# Redefining Food Delivery with Autonomous Vehicles

A case study in research-led design for AI-powered systems

**TEAM / ROLE**

**Experience Design Lead**

Research Lead

Product Manager

Engineering Lead

Industrial Designer

Dig./Phys. Prototyper

**COMPANIES**

Motional

Uber Eats

# Context & Opportunity

## The Situation

Motional partnered with Uber Eats for their first on-road autonomous vehicle delivery pilot. It was an opportunity to differentiate in a crowded AV space by proving we could take on both rideshare and food delivery reliably and at scale.

This pilot became a springboard for deeper Uber collaboration and a chance to design trust into a brand new experience.

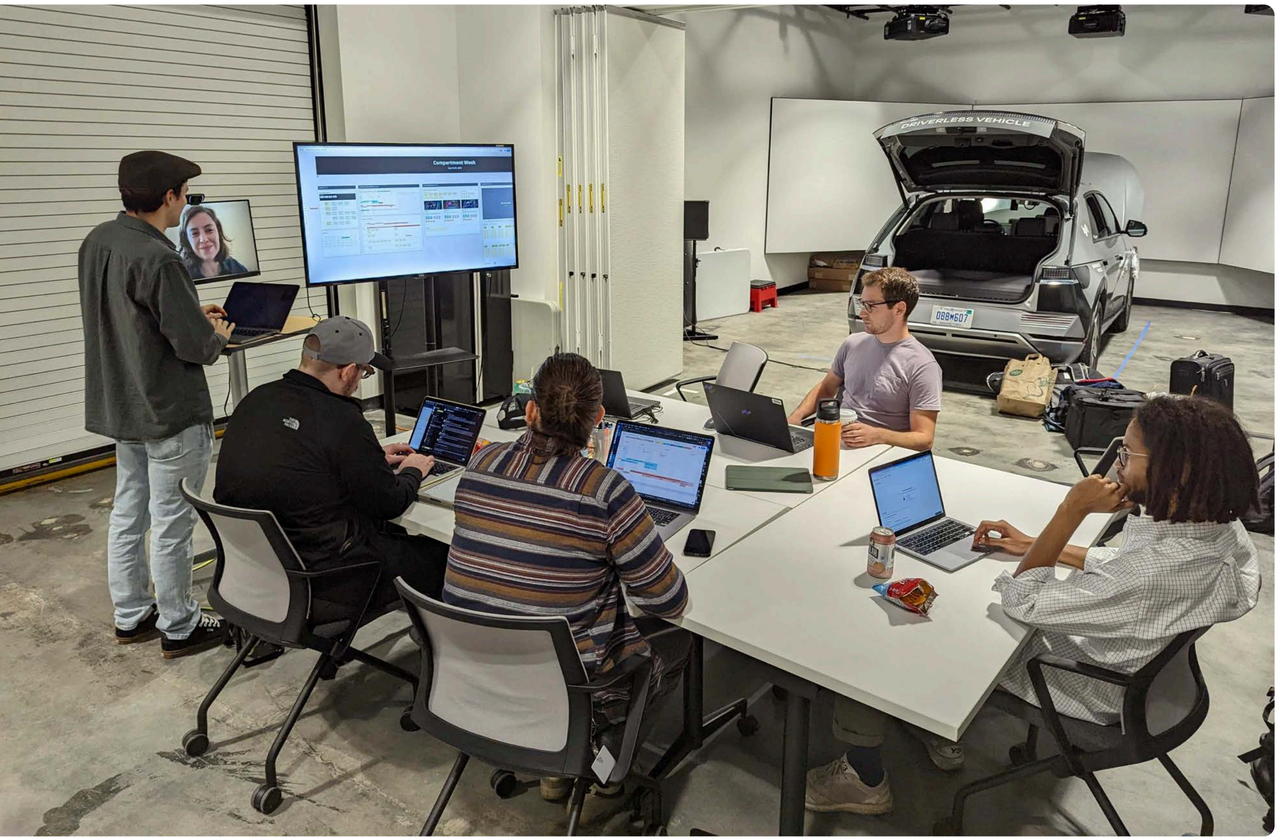
## Design Challenges:

- **AVs were unfamiliar:** How do we create trust and excitement, not confusion?
- **Tech alone doesn't solve problems:** Human behavior is messy, and we needed to design for it.

## Why This Mattered to Users:

- **Merchants:** More predictable handoffs with fewer unknowns. One less person to coordinate with during busy service hours. Clear expectations.
- **Recipients:** Lower cost. Less awkwardness. Greater security and control.

# Project Role & Goals



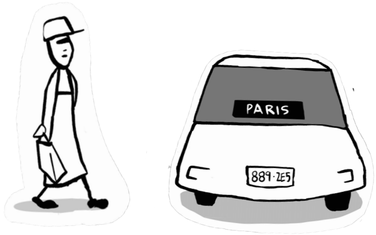

### What We Set Out to Solve:

- Build a trusted, intuitive autonomous vehicle delivery experience
- Identify and reduce friction for merchants, recipients, and vehicle operators
- Inform vehicle enhancements, in-app experience, and future scale through research
- Support commercial teams with tools and insights to grow partnerships strategically

### Actions Taken as Experience Design Lead:

- Advocated for on-site immersion early in the project, shifting the team from assumption-based to human-centered decision making
- Collaborated with product and research leads on a multi-perspective learning agenda
- Created storyboards and testing tools for merchant and recipient research
- Built multi-modal prototypes to evaluate usability (authentication, retrieval, handoff)
- Led design exploration of vehicle UI, compartment ID, and AV-human interaction
- Created journey maps that informed the pilot's operational design and scaling strategy

# Research Strategy






## Merchant & Vehicle Research

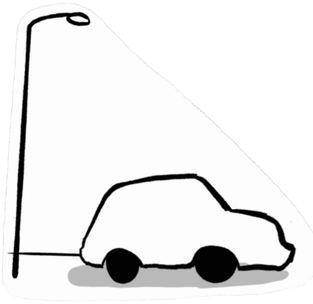
- Ridealongs + Vehicle Operator Interviews
- Authentication Testing (QR Code vs. Keypad)
- Merchant Interviews (store environments, order handoff pain points)

**Takeaway:** Merchants struggled with competing delivery platforms; authentication had usability gaps.


## Eater Experience & Wayfinding

- In-home Interviews (How do people interact with an AV for food delivery?)
- Wayfinding & Order Retrieval Testing (Where do they go? Are they comfortable using it?)

**Takeaway:** Users needed stronger digital+physical guidance to know what to expect and avoid feeling lost or awkward in public.



## Market Fit & Future Scaling

- Virtual Interviews (Power users & motivations)
- Quantitative Survey (Broader validation)

**Takeaway:** AVs had broader market potential, influencing vehicle storage design. Future Use Cases (Grocery? Package delivery?)

# Turning Insights Into Action

Our findings and design decisions shaped how the pilot evolved, and helped broader Motional and Uber see the value of experience-led thinking in a tech-first project.

Turning Insights Into Action

# The Merchant Environment

**INSIGHT**

Merchants juggled in-store customers, multiple delivery platforms, and noisy order screens, needing a simple, secure way to load food into the AV and return to their tasks.

**DESIGN DECISIONS**

We explored QR code scanning and Keypad Entry, ultimately landing on Keypad authentication using the order number on the receipt:

- No need for merchants to locate a personal device
- Eliminated issues with battery, Wi-Fi, or poor lighting
- Built trust with a low-friction, familiar format

**OUTCOME**

This became a hardware input requirement for future vehicles and reduced risk and merchant worries around loading errors.

Turning Insights Into Action

# Setting Expectations for Recipients

**INSIGHT**

Recipients were auto-opted into the driverless pilot, but many didn’t realize a driverless car would arrive, or that they’d need to meet it at the curb. This led to confusion and missed connections.

**DESIGN DECISIONS**

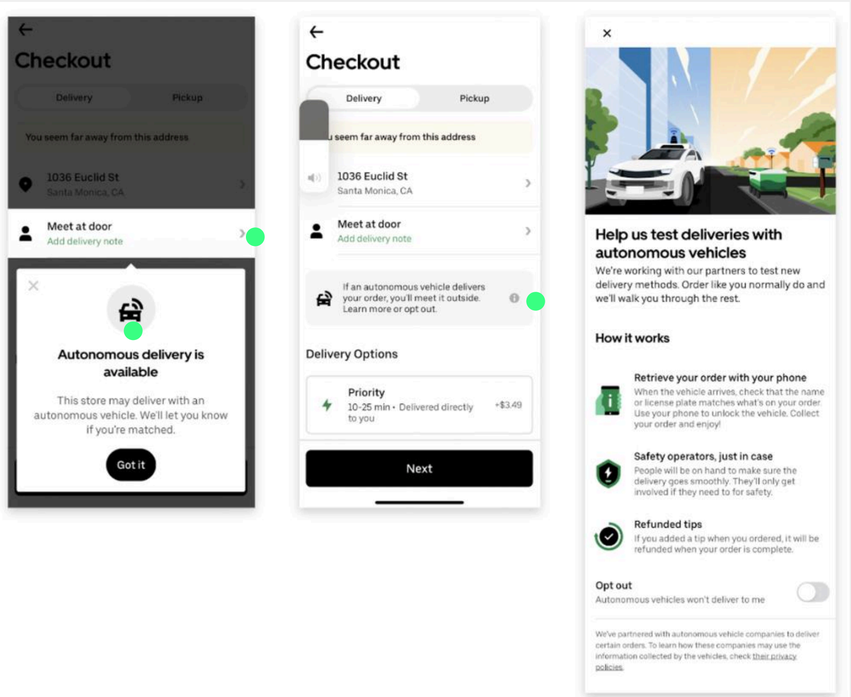
We introduced clearer pre-arrival messaging with:

- Strengthened visual cues showing an AV might arrive
- Messaging enforcing value: energy-efficient, no tip required

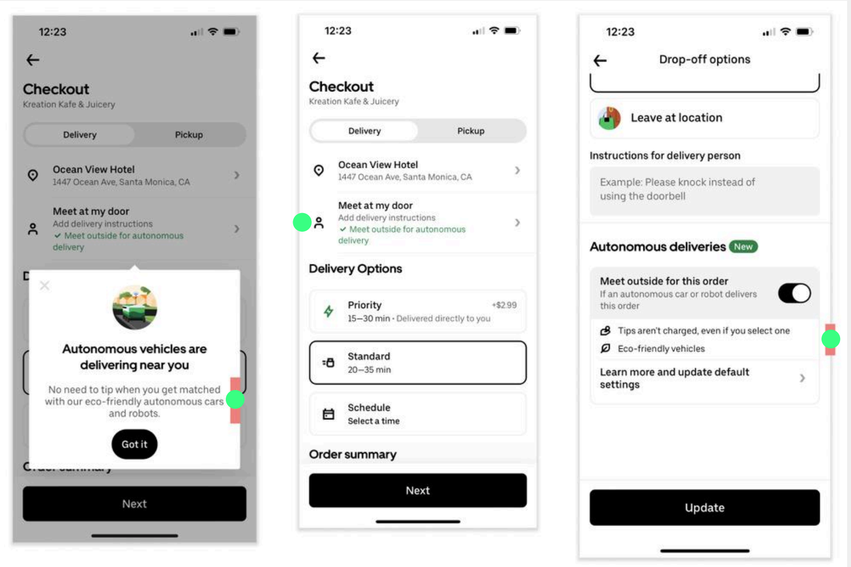
**OUTCOME**

Better expectation-setting helped build trust and made the AV delivery feel like a feature, not a surprise. We tracked and saw reductions in time on delivery as well as completion rate.

**UE Pilot Exp V1**




**UE Pilot Exp V2**



Turning Insights Into Action

# Order Loading & Retrieval Guidance

**INSIGHT**

Even without a driver to ‘steal a fry’, human behavior still introduced risk: grabbing the wrong item, opening the wrong compartment, or simply being unsure how to get their order. Guidance was essential.

**DESIGN DECISIONS**

We identified future product requirements based on findings:

- Lockable, powered compartments with individual access
- Logic for order placement and retrieval (compartment ID)
- On-screen or in-app guidance to match order to compartment

**OUTCOME**

These requirements informed future model design, so that it could support self-serve retrieval securely, without needing human intervention.

# Outcomes & Impact

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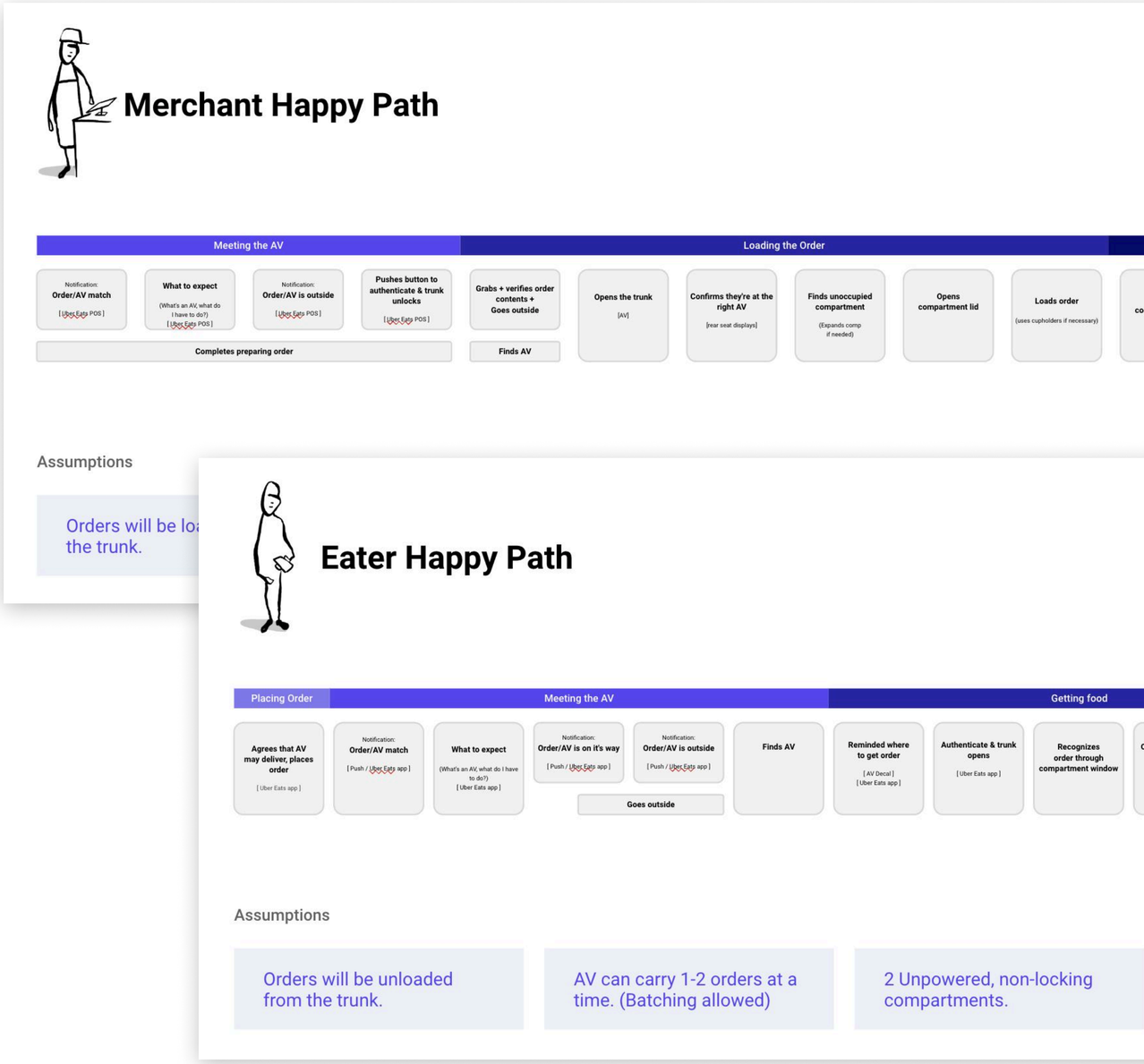
## How Design Moved the Pilot and the Business Forward

- Reframed the project from proving tech to solving human experiences
- Created journey maps that visualized the complete merchant and recipient flow, surfacing friction points and failure scenarios that hadn't been considered in preparing for a purely driverless experience
- Enabled alignment across product, engineering, and commercial teams around what a “ready-for-scale” experience needed to look like
- Directly influenced pilot expansion to new partners like Shake Shack, helping prioritize which merchants to bring on based on real-world delivery dynamics
- Set the foundation for how Motional and Uber Eats think about scaling driverless delivery beyond the pilot



Outcomes & Impact

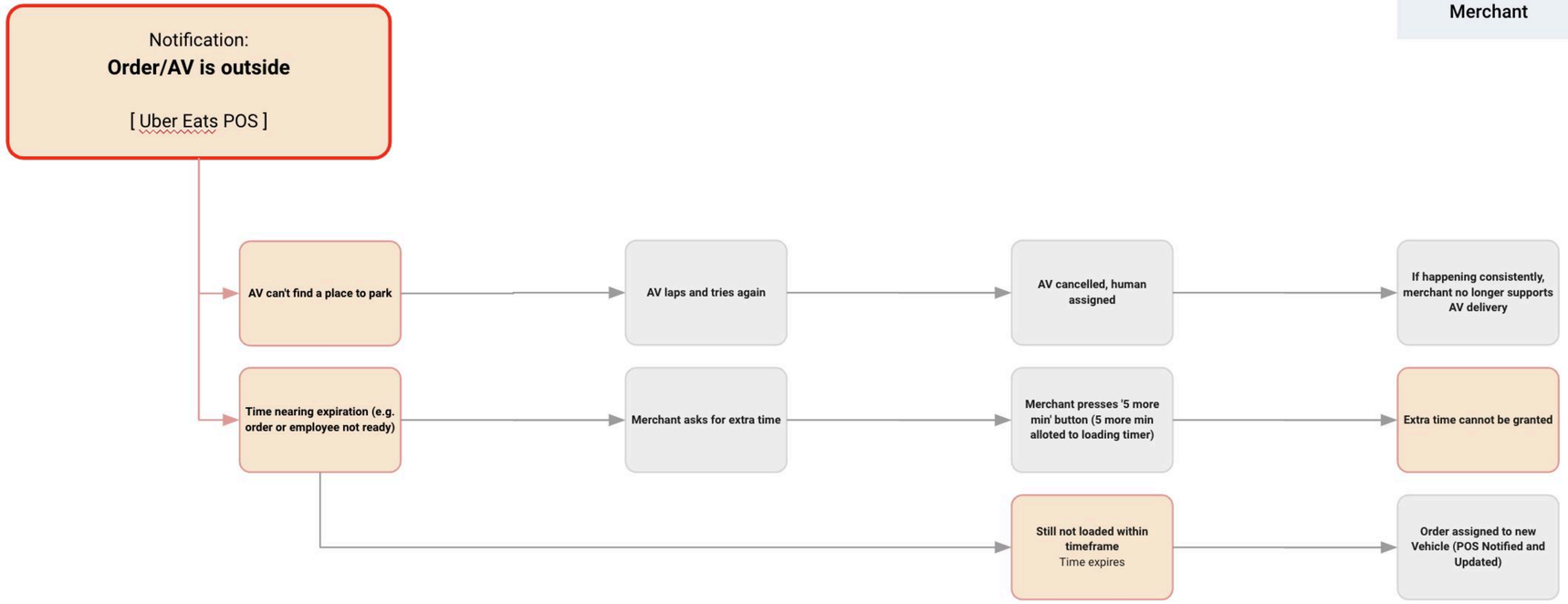
# Journey Step Deep Dive

We unpacked what can go wrong after an AV arrives. revealing parking issues or merchant delays.

ISSUE 1

## Timing matters

Merchant



# Journey Step Deep Dive

Proposing mitigation strategies like timers and reminders, and flagging downstream system implications.

ISSUE 1

## Timing matters

Merchant

### Problems

- Unlike rides, neither merchants nor customers had to go outside to meet the vehicle prior to AV delivery, and may be slow/inconsistent in doing so
- Vehicle cannot sit at locations indefinitely, especially if double parked
- There are multiple situations where the user could act slowly or incorrectly, preventing the happy path flow from continuing

### Unhappy Path Solutions

- Series of built-in timers that account for user not acting quickly enough, triggering some resolution for that stage in the flow
- Series of reminders and warnings sent to user interface to speed them up to avoid more serious issues

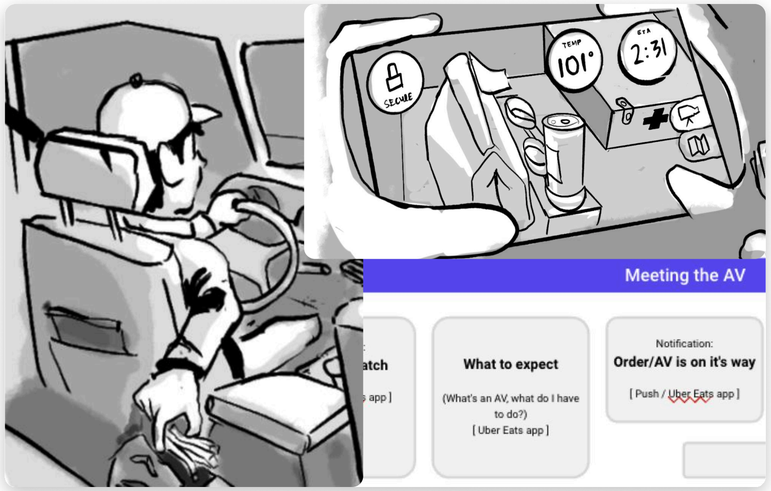
### Implications of Solutions

- Multiple timers, triggers, UI warnings, and deadline outcomes will be difficult to build
- Some post-timeout resolutions are unclear
- Vehicle may or may not have order inside
  - No way to automatically check for this
  - Vehicle action should be different depending on whether or not it has food inside

# Looking Back & Looking Ahead

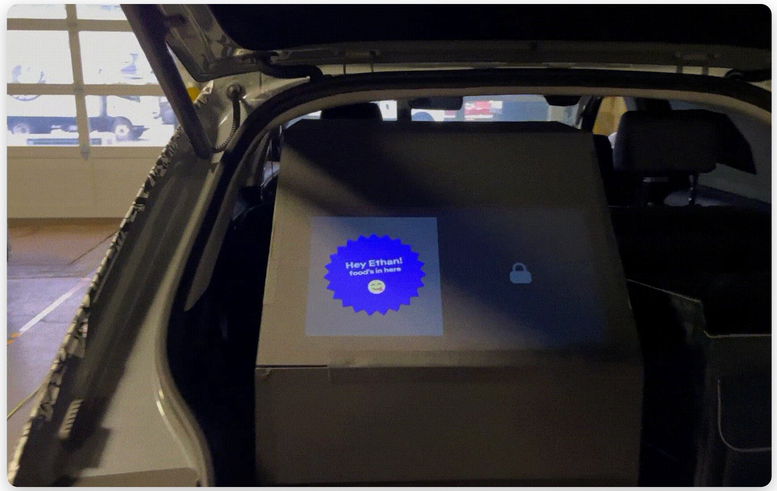
### Shifting from Proving Tech to Designing for People

We made findings actionable, influencing how Uber Eats positioned autonomous delivery and refining key interactions, like improving feedback collection.




### Designing for an Unknown Future

Visuals! Materialize a collective imagination. Journey mapping kept us grounded, clarifying focus and surfacing gaps/pain points.




### The Power (and Limits) of Prototyping

Delays in a prototype can break the feeling of reality, especially with futuristic tech. I'd be excited to push prototyping further next time, leveraging tools that create more seamless, high-fidelity simulations.

# Thank You