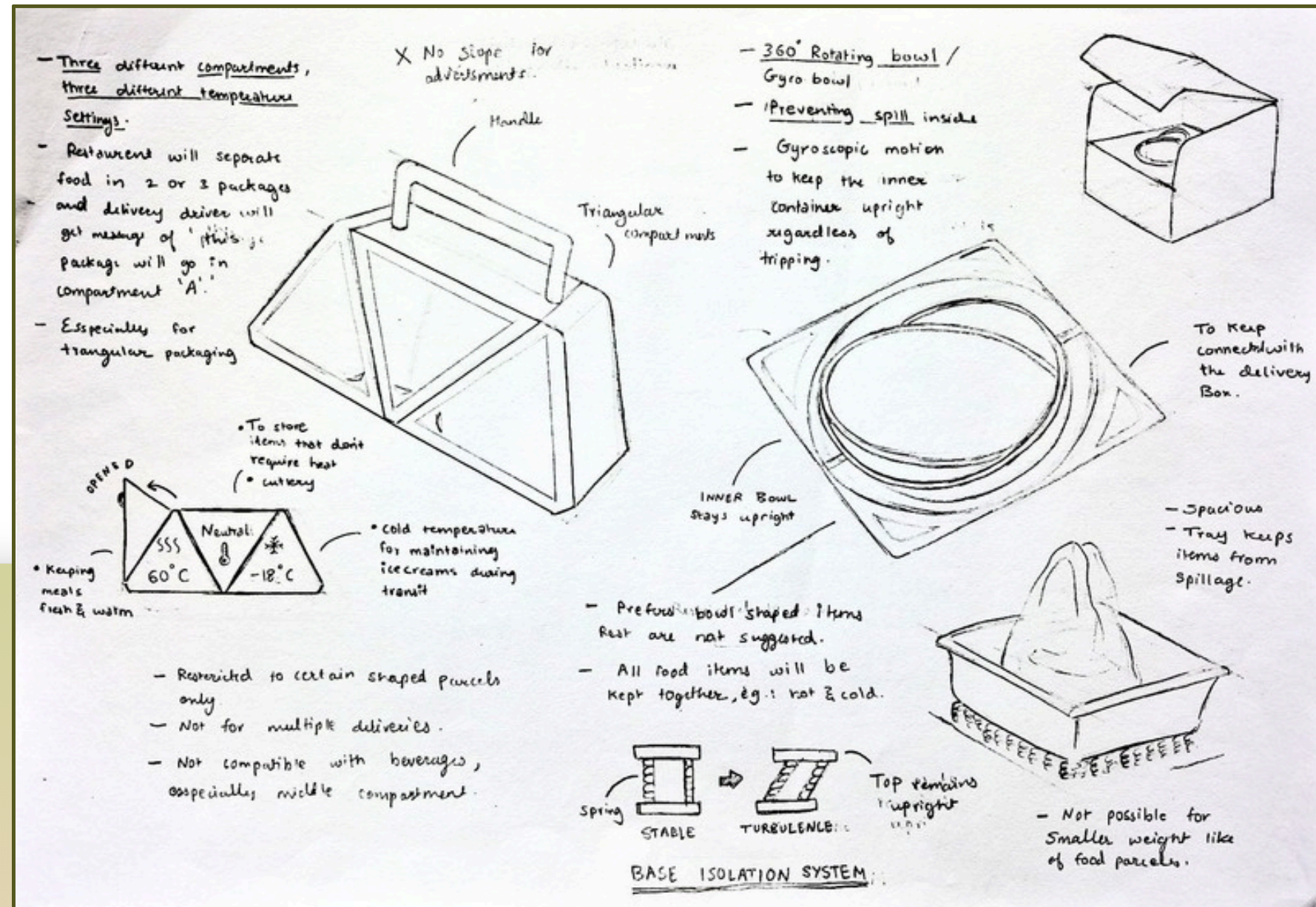
DELIVERY PARTNER – PICKUP & TRANSPORT



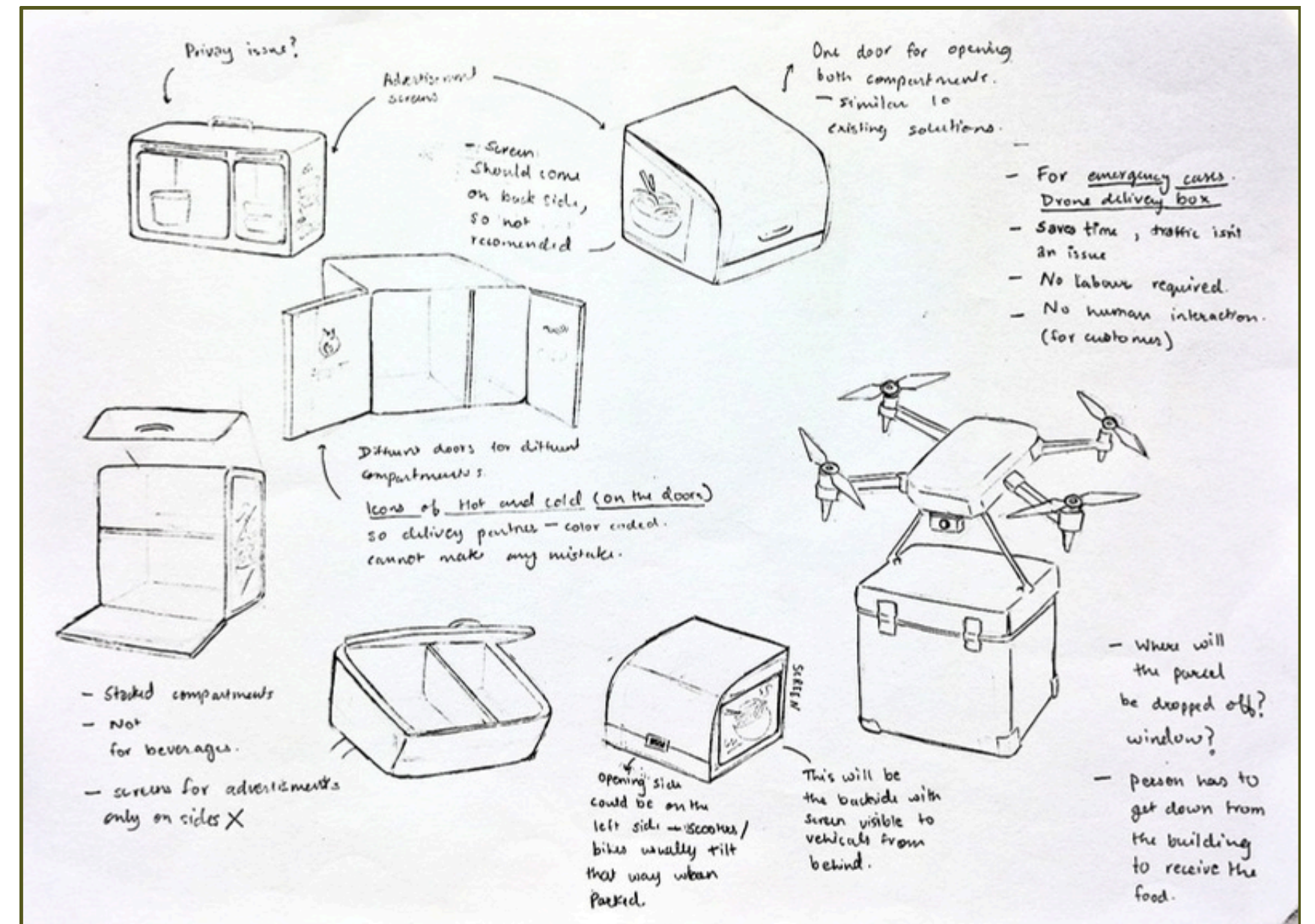
CUSTOMER – TRACK & RECEIVE



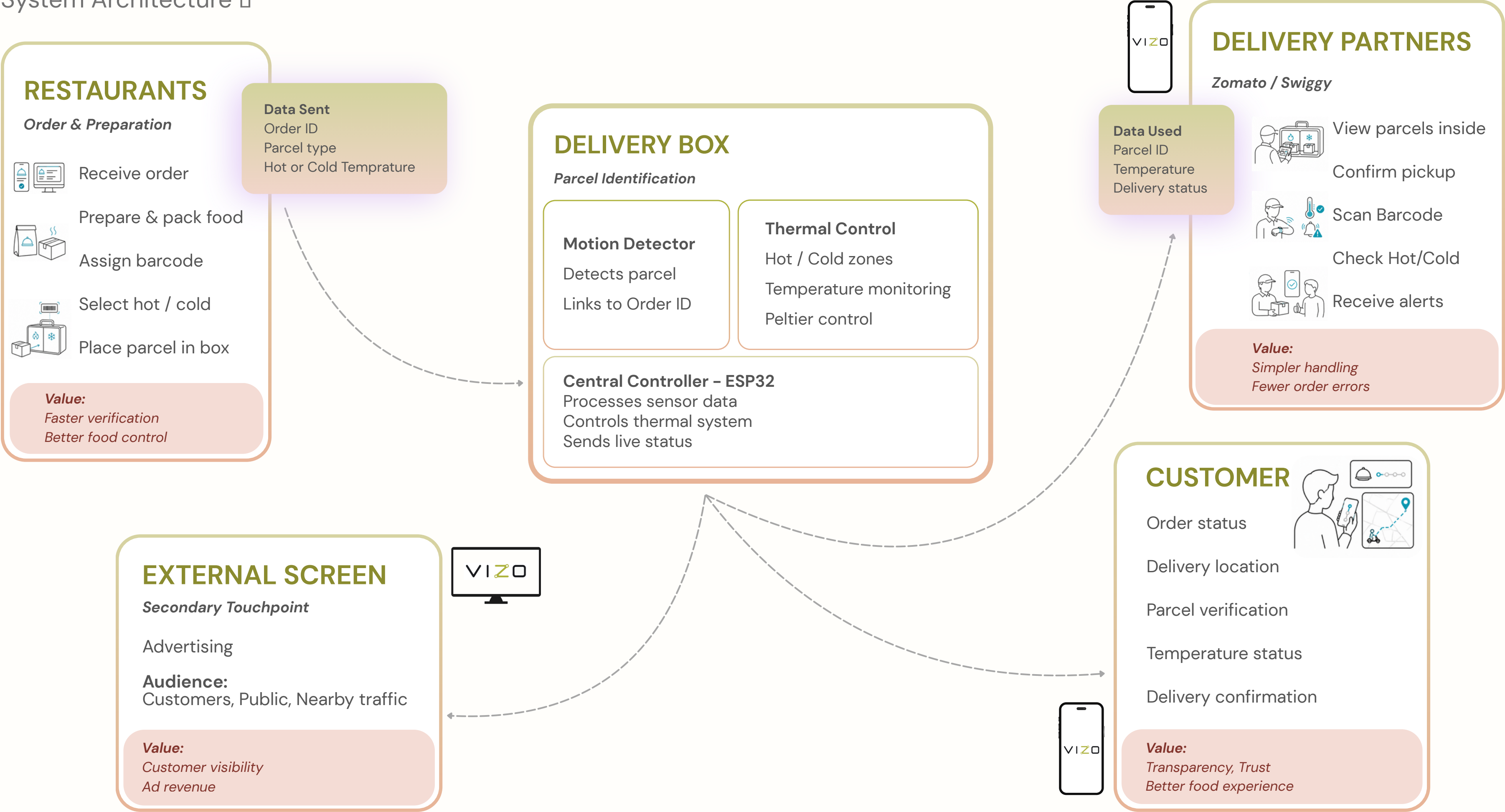
IDEATION SKETCHES



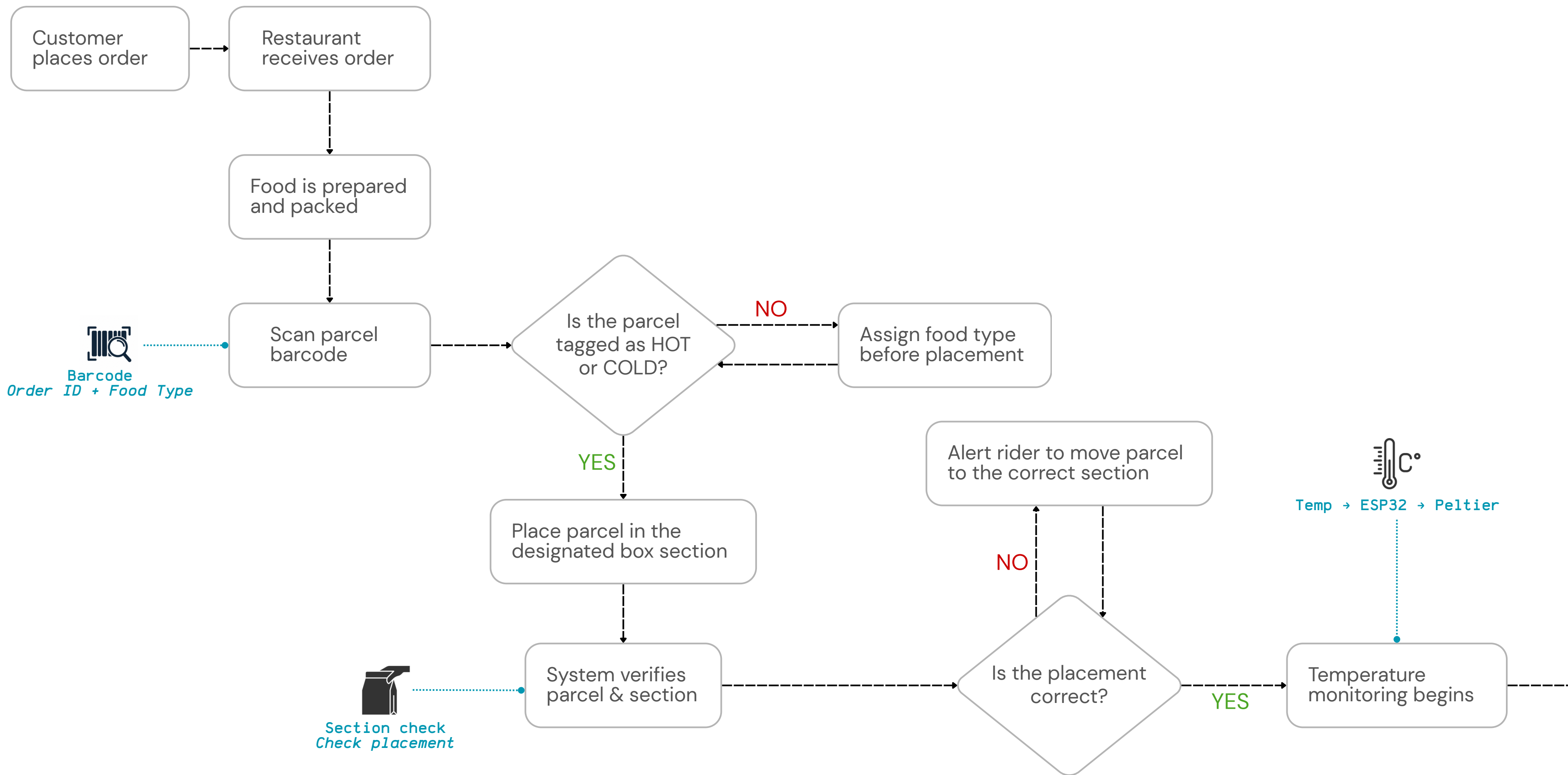
Ideations and Iterations of the product



System Architecture



User Flow





Live Status to
Rider / Customer

Parcel status; temp monitored
during transit

Rider takes out the
parcel in middle of
ride.

Message to the customer
informing them "please
check parcel ; donot
accept tampered/
incomplete parcel"

Rider reaches
customer location

Parcel removed
from delivery box

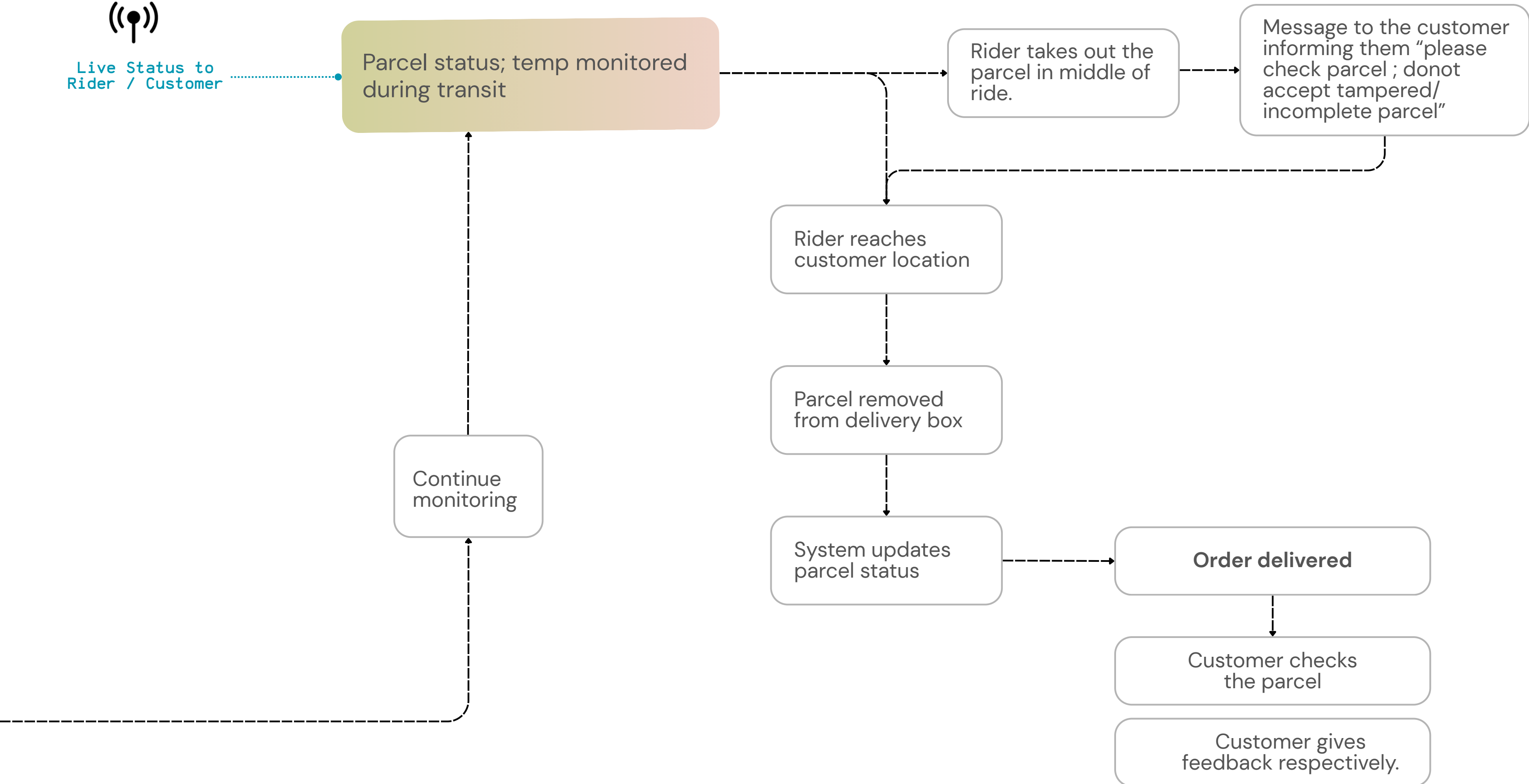
System updates
parcel status

Order delivered

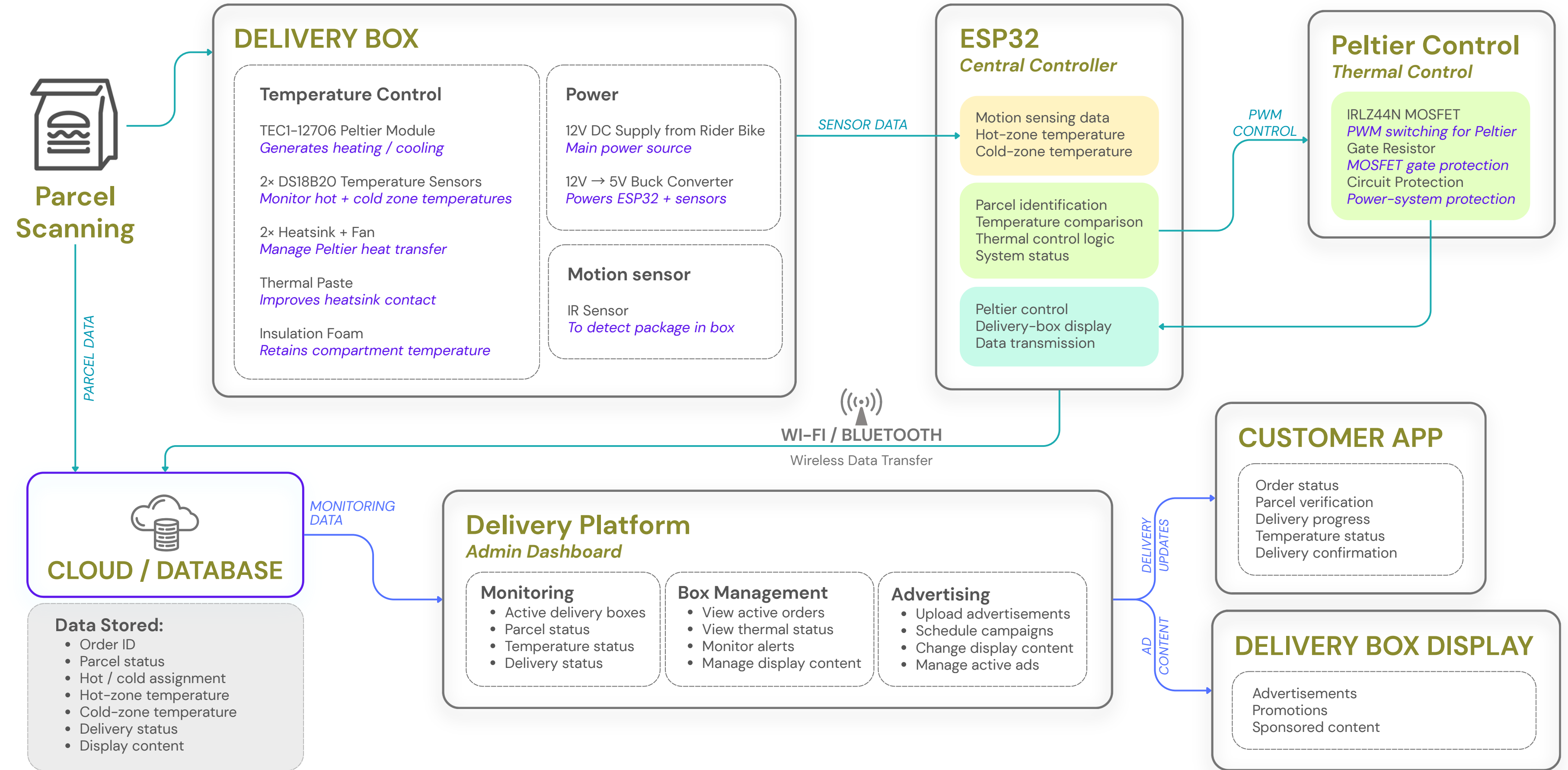
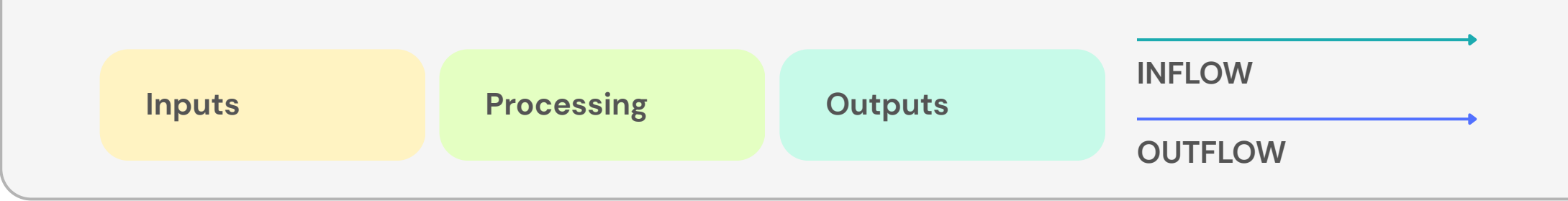
Customer checks
the parcel

Customer gives
feedback respectively.

Continue
monitoring



TECH PLAN – DATA INFLOW & OUTFLOW



vizoo



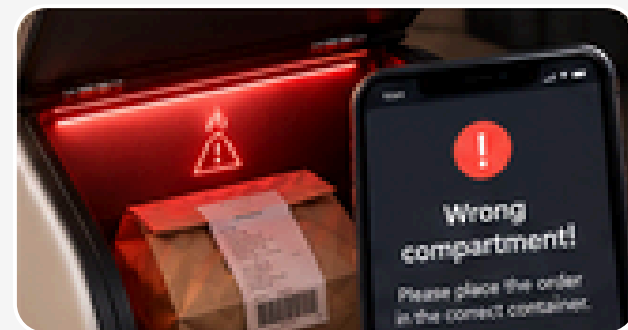
1 DYNAMIC ADVERTISING

A high-visibility screen lets restaurants run their own ads across all delivery boxes. Update campaigns anytime, anywhere – all boxes different / sync.



2 DUAL – TEMPERATURE STORAGE

Keeps hot food hot and crispy (up to 60°C) and cold items chilled and fresh (down to 3°C).



3 WRONG PLACEMENT ALERT

If an item is placed in the wrong container, the compartment lights up red and the rider gets an instant notification.



4 SCAN & SORT

Scan the order label and the box inside guides you with the right container. The corresponding container lights up, and the rider also receives a message accordingly.



Solution □

FINAL PRODUCT IMAGES

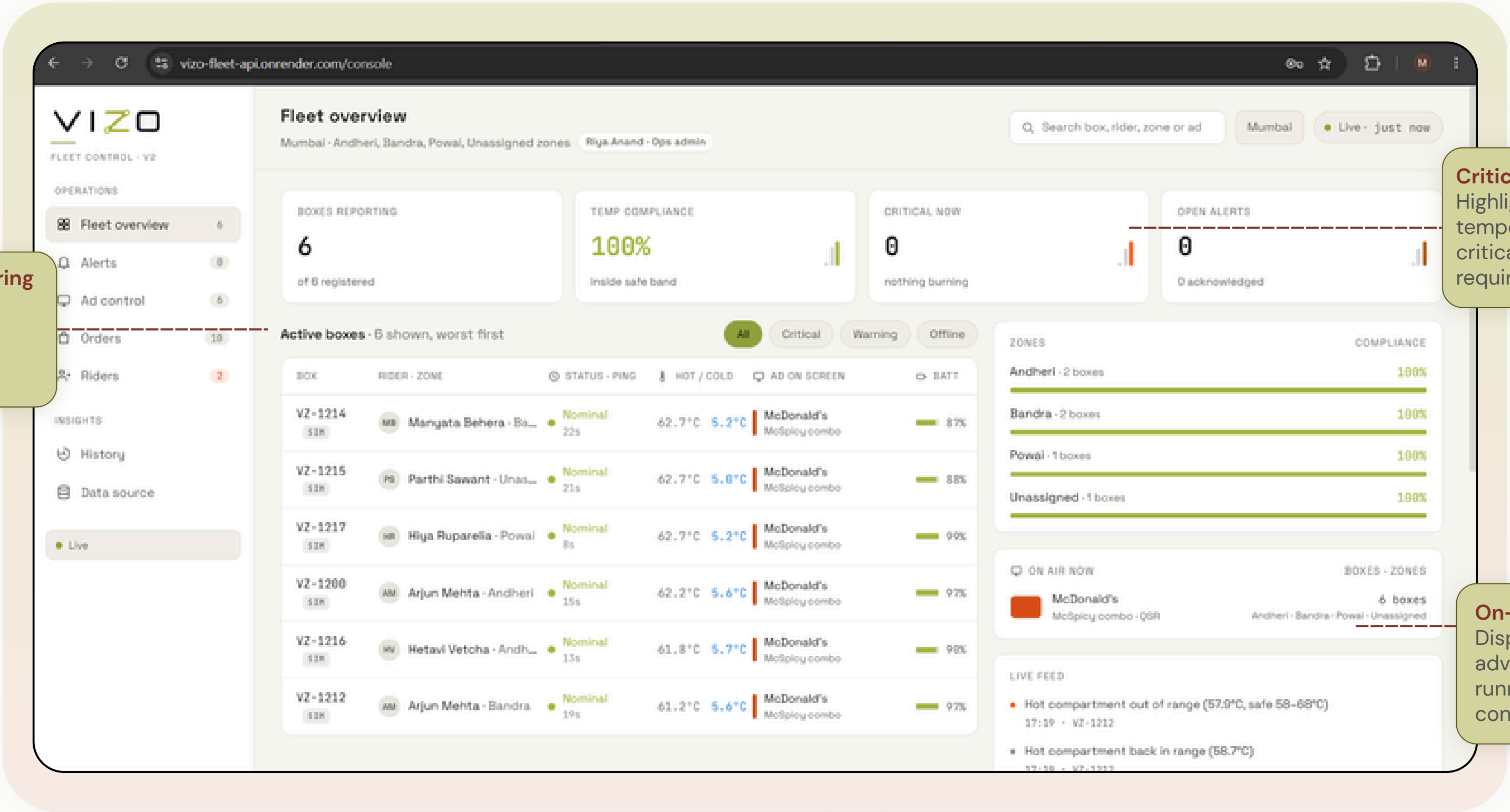


Admin Dashboard

FLEET OVERVIEW

A centralized dashboard for monitoring active delivery boxes, parcel conditions, temperature compliance and live operational alerts across the delivery fleet.

Active Box Monitoring
Tracks each box by rider, zone, status, temperature and battery.



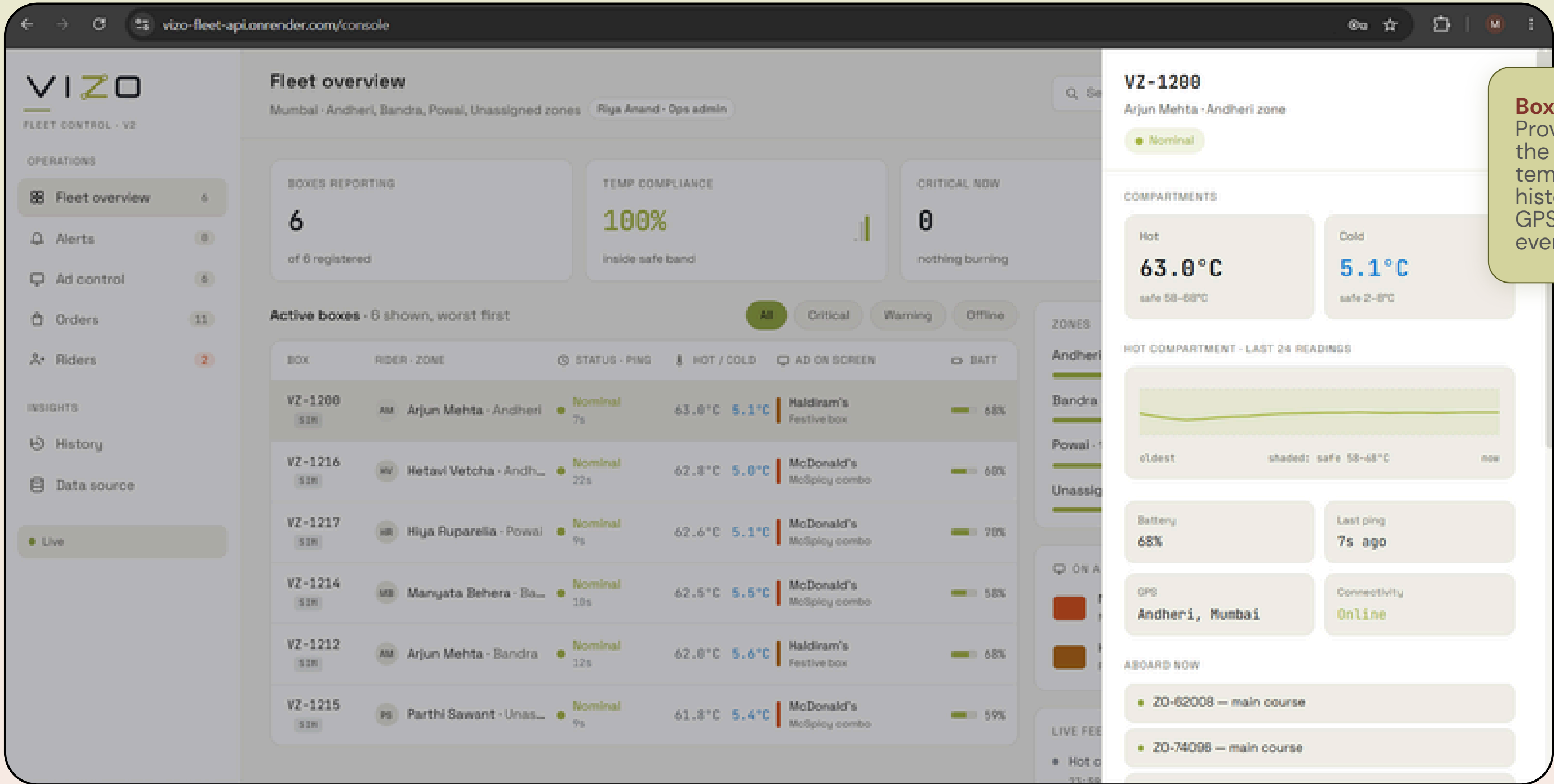
Critical Alerts
Highlights boxes with temperature deviations or critical conditions requiring attention.

On-Air Advertising
Displays the current advertisement running across the connected boxes.

Admin Dashboard

BOX DETAILS: LIVE MONITORING

A detailed view of an individual delivery box, showing its temperature, connectivity, location and active parcel status.



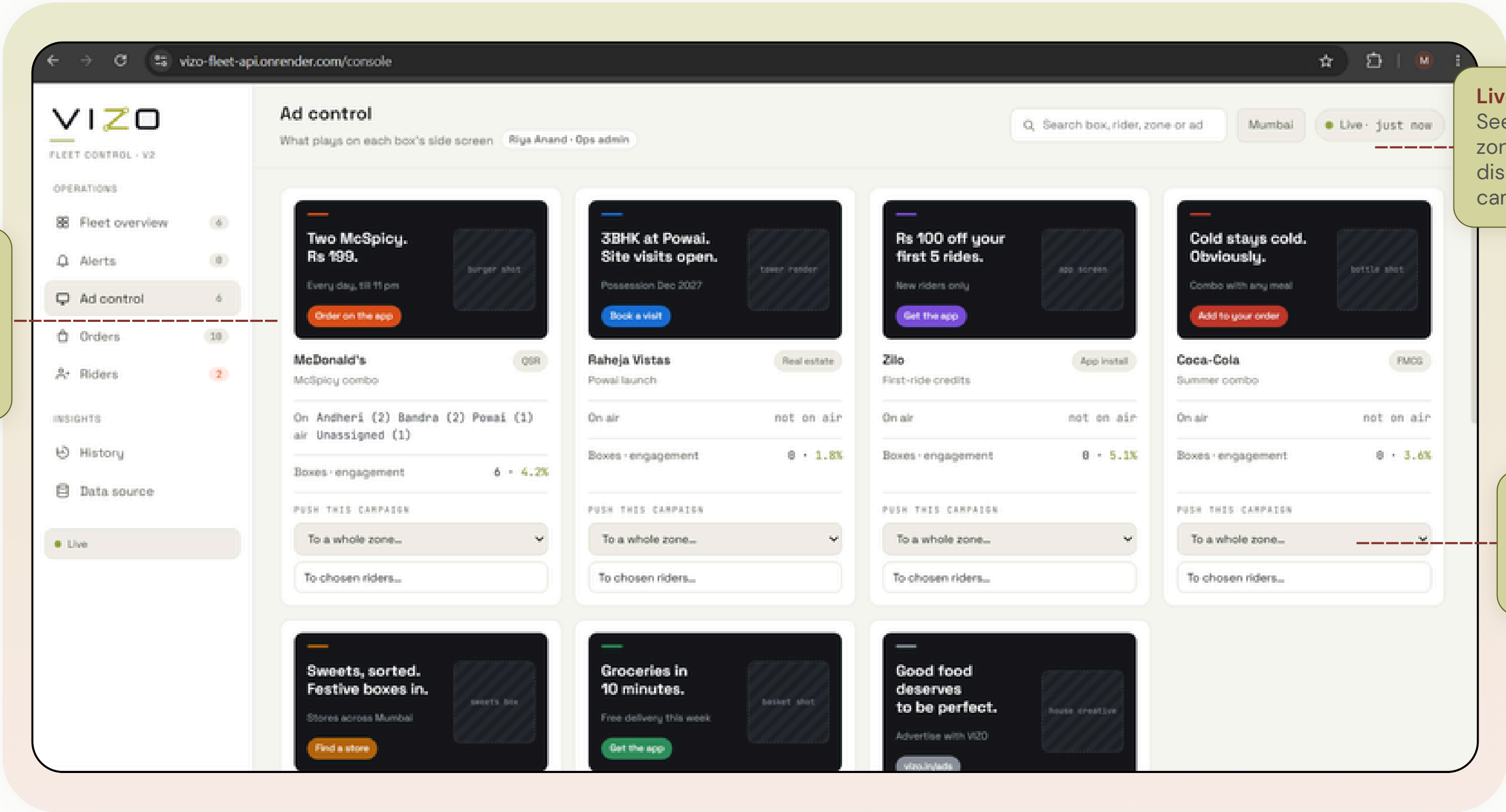
Box Monitoring
Provides a complete live view of the box, including hot/cold temperatures, temperature history, battery, connectivity, GPS location, active parcel and event status.

Admin Dashboard ▢

AD CONTROL

A central interface for managing advertisements displayed on the delivery boxes, from campaign selection to box and rider targeting.

Campaign Library
Browse active and upcoming advertisements with campaign details.



Live Status
See which boxes / zones are currently displaying each campaign.

Targeting
Push campaigns to specific zones or selected riders.

Admin Dashboard

ORDERS: DELIVERY & CONDITION LOG

A central view of all parcels handled by the fleet, tracking their route, box, temperature, status and delivery outcome.

Order Overview
Shows delivered, active and in-box orders at a glance.

VIZO

FLEET CONTROL - V2

OPERATIONS

Fleet overview

Alerts

Ad control

Orders

Riders

INSIGHTS

History

Data source

Live

Orders

Every order the fleet has carried, newest first

Riya Anand - Ops admin

DELIVERED TODAY

2662

since midnight IST

IN THE BOX NOW

10

aboard, not yet dropped

DELIVERED ALL TIME

2662

across the fleet

HELD TEMPERATURE

79%

553 left the safe band

Order log

Opened when the box is loaded, closed when it's dropped

ORDER	ROUTE	BOX	CONTENTS	HOT / COLD	OUTCOME	TIME
SW-51024 Swiggy	Cafe Madras to Carter Road	VZ-1217 Riya Ruparelia	1 item SW-51024 — main course	62.6°C / 5.3°C at pickup	In the box	22:25 today
ZO-83476 Zomato	Kyari's Co. to Carter Road	VZ-1217 Riya Ruparelia	1 item ZO-83476 — main course	62.6°C / 5.3°C at pickup	In the box	22:25 today
ZO-10908 Zomato	Jai Hind Lunch Home to Marol Naka	VZ-1217 Riya Ruparelia	2 items ZO-10908 — main course, ZO-10908 — sides	62.6°C / 5.3°C at handover	Held range	22:25 today
ZO-13449 Zomato	Ram Ashraya to Bandra Kurla Complex	VZ-1215 Parthi Sawant	2 items ZO-13449 — main course, ZO-13449 — sides	62.2°C / 5.6°C at pickup	In the box	22:25 today
ZO-45043 Zomato	Highway Gomantak to Marol Naka	VZ-1215 Parthi Sawant	1 item ZO-45043 — main course	62.2°C / 5.6°C at pickup	In the box	22:25 today
ZO-27121 Zomato	Highway Gomantak to Khar Danda	VZ-1215 Parthi Sawant	1 item ZO-27121 — main course	62.2°C / 5.6°C at handover	Held range	22:25 today
SW-38492	Elco Market	VZ-1214	2 items	62.6°C / 5.6°C	In the box	22:25

Parcel Traceability
Tracks each order by ID, route, box, rider, contents, temperature and delivery status from pickup to handover.

Admin Dashboard

RIDERS: FLEET & BOX ASSIGNMENT

Manage delivery partners, their assigned boxes, zones and active status across the fleet.

Rider Overview
View registered riders and how many are currently carrying a box.

VIZO

FLEET CONTROL - VZ

OPERATIONS

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Data source

Live

Riders

Everyone with an account, whether or not they carry a box yet

7

signed up on this fleet

5

2 still waiting

1

box registered, zone not set yet

Rider accounts

Oldest first - a box is registered the first time they sign in

RIDER	ZONE	BOXES	STATUS	JOINED	ACTIONS
Arjun Mehta riden@vizo.in	Andheri, Bandra	VZ-1200, VZ-1212	Hasn't onboarded	04 Sept last reported 22:24	Remove
Manjata Behera manjatabehera1800@gmail.com - Google	Bandra scooter - night shift	VZ-1214	1 box	06 Sept last reported 22:24	Remove
Parthi Sawant mailparthisawant@gmail.com - Google	Unassigned bike - morning shift	VZ-1215	1 box	06 Sept last reported 22:24	Remove
Hetavi hetavi@vizo.in	—	—	Email unconfirmed	06 Sept never reported	Remove
Hetavi hetavivetcha@gmail.com	—	—	Email unconfirmed	06 Sept never reported	Remove
Hetavi Vetcha hetavivetcha@work@gmail.com - Google	Andheri scooter - afternoon shift	VZ-1216	1 box	06 Sept last reported 22:24	Remove
Hiya Ruparelia rupareliahiya@gmail.com - Google	Powai ev - afternoon shift	VZ-1217	1 box	06 Sept last reported 22:24	Remove

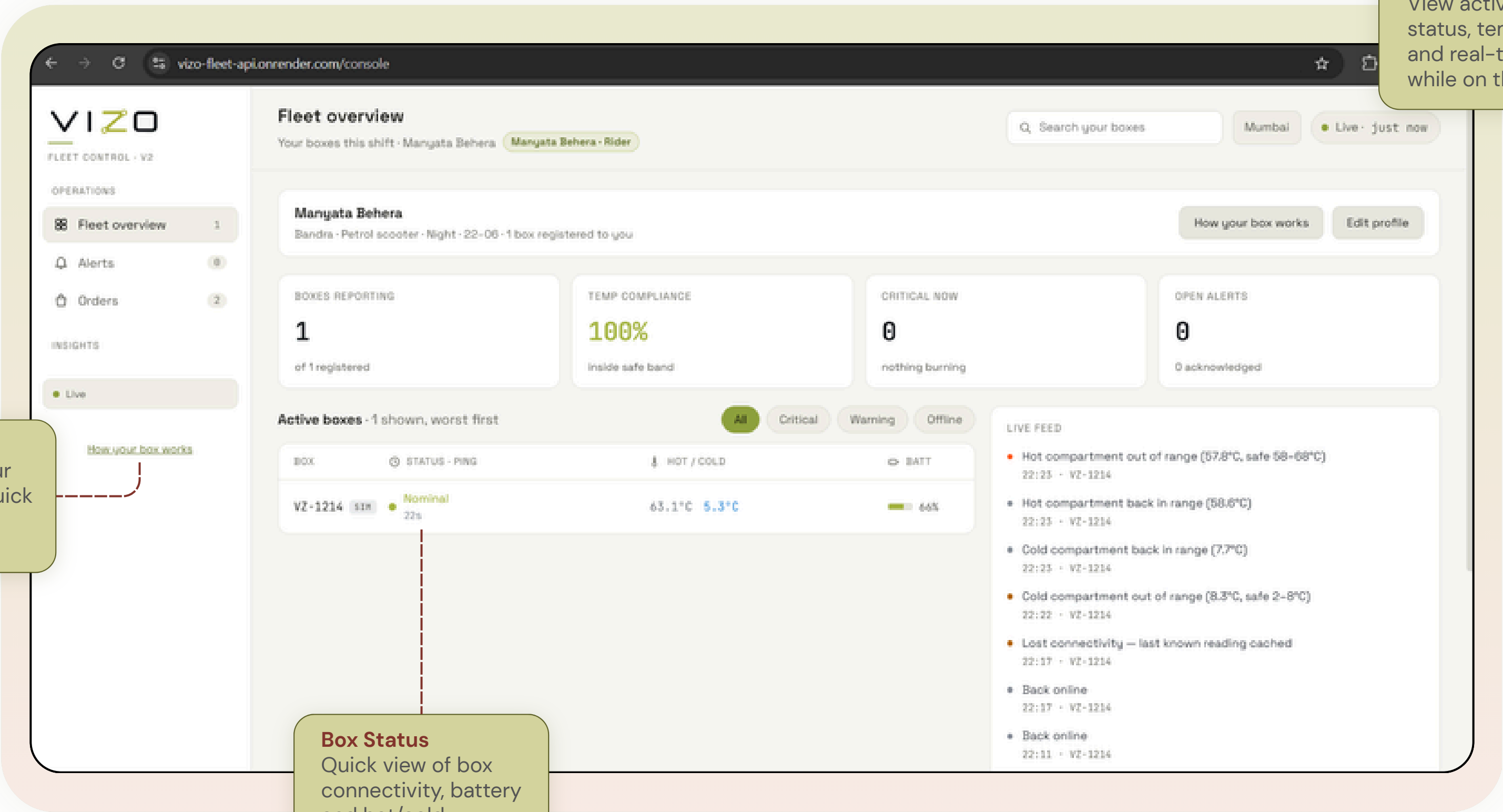
Box Assignment
Track which box is assigned to each rider and its operating zone.

Rider Status
Identify active, pending or unconfirmed rider accounts.

BOX & DELIVERY STATUS

(Currently designed as a desktop interface; the dashboard will be adapted for mobile use by riders.)

Live Delivery Monitoring
View active parcels, delivery status, temperature alerts and real-time box updates while on the move.



Box Guidance
Access “How your box works” for quick reference during delivery.

Box Status
Quick view of box connectivity, battery and hot/cold temperatures.

Proof of Concept □

SENSOR UNIT

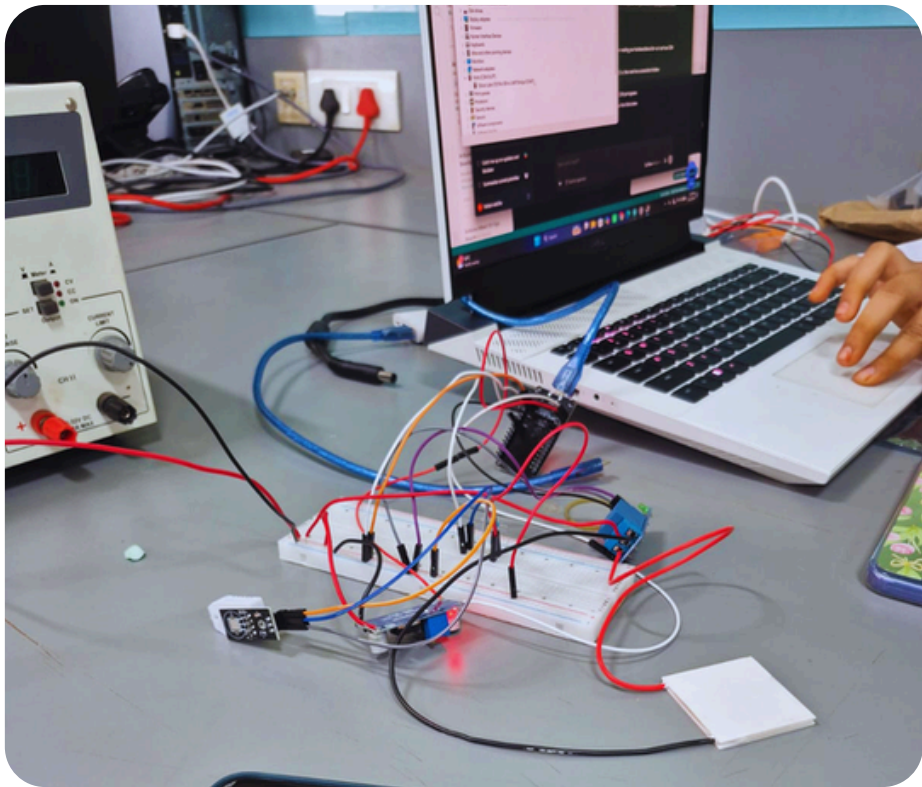


ESP32 + TEMPERATURE SENSING

ESP32 reads live temperature data from the two DS18B20 sensors for the hot and cold compartments.

Proof of Concept □

THERMAL CONTROL



Thermal control test

PELTIER CONTROL

Temperature feedback from the sensors controls the Peltier through PWM.
Sensor → ESP32 → MOSFET → Peltier

Proof of Concept □

PARCEL IDENTIFICATION

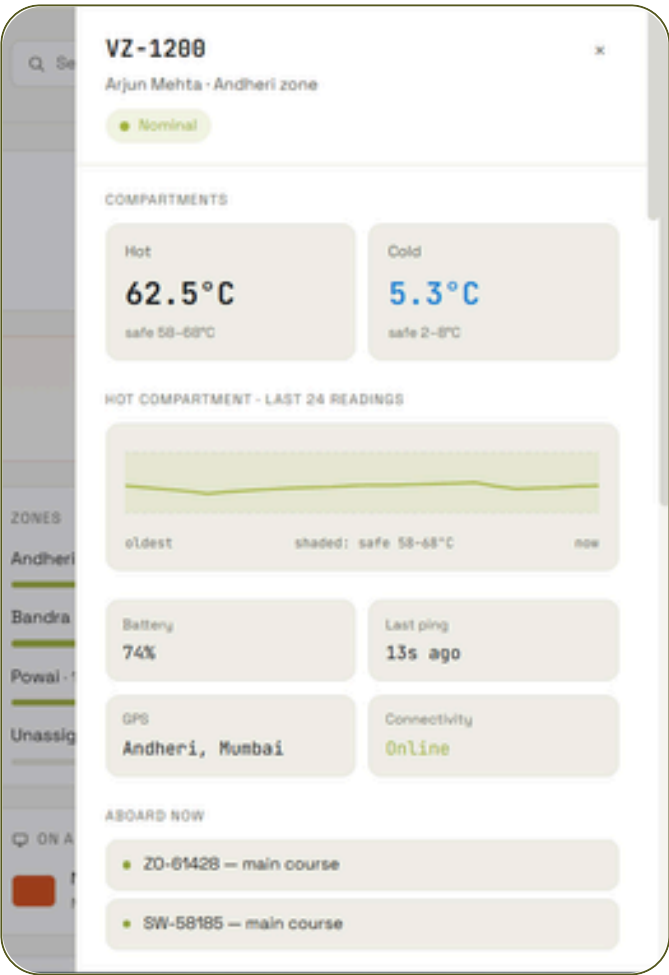


Parcel verification

RIDER PHONE SCAN

The rider scans the parcel barcode through the delivery app.
Scan → Order ID → Hot / Cold → Parcel status

Proof of Concept □
SERVER DATA



Live server data

ESP32 → API → SERVER

Live box and parcel data is sent to the server.
Data: Parcel ID, Temperature, Zone, Status

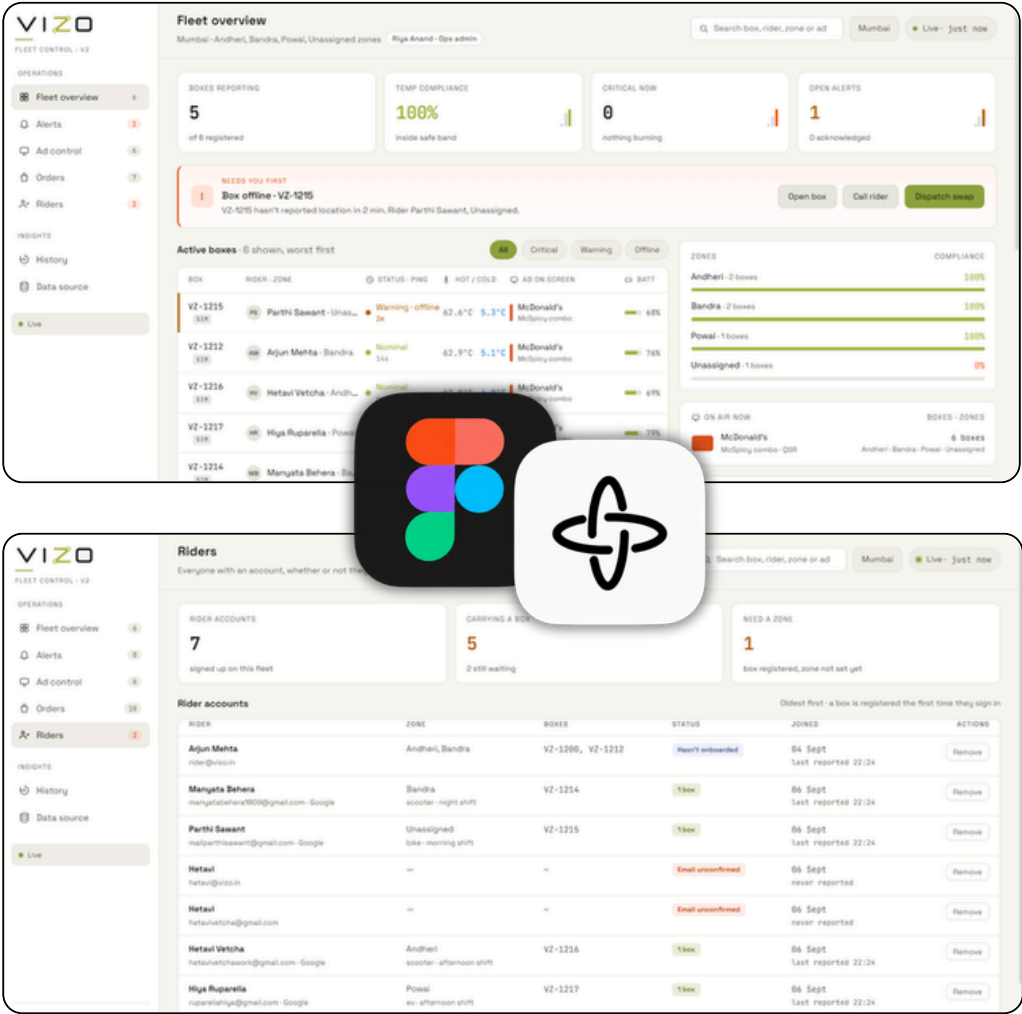
Proof of Concept □
API & CONNECTIVITY



BACKEND – RENDER

Render hosts the API that receives and serves box data.
ESP32 → API → Render → Dashboard

Proof of Concept □
DASHBOARD DESIGN



FIGMA MAKE – DASHBOARD UI

Dashboards visualise: Active parcels, Temperature, Alerts, Delivery status, Box status, Advertisement management