USER-CENTERED DESIGN THROUGH AN ACCESSIBILITY FIRST LENS

PORTFOLIO PRESENTATION

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About Me

- 10+ years as researcher, designer & front-end developer
- PhD @ U of Michigan
- Technology & inclusion research with academia, industry & community partners
  - Study tech disparities of marginalized communities in transnational contexts
  - Work in FinTech, Health & Accessibility
  - Research in top HCI venues recognized by media & with awards

About Me

- Ultimate frisbee player, high endurance swimmer & runner
- National park enthusiast
- Board game collector

Today’s Talk

- User-centered design enables enjoyable user experiences.

  However, it can exclude marginalized users.

- I show how an Accessibility First approach can further inclusion goals in user-centered design.

Agenda

Characterizing the Limits of User-Centered Design

- FinTech studies with marginalized communities in India

User-Centered Design through an Accessibility First Lens

- In-depth Study 1: Evaluating Uber UX for people with visual impairments
- In-depth Study 2: Reimagining accessible indoor navigation tech design

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Characterizing the Limits of User-Centered Design

- **FinTech studies with marginalized communities in India**

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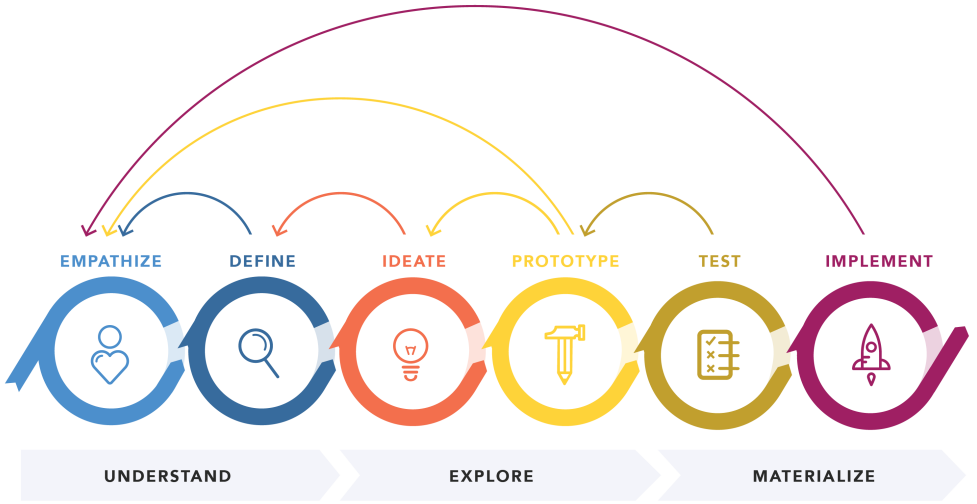
Promise of User-Centered Design

- Iterative process that centers users & their needs throughout all design phases

- Results in positive outcomes for product & business
  - increases usability & intuitiveness
  - boosts competitiveness & improves sales



User-Centered Design Principles

- Abstracted personas to represent user characteristics
- Standardized methods to elicit user needs
- Iterative user-engagement to refine design decisions

Work Featured in TechCrunch

Characterizing the Limits of User-Centered Design

FINTECH STUDIES WITH MARGINALIZED COMMUNITIES IN INDIA

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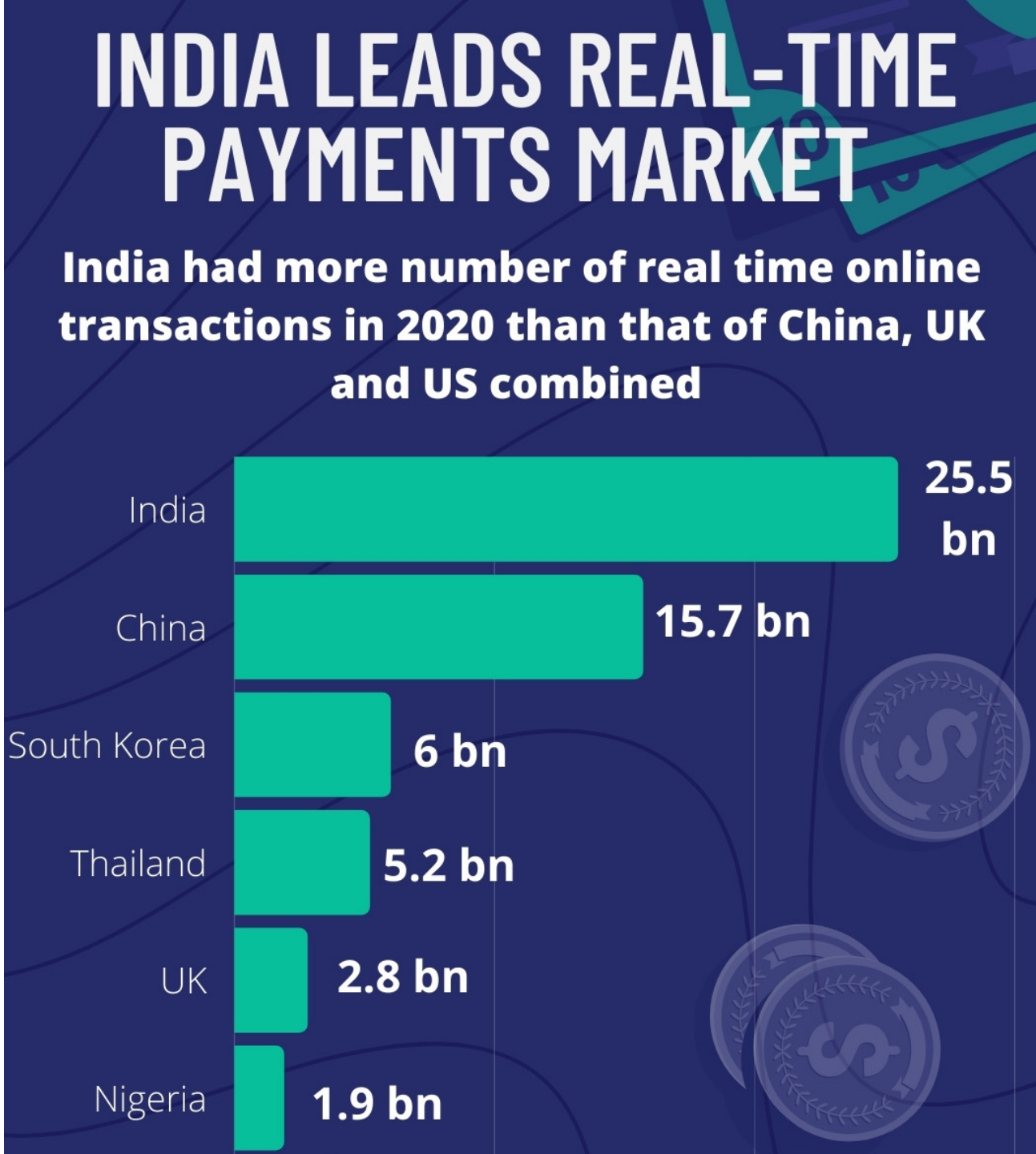
India’s Leadership in FinTech

- Rapid transition from a cash-based to a cashless economy
  - 2010 - 10% digital transactions
  - 2026 - ~65% digital transactions[1]
- Enabled by government policy & wide availability of smartphones & internet



FinTech’s Promise of Financial Inclusion

- Increases participation of workers in the formal economy
- Enables easy access to social benefits & government schemes

Objective

- Generate FinTech design implications to enable financial inclusion for marginalized users

Studies & Methods

- Adoption of digital payments by small business owners

  Qualitative & Quantitative: field studies & preferences survey

- Use of digital payments by people with visual impairments

  Qualitative: semi-structured interviews

- Use of digital loan platforms by financially-stressed users

  Qualitative: semi-structured interviews

Key Insights

Abstracted personas center the average user

Resulting design decisions can exclude marginalized user groups

Standardized methods limit forms of inquiry

Methods can impose constraints which limit insights

Iterative user engagement assumes ease of user access

Participation hurdles can increase operational costs & affect quality of insights

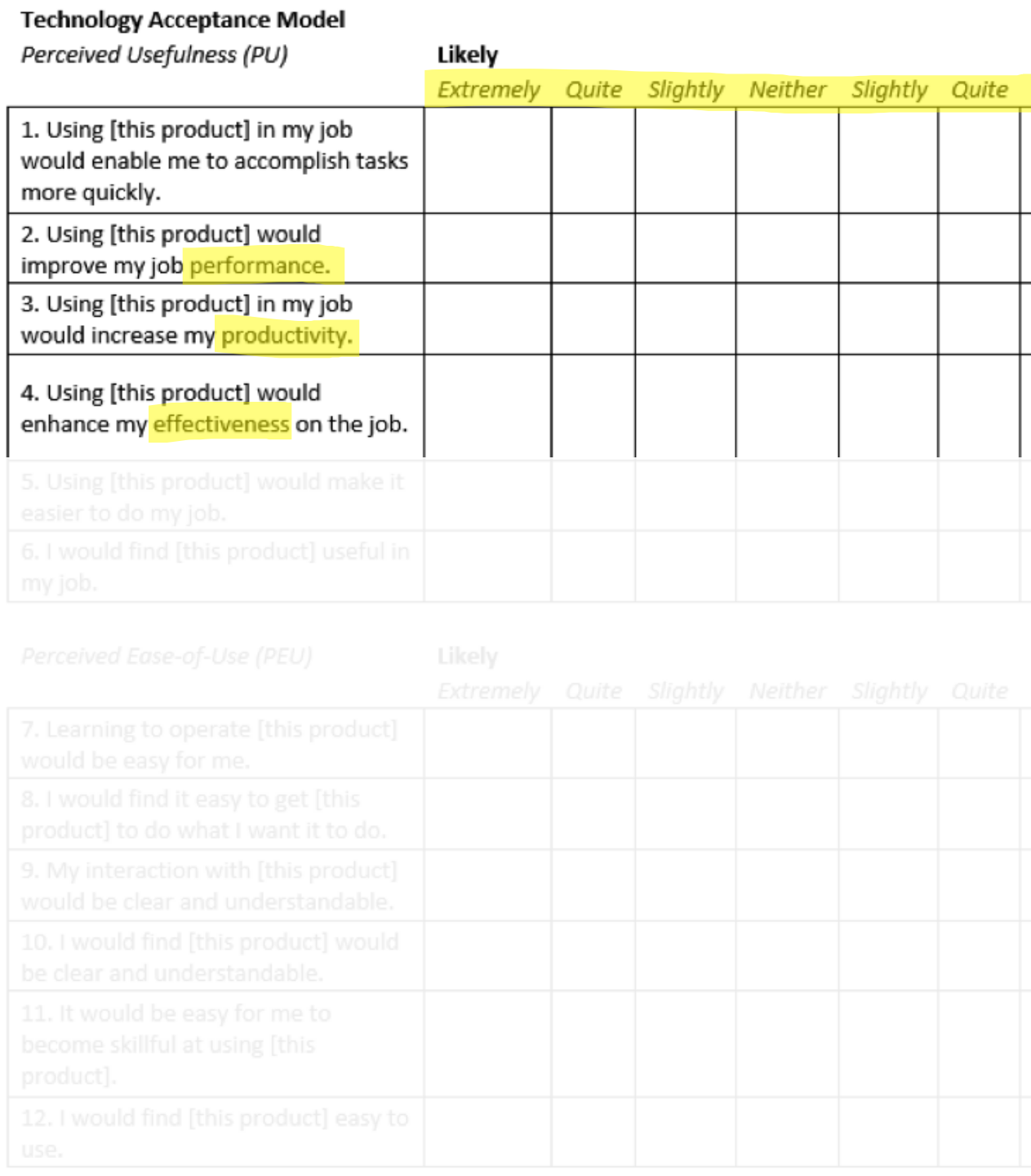
Design (in)Decisions

- Ability taken for granted
  - visual workflows
- Literacy assumed
  - sensitive data required
  - harsh terms accepted
- Excludes many users

"They contacted my friends and family through WhatsApp. They shared my photo and published my details saying I had taken loan and hadn't repaid and started harassing them. I lost a lot of friends. I was very upset. At one point, I even tried to commit suicide."

Methods as Constraints

- Adoption widely understood quantitatively (e.g., T.A.M)
- Survey design & implementation challenging
  - translation inaccurate & difficult
- Limits insights



Technology Acceptance Model

Perceived Usefulness (PU)

	Likely					
	Extremely	*Quite*	*Slightly*	*Neither*	*Slightly*	*Quite*
1. Using [this product] in my job would enable me to accomplish tasks more quickly.						
2. Using [this product] would improve my job performance.						
3. Using [this product] in my job would increase my productivity.						
4. Using [this product] would enhance my effectiveness on the job.						
5. Using [this product] would make it easier to do my job.						
6. I would find [this product] useful in my job.						

Perceived Ease-of-Use (PEU)

	Likely					
	Extremely	*Quite*	*Slightly*	*Neither*	*Slightly*	*Quite*
7. Learning to operate [this product] would be easy for me.						
8. I would find it easy to get [this product] to do what I want it to do.						
9. My interaction with [this product] would be clear and understandable.						
10. I would find [this product] would be clear and understandable.						
11. It would be easy for me to become skillful at using [this product].						
12. I would find [this product] easy to use.						

Participation Hurdles

- Refusal to participate
  - unmotivated by incentives
  - question value of engagement
- Research fatigue
  - repeat users due to small sampling frames
- Increases operational costs & affects the quality of insights

"I don't want to participate in the study. There is no value. It's a waste of my time" – Store Owner

Implications for User-Centered Design

- Critically identify & work with marginalized user groups
- Adapt methods to broaden applicability
- Rethink user engagement strategies

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  - FinTech studies with marginalized communities in India

- **User-Centered Design through an Accessibility First Lens**
  - **In-depth Study 1: Evaluating Uber UX for people with visual impairments**
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Recognized with Best Paper Award at CSCW 2018

USER-CENTERED DESIGN THROUGH AN ACCESSIBILITY FIRST LENS

CASE STUDY 1: EVALUATING UBER UX FOR PEOPLE WITH VISUAL IMPAIRMENTS

Invited Talk at Global UX team at Uber San Francisco in 2018

Stakeholder Composition

- Research team: 1 principal researcher at Microsoft, 4 academic researchers & 2 student research assistants
- Product team: 2 UXR leads on Uber's Global UX team

Project Role

Project management

- led research planning
- supervised data collection & analysis

Cross-functional engagement

- facilitated share-outs with academic researchers
- interfaced bi-weekly with Uber UX
- resolved differences in understanding of impact between both stakeholders

Transportation & People with Disabilities

- People with disabilities struggle with social & economic participation
- Transportation facilitates access to resources & inclusion
- India has a rich transportation landscape
  - Includes mass transit & door-to-door services


निकास
Exit
3, 4
गेट नं०
Gate No.
मिंटो रोड़, बाराखम्बा रोड़
Minto Road, Barakhamba Road
Towards Noi


UP80AX
9967

Ride-sharing for People with Disabilities

- India’s rich transportation landscape is inaccessible
- Ride-sharing could complement public transportation & facilitate inclusion

Uber UX Outlook

- UX centered everyday (nondisabled) riders
  - Unaware of Uber's marginalized riders
  - Worried about costs of studying & addressing their needs
- Focused on improving "in-cab" experiences
  - Used independence as a metric to evaluate driver & rider experiences

Objective

- Create value proposition for Uber to scale their service & make it inclusive

Research Question

- What are the transportation practices of people with visual impairments in India?
- What are their experiences with ride-sharing services like Uber?
  - What challenges do they encounter in using them?

Methods

Primary: Semi-structured interviews

to capture in-depth user narratives

- lasted between 60-80 minutes long
- included scenarios & conceptual questions

Secondary: In-person observations

to identify quick wins for Uber

- accompanied people on Uber rides
- collected field notes & videos

- Snowball sampling
- Data collected until saturation
- Desk research to uncover potential market opportunities

Cross-Functional Data Analysis

- Led weekly sessions with principal researcher to develop codes & themes
- Consolidated feedback from Uber UX
- Analyzed data inductively

Key Insights

- Uber contributes to riders' sense of independence. However, independence is made possible through drivers help
- Out-of-cab experiences rather than in-cab experiences surface key usability challenges
- Working with marginalized users surfaces sizeable market opportunity

Positive Impact on Independence

“When this service is available, it is really very, very much freedom (sic) for us because we can do what we want, we can avail anything, we can go anywhere, we don’t need to take sighted assistance […] it unveils a new door, a new world for us, the world of independence”

Drivers Help Essential for Independence

“Drivers will drop me exactly wherever I want and most of the drivers are ready to even guide me. They used to walk with me up to the door. My independence has increased a lot.”

- Implication: Disability disclosure to enhance interactions

Out-of-cab troubles

- Finding the cab is most difficult part of using Uber
- Was an issue for other everyday users too

Market Opportunity

- ~40 million people with visual impairments
- Second largest in the world
- ~50% live in cities & ~20% of them have a steady income

~4 to 5 million users who can be acquired

Research Impact

- **UX Process:** Surfaced UX issues in reduced cycles
- **UX Strategy:** Refined key UX metric to broaden scope of impact
- **Product:** Outlined low-cost designs to increase user engagement
- **Business:** Uncovered sizeable market opportunity of 4-5 million users

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CASE STUDY 3: REIMAGINING ACCESSIBLE INDOOR NAVIGATION

TECH DESIGN

Google

Stakeholder Composition

- Research team: 4 AI experts, 1 research director, 1 staff scientist
- Product team: 1 UXR, 1 AI expert, product manager

Project Role

Project management

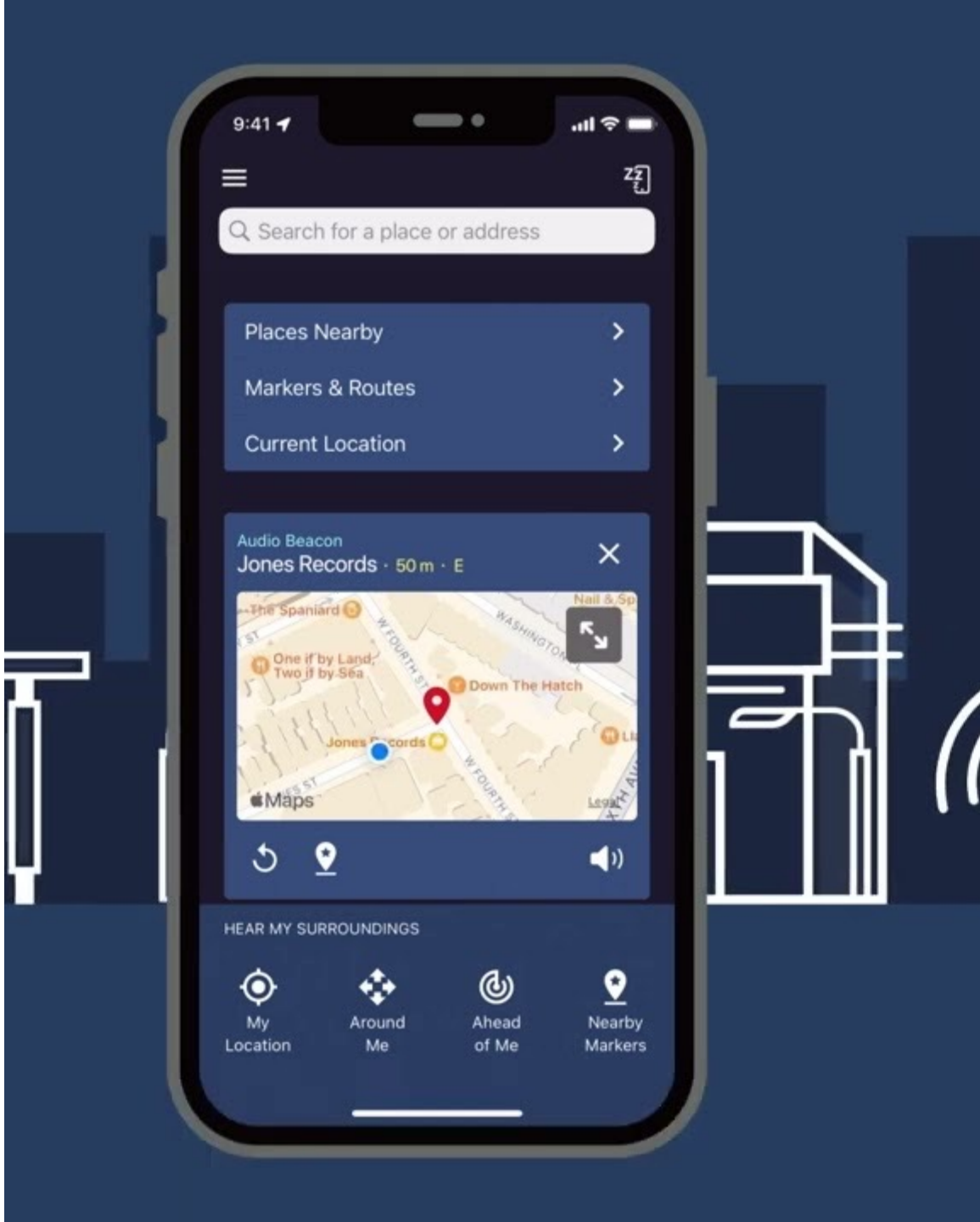
- established timeline & research plan
- ramped up on Google internal processes
- negotiated with vendors & halved costs

User-research lead

- led data collection & analysis
- fostered cross-functional collaborations
- advocated for user-centered principles & methods

Accessible Navigation Tech

- Navigation tech important for people with visual impairments
  - often the only way to accomplish everyday tasks
- No indoor navigation technology comprehensively addresses user needs



Objective

- Outline product vision for the design of AI-based accessible indoor navigation technologies

Research Team Outlook

- Highly technical AI experts
- Had not worked with a UX researcher before
- Had a technology first approach to design
  - State of research: Robot with navigational capabilities
  - Goal: Transfer capabilities via mobile app

Research Questions

- How do people with visual impairments in India navigate indoor environments?
  - What are their day-to-day strategies & interactions when they navigate?
- What are key design considerations for AI-based technologies to support these strategies & interactions?

Project Constraints

- Work within timeline, budget, & be accessible
- Support remote efforts
- Yield evidence for advocacy
- Include multiple data sources
  - Can validate each other & lend more strength to claims

Methods

Primary: Semi-structured interviews

to understand navigation strategies

- lasted between 60-80 minutes long
- included situational questions
- worked with moderator & translator

Secondary: Video-diary study

to capture tacit micro-interactions

- understand social context & interactions
- 1 week, avg length of clips ~ 1.5 minutes
- worked with buddy to record videos

Purposive sampling strategy

Data triangulation via affinity maps

Longitudinal Cross-functional Engagement

- Sourced feedback on research materials
- Mobilized team to attend interviews & ask questions
- Analyzed interviews & videos to brainstorm ideas
- Conveyed intermittent findings during weekly share-outs

Key Insights

- Indoor navigation is collaborative
- Indoor navigation is embodied

Indoor Navigation is Collaborative

- People always navigate with companions who ensure safety & end-to-end guidance
- Design principle: Extend unit of design to include person with visual impairment & companion

Indoor Navigation is Embodied

- Navigation skills are tacit, hard to articulate & sensory
- Some navigation challenges & strategies never surfaced during interviews
- Design principle: Include people with visual impairments as critical stakeholders to guide design decisions

Research Impact

- Vision: Increased budget to understand *collaboration* in-depth
- UX strategy: Created job requisition for person with visual impairment based on findings of embodiment

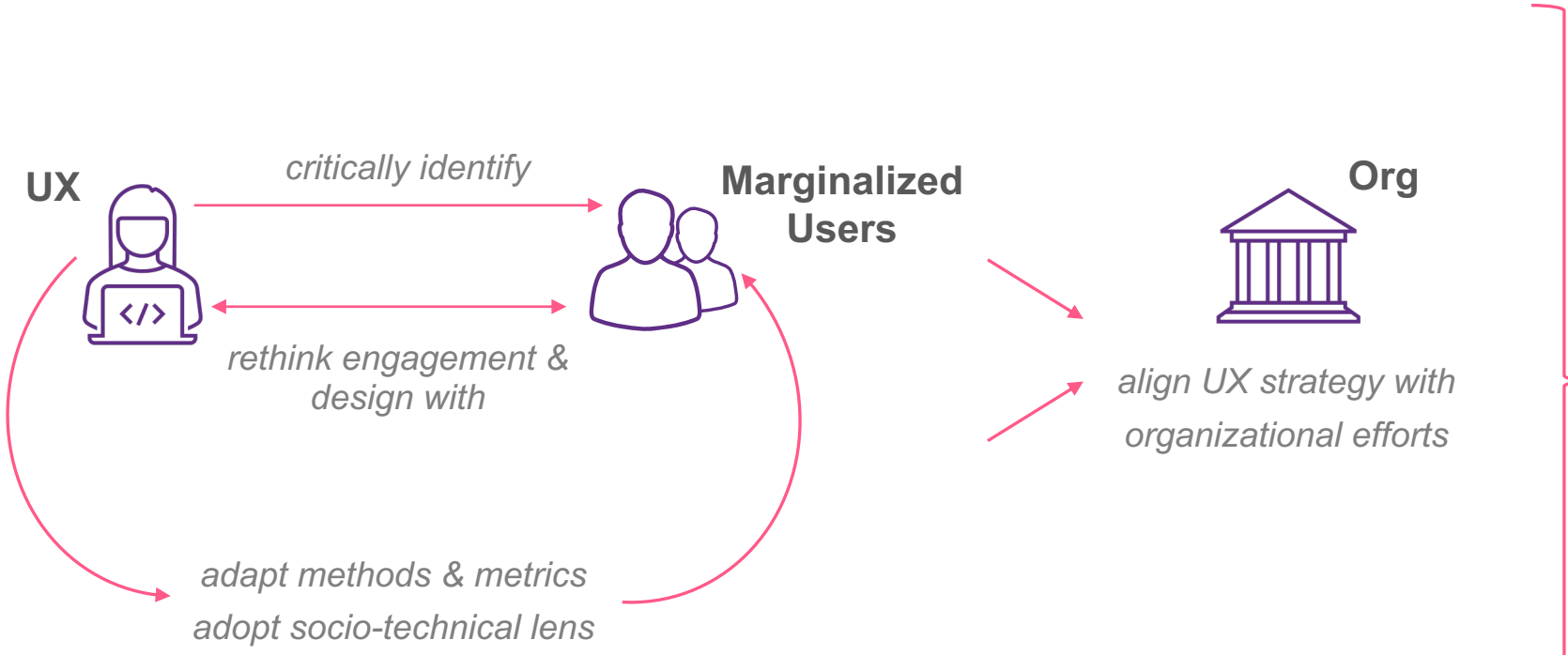
"It is clear that we have to move ahead keeping *collaboration* in mind" – AI Staff Scientist

"We have been looking at indoor navigation as the problem of navigating a robot, which we can't really do" – AI developer on project

Implications for User-Centered Design

- Critically identify & work with marginalized user groups
- Adapt methods & redefine metrics to broaden applicability
- Rethink engagement to design *with* users rather than *for* users
- Adopt a socio-technical lens to study user interactions with tech
- Align UX strategy with organizational DEI efforts

Accessibility First for Inclusion: The Next Frontier of User-Centered Design



Outcomes

1. *Unveils new markets for business*
2. *Improves UX process efficiency*
3. *Spurs creativity across UX teams*
4. *Increases usability of products*

My UX Philosophy

- Evidence-based design: Generate socio-technically grounded insights to lead & work alongside design
- Cross-functional engagement: Collaborate with multidisciplinary teams to inform product inclusion, strategy & vision
- Advocacy: Educate stakeholders about UX & sensitize them to experiences of marginalized users to realize inclusion goals

Thank you!

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