Social Computing for Social Good in Low-Resource Environments

Aditya Vashistha
University of Washington

Social Computing Revolution

Discussion Forums, Social Media Platforms, Crowdsourcing Marketplaces, Blogs, Wikis…

upwork™ amazon mechanical turk CrowdFlower

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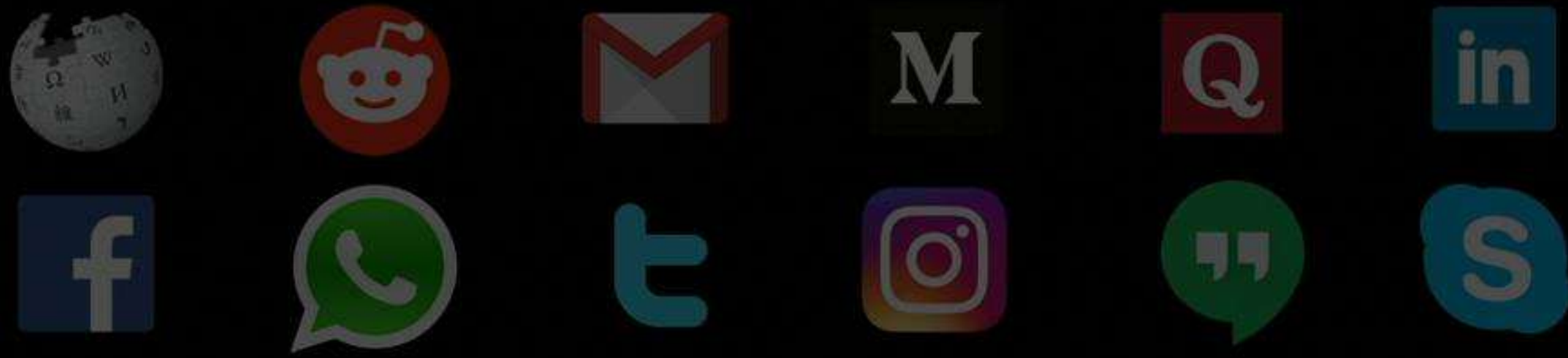


upwork amazon mechanical turk CrowdFlower

Literacy, Language, Socioeconomic, & Connectivity Barriers

781 Million
illiterate

2.5 Billion
speak low-resource languages

736 Million
live on < $2/day

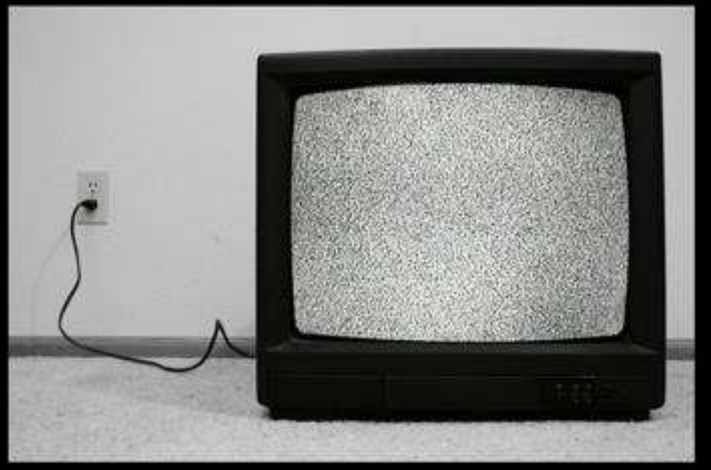
3.6 Billion
w/o connectivity

Great First Steps…

Facebook Aquila

Google Loon

Microsoft Airband



Great First Steps…

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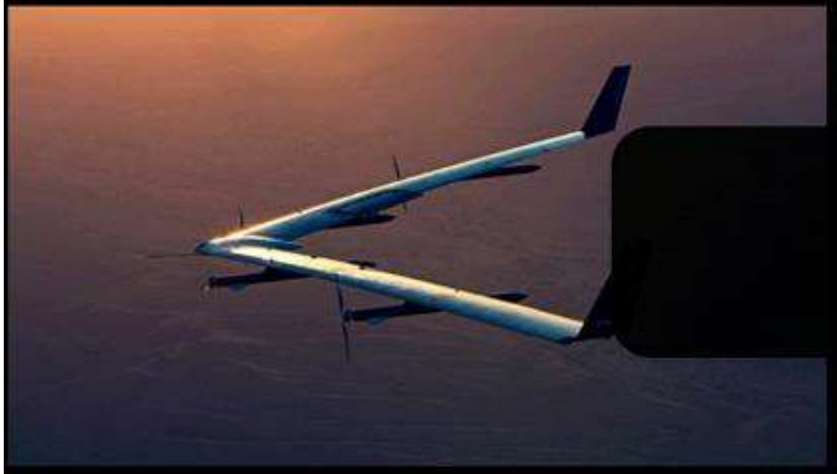

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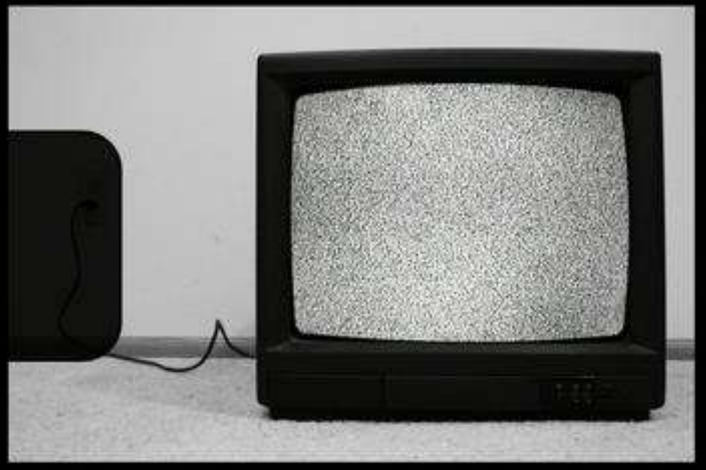

Connectivity

Sociocultural norms

Devices

Geopolitical environment

Energy and power

Literacy and language

Transport

Connectivity

Sociocultural norms

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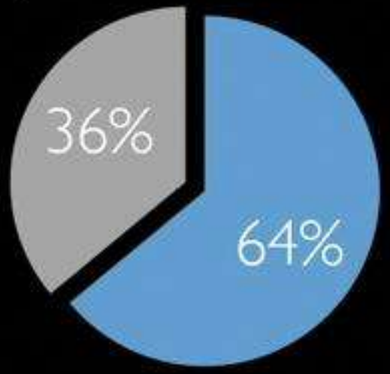
Smartphone Feature or Basic Phone



→ 100+ proprietary OS

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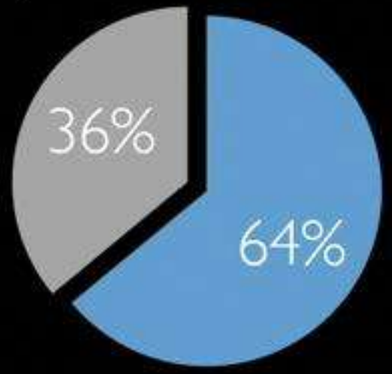

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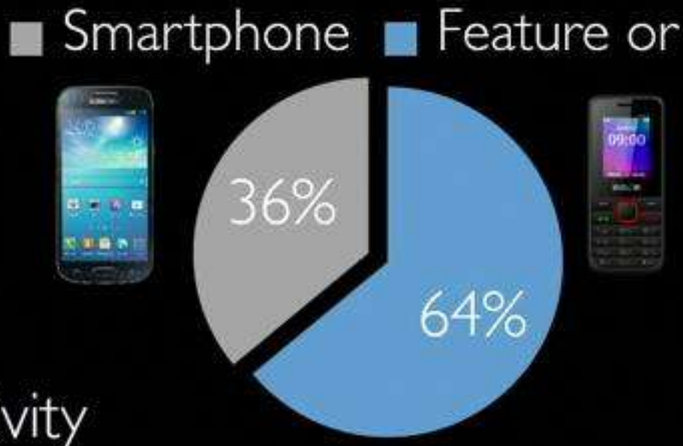

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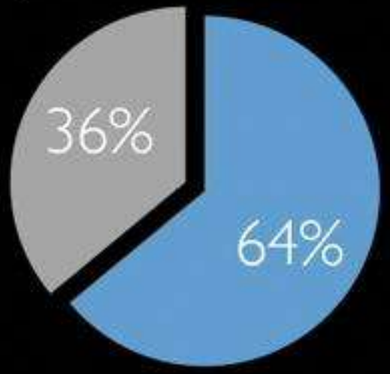
26% people illiterate

122 major languages but no models and data

No fonts for several languages

Smartphone Feature or Basic Phone



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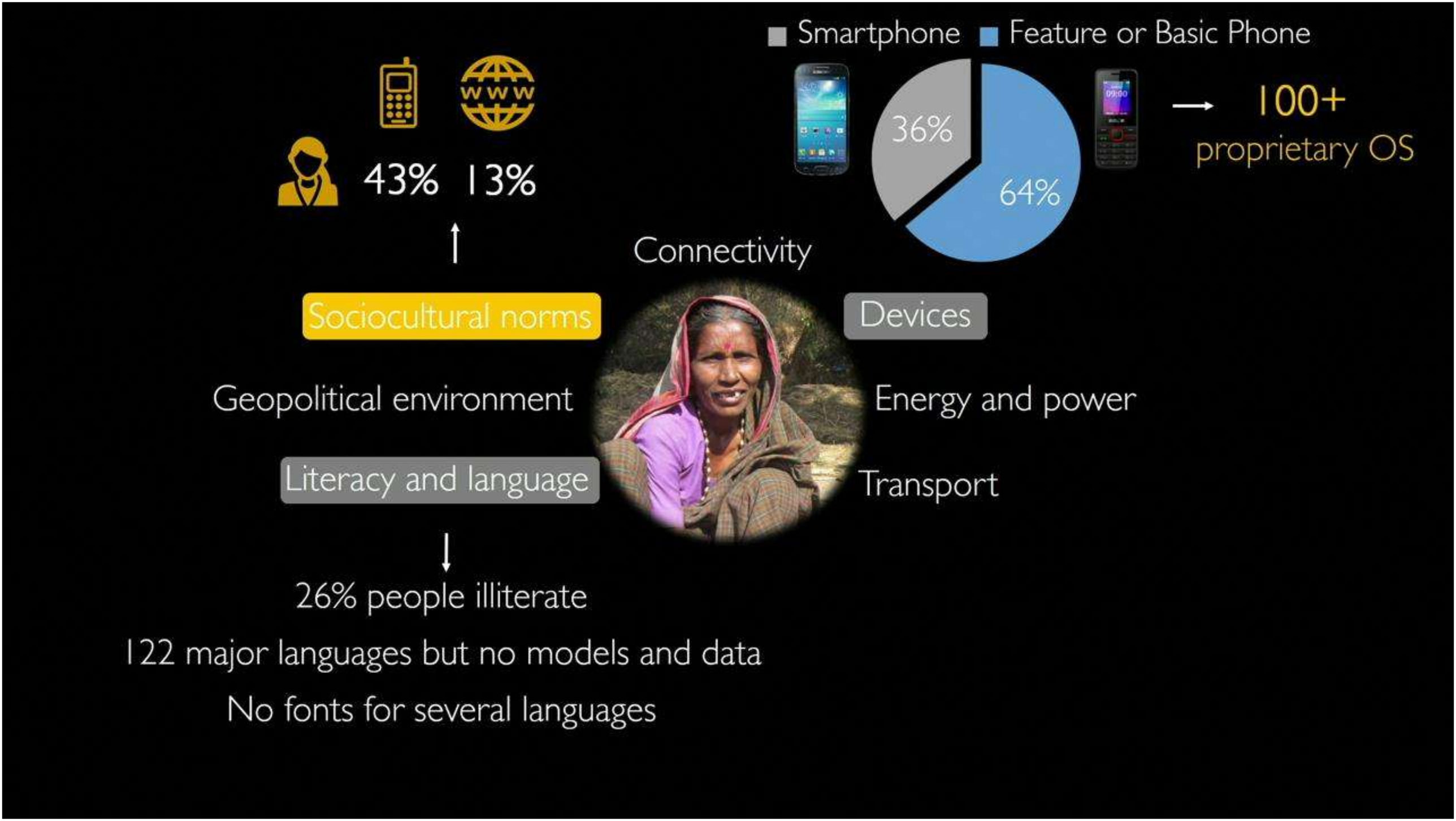
Smartphone
Feature or Basic Phone
36%
64%
100+
proprietary OS
43%
13%
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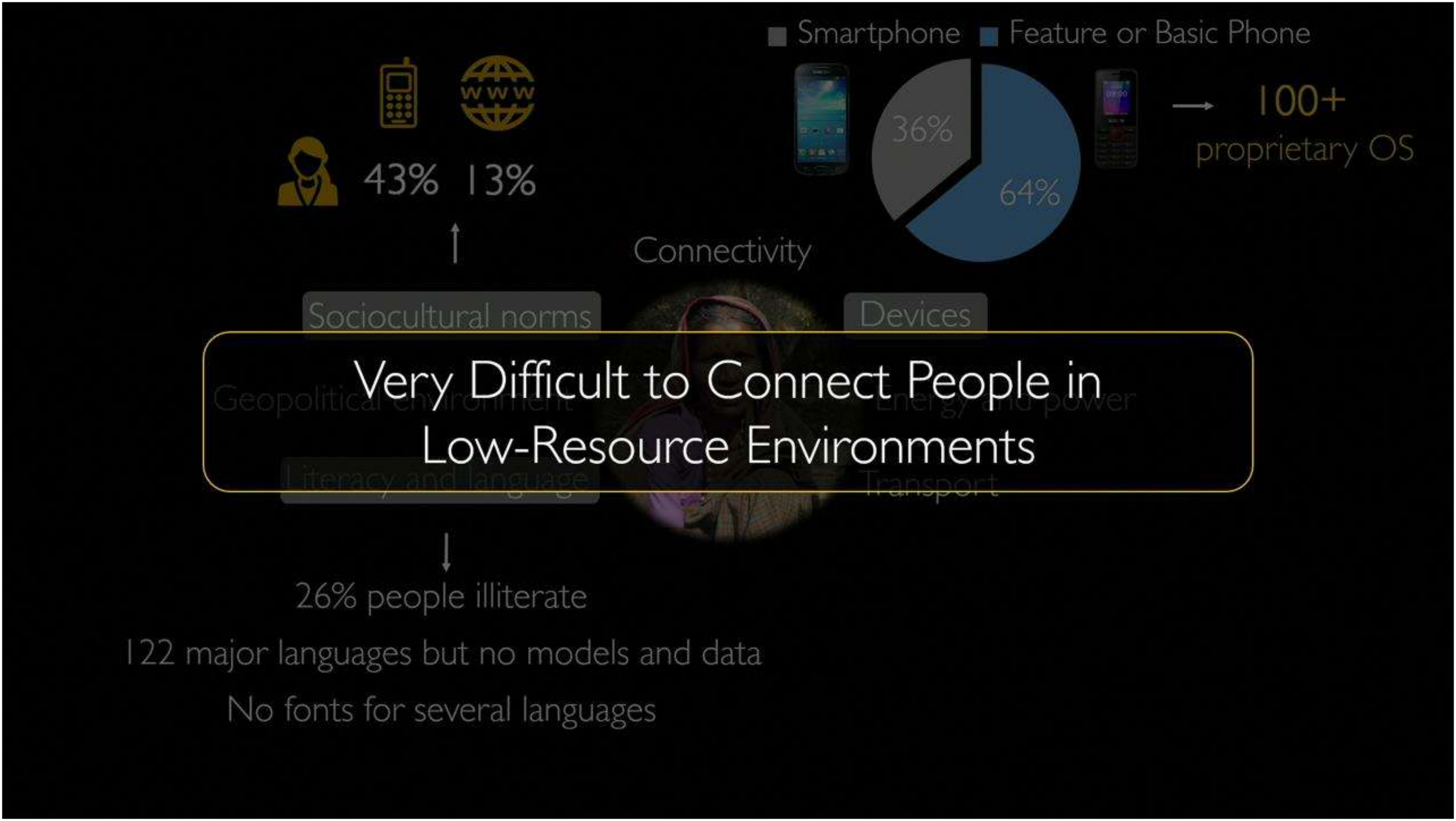
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Sociocultural norms
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Very Difficult to Connect People in Low-Resource Environments
Transport
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Marginalities within Marginalities

Marginalities within Marginalities

80%

of persons with disabilities
live in developing regions

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90%
of children do not attend school

95%
of women are beaten at home

Goal: How to bring the benefits of social computing to billions of people who face literacy, language, socioeconomic, accessibility, and connectivity barriers?

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Connect

Information

Equity

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Interdisciplinary Methods and Techniques

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Built 9 Systems

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Built 9 Systems

Systematized Usage

750+ interviews and focus groups
Quantitative analysis of thousands of users

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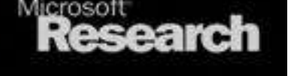

Estimated 220,000 people in Low-Resource Environments

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Voice-based Social Computing Services Using IVR

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Voice-based Social Computing Services Using IVR

Phone is Ringing….

Goal: How to bring the benefits of social computing to billions of people who face literacy, language, socioeconomic, accessibility, and connectivity barriers?

Voice-based Social Computing Services Using IVR

Welcome to the Service

Goal: How to bring the benefits of social computing to billions of people who face literacy, language, socioeconomic, accessibility, and connectivity barriers?

Voice-based Social Computing Services Using IVR

To record an audio message, press 1.
To listen to others' messages press 2.

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Overcoming Barriers

Voice-based Social Computing Services for Global Development

Health

Empowering Health Workers
Yadav et al. WWW 17

Real-time Health Radio Show
Kazakos et al. CHI 16

Treatment of People with AIDS
Joshi et al. CHI 14

Agriculture

Agriculture Discussion Forum
Patel et al. CHI 10

Peer Advice System
Patel et al. ICTD 12

Commodity Price System
Basu et al. APCHI 13

Civic Engagement

Citizen News Journalism
Mudliar et al. ICTD 12
D'Silva, Marathe, Vashistha, et al. DEV 14
Marathe et al. ICTD 15

Civic Engagement Portal
Gulaid and Vashistha, ICTD 13
Chakraborty et al. ICTD 15

Employment

Job Ads by Entertainment
Raza et al. CHI 2013

Employment Exchange
White et al. ICTD 12

Social Computing

Agarwal et al. ICTD 09
Koradia et al. ICTD 12
Vashistha et al. CHI 15
Raza et al. CHI 18
Vashistha et al. CHI 19

MISC

Feedback on School Meals
Grover et al. DEV 12

Measure Knowledge Retention
Raza et al. CHI 19

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Millions of Calls and Voice Messages in Local Languages from Marginalized People

Challenges of Voice-based Social Computing Services

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1

Content Moderation

Challenges of Voice-based Social Computing Services

1. Content Moderation
2. Financial Sustainability

Challenges of Voice-based Social Computing Services

1. Content Moderation
2. Financial Sustainability
3. Set Up & Connectivity

Challenges of Voice-based Social Computing Services

1. Content Moderation → Poor Scalability
2. Financial Sustainability → Poor Sustainability
3. Set Up & Connectivity → Poor Replicability

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1. Content Moderation — Poor Scalability
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Not Running!

Challenges of Voice-based Social Computing Services

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Not Running!

Today's Talk

How to create scalable, sustainable, and replicable voice-based social computing systems that can grow at the scale of large Internet websites?

Challenges of Voice-based Social Computing Services

1. Content Moderation
   - Poor Scalability
2. Financial Sustainability
   - Poor Sustainability
3. Set Up & Connectivity
   - Poor Replicability

Not Running!

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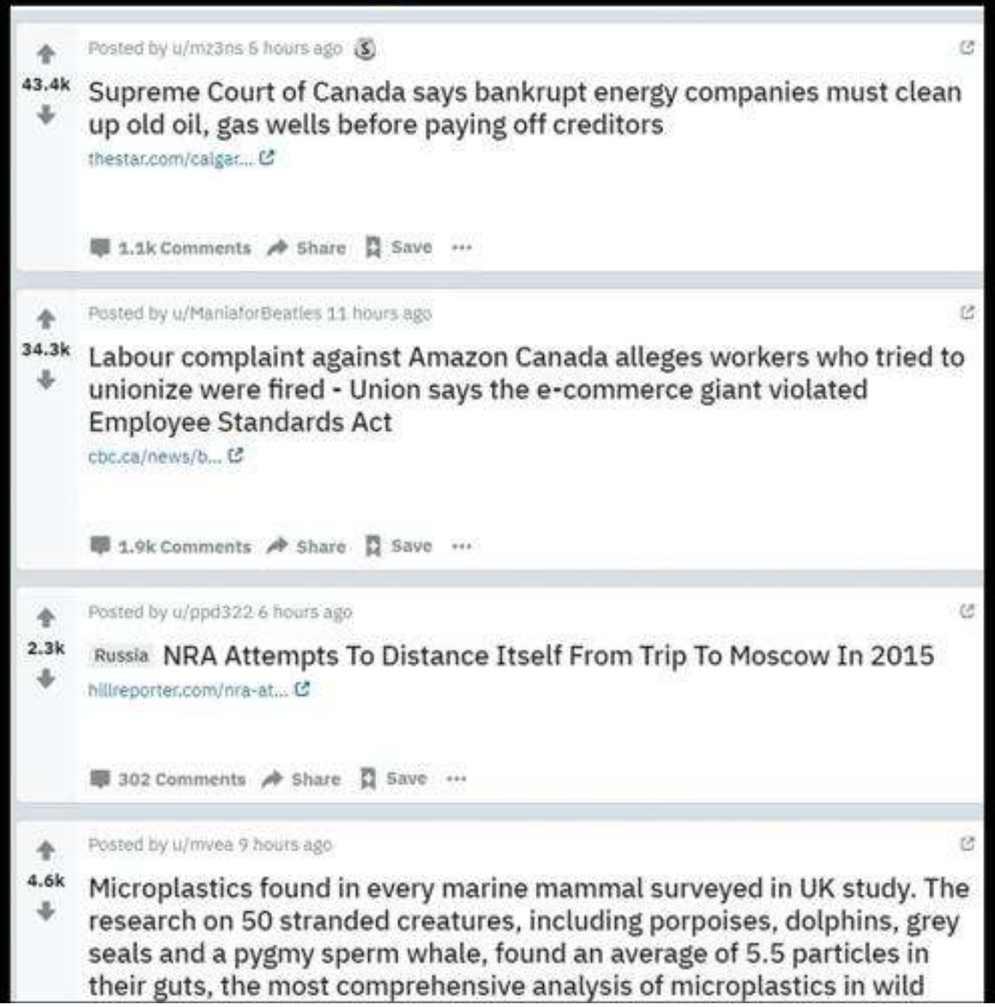
Content Moderation Challenge

reddit



Content Moderation Challenge

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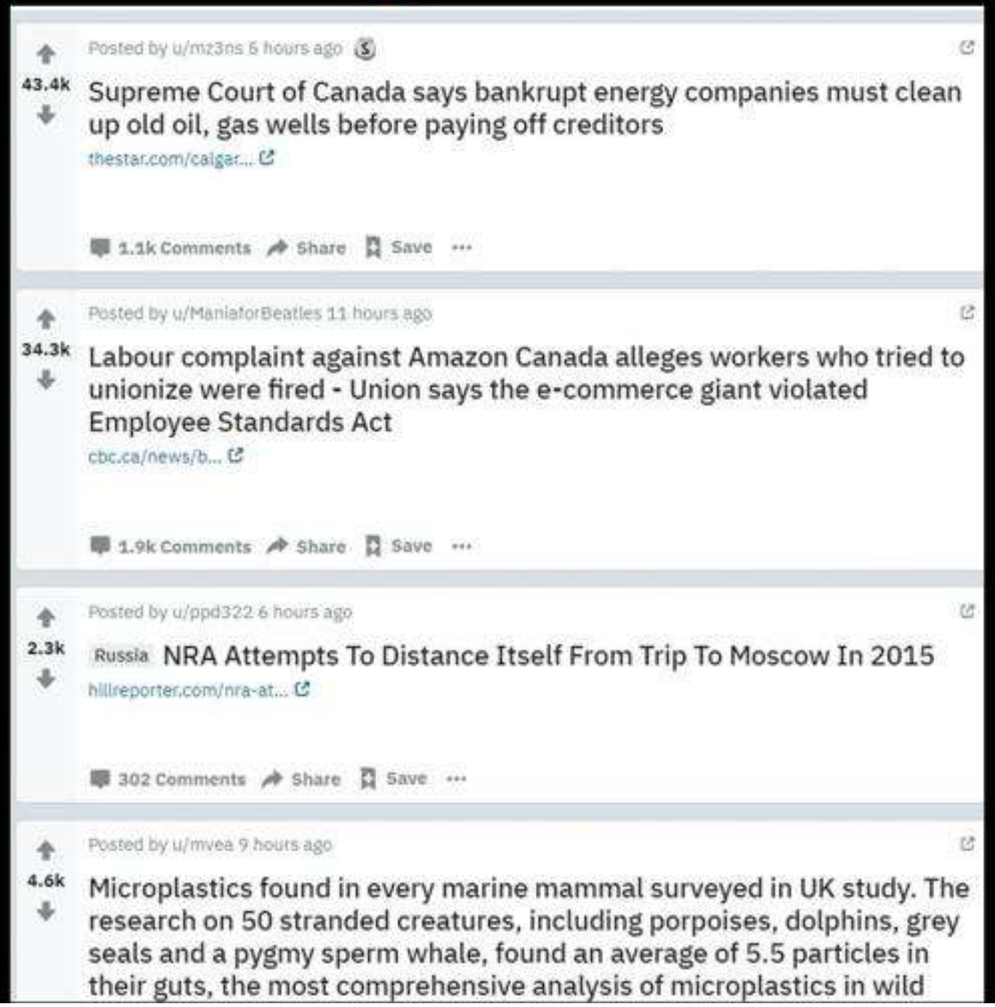
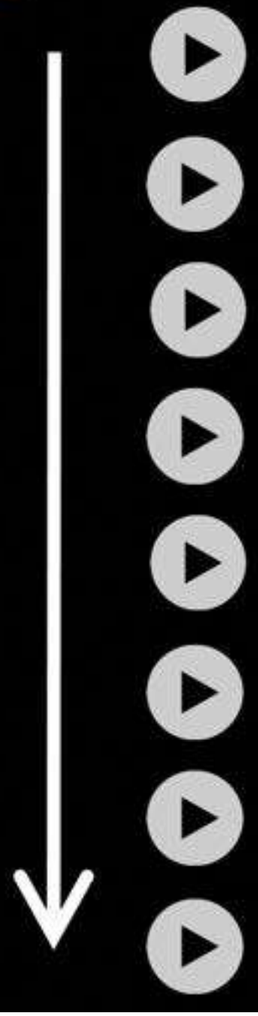


Voice-based Discussion Forum



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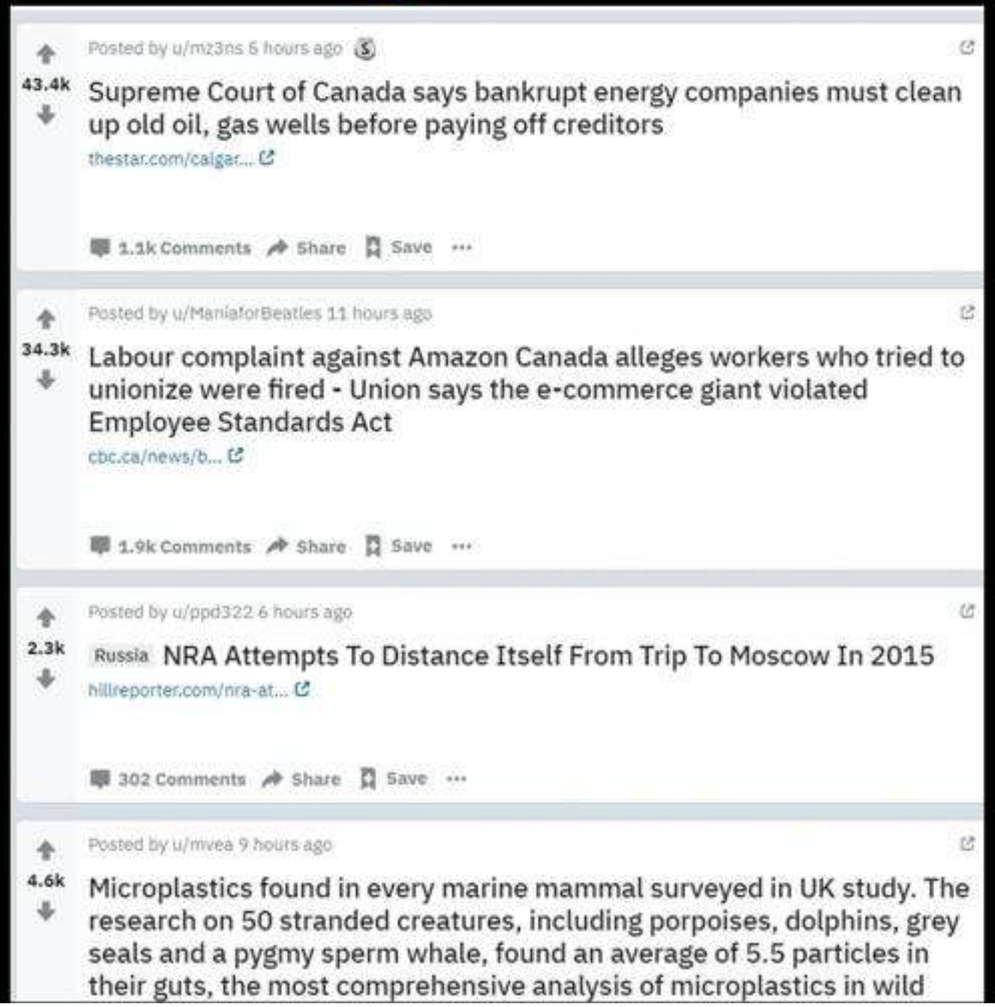

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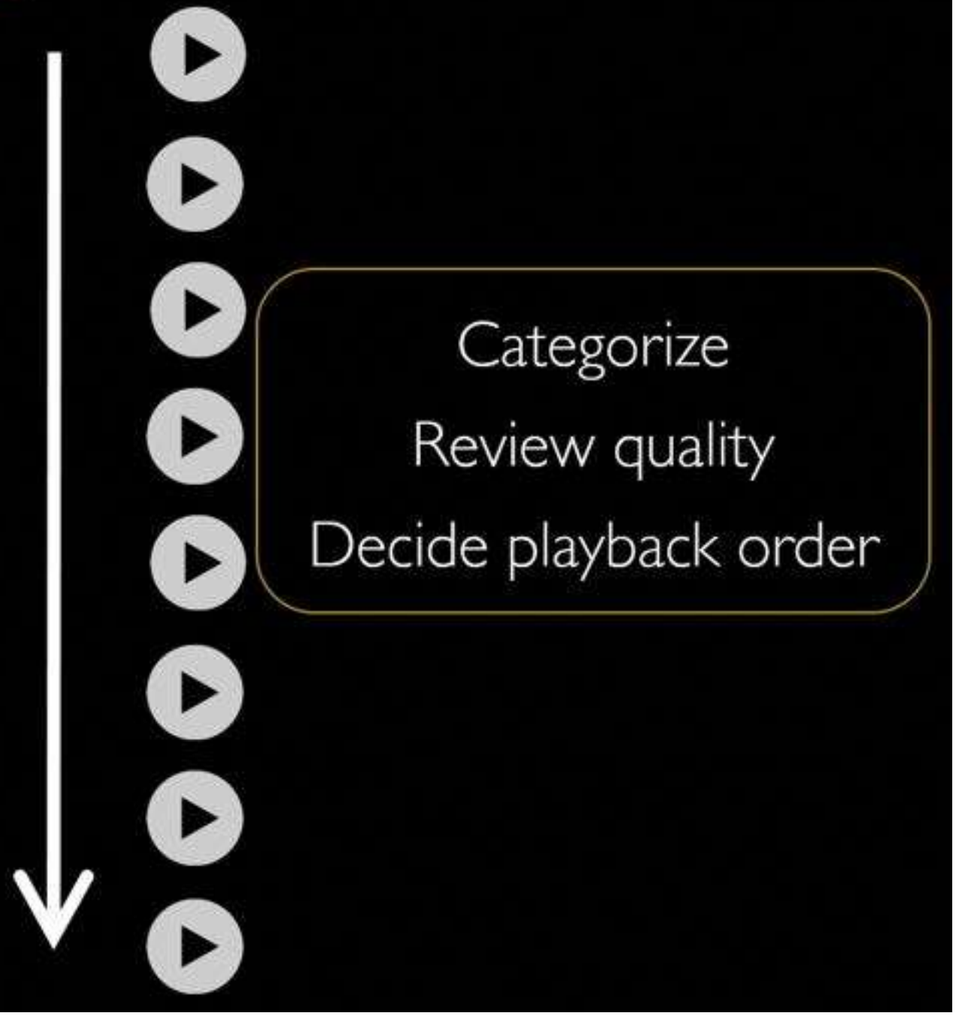

Categorize

Review quality

Decide playback order

Managing User-Generated Content in Local Languages

Managing User-Generated Content in Local Languages

How to reach the scale of large Internet websites?

Key Idea: Enable Scaling through Community Moderation

Key Idea: Enable Scaling through Community Moderation

reddit

stackoverflow

RQ: Can marginalized users of these services moderate and categorize voice messages?

Novice users

Sangeet Swara

A Community-Moderated Voice-Based Social Media Service

🏆 [Vashistha et al. CHI 15, Best Paper Award]

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A Community-Moderated Voice-Based Social Media Service

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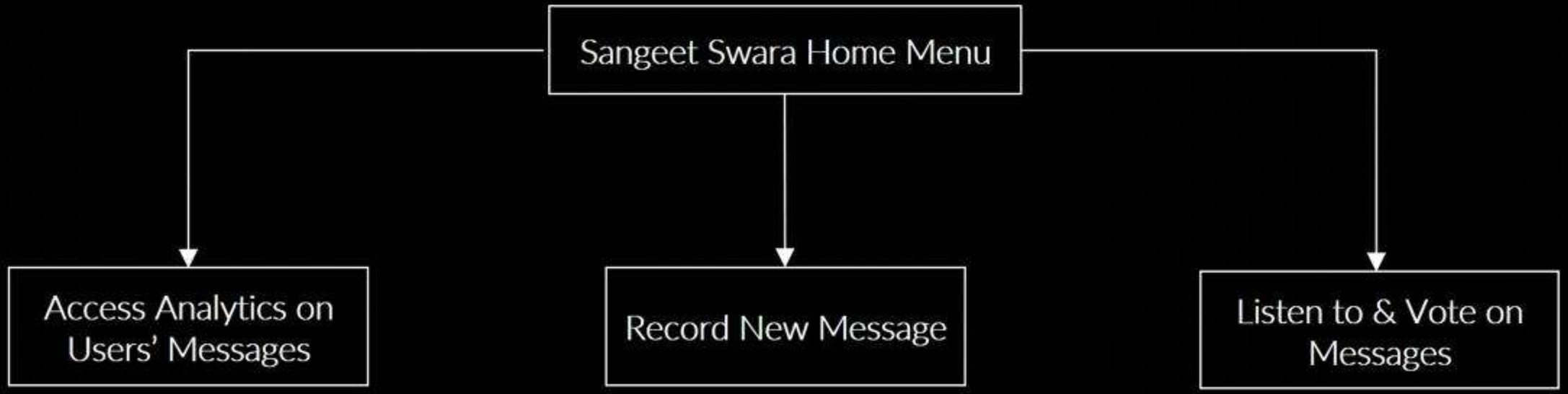

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Now you are listening the message with Rank 5

Sangeet Swara
A Community-Moderated Voice-Based Social Media Service

🏆 [Vashistha et al. CHI 15, Best Paper Award]

….Message recorded by a user is being played….

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Sangeet Swara
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If you don't like this message, then give your vote by pressing 2.

Sangeet Swara
A Community-Moderated Voice-Based Social Media Service

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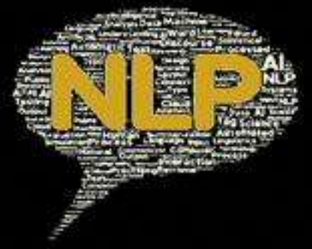
Community Moderation Algorithm for Voice Interfaces



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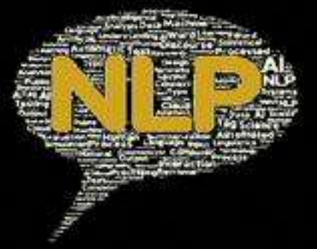
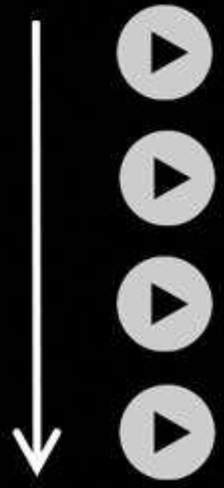


How to decide the playback order?



Balance of novelty & popularity

Community Moderation Algorithm for Voice Interfaces

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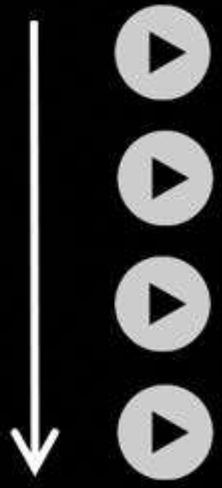

Balance of novelty & popularity

How to decide the quality of messages?

High score for messages with high ratio of upvotes to downvotes

High confidence in judgement

Deployment of Sangeet Swara in Rural India

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Spread virally from 73 people to 1500+ by word of mouth

Traffic in 11 weeks

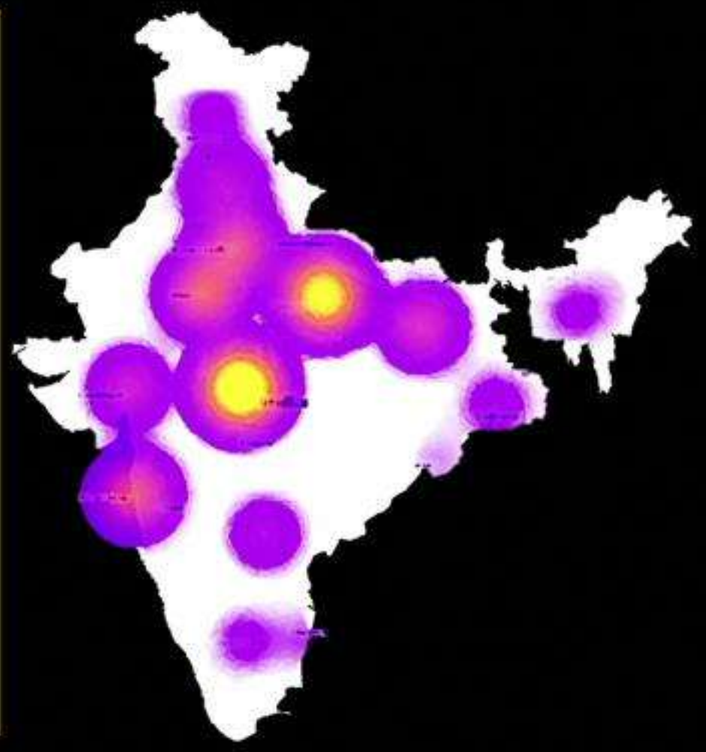
25,000 calls

5,400 messages

140,000 votes

200,000 playbacks

Avg. call: 5 mins



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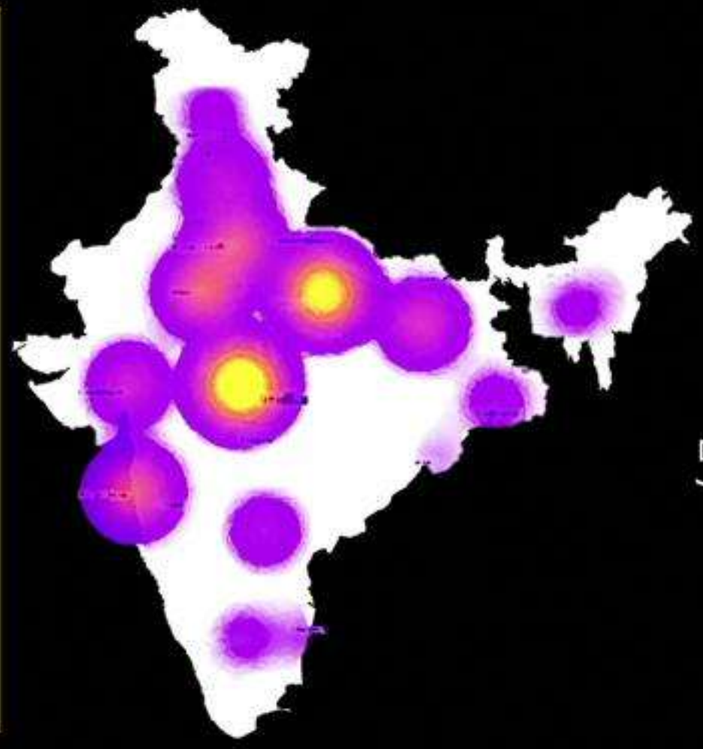
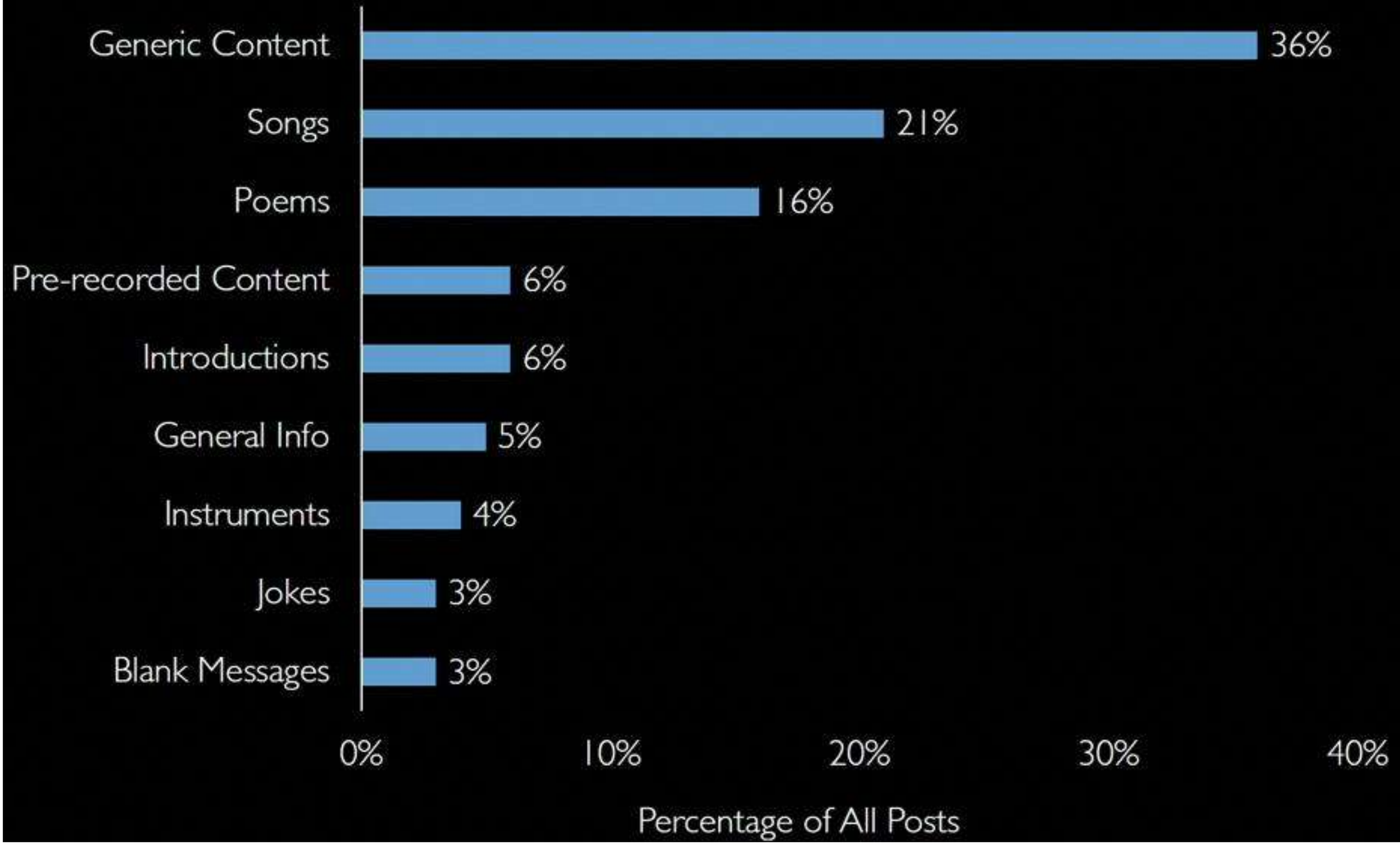


50% rural residents

94% men

26%+ blind people

Did Users Value the Community?



Did Users Value the Community?

Impassioned Usage by Blind People

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Impassioned Usage by Blind People

"I couldn't get educated. I want to thank you because you enabled all blind people to get in touch and share. No matter how much I praise, it won't be enough."

Did Users Value the Community?

Impassioned Usage by Blind People

Do they derive same benefits from using mainstream social media platforms?



🏆 [Vashistha et al. ASSETS 15, Best Student Paper Award]

Did Users Value the Community?

Impassioned Usage by Blind People

Do they derive same benefits from using mainstream social media platforms?

More barriers beyond the basic hurdles of literacy, language, poverty, and connectivity

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Problems with Screen Reader Software

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Impassioned Usage by Blind People

Platform for Rural Users & Musicians

Did Users Value the Community?

Impassioned Usage by Blind People

Platform for Rural Users & Musicians

"Swara is trying to get talent from people in villages and towns.
It is getting recognition to those who never got an opportunity
to show their talent."

Did Users Value the Community?

Impassioned Usage by Blind People

Platform for Rural Users & Musicians

Instrumental Benefits

Did Users Value the Community?

Impassioned Usage by Blind People

Platform for Rural Users & Musicians

Instrumental Benefits

"Some people record questions, which increases our knowledge. We learn new vocabulary and accent. I feel great when people give me feedback. I consciously think of ways to improve my messages."

Did Users Value the Community?

User's valued their interactions with the community members!

Community Moderation Evaluations and Results

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Categorization tasks

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3,700 tasks
93% response rate
98% accuracy

Categorization tasks

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Categorization tasks

Distinction b/w high & low ranked messages

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Distinction b/w high & low ranked messages

	Song	Joke	Poem	Misc
Top 50	16	7	23	4
Bottom 50	10	0	2	38

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Top-ranked vs. Bottom-ranked → 90% agreement

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Comparison with experts

Understanding users' perceptions

Understood ✓
Satisfied ✓

Two Significant Contributions

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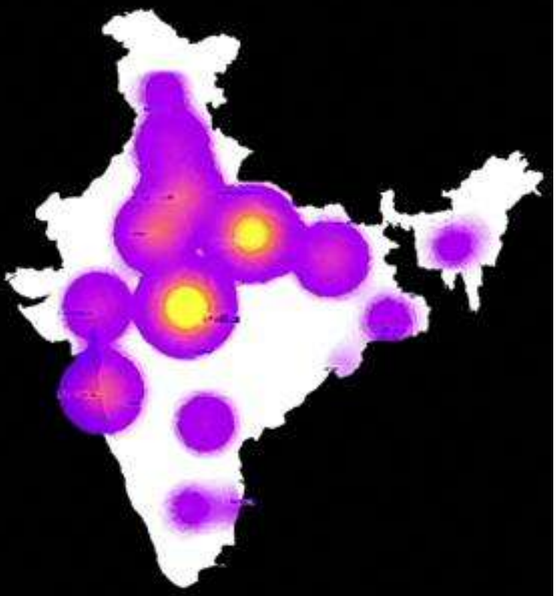
1. Built the first community-moderated voice-based social media service that connected people, provided them information, and gave them digital equity



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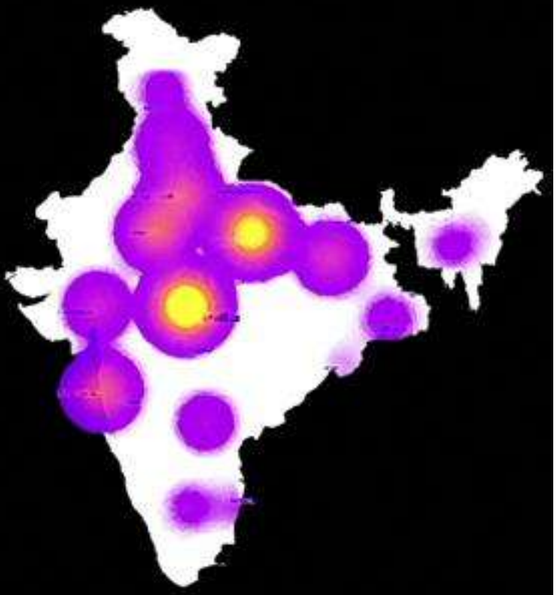
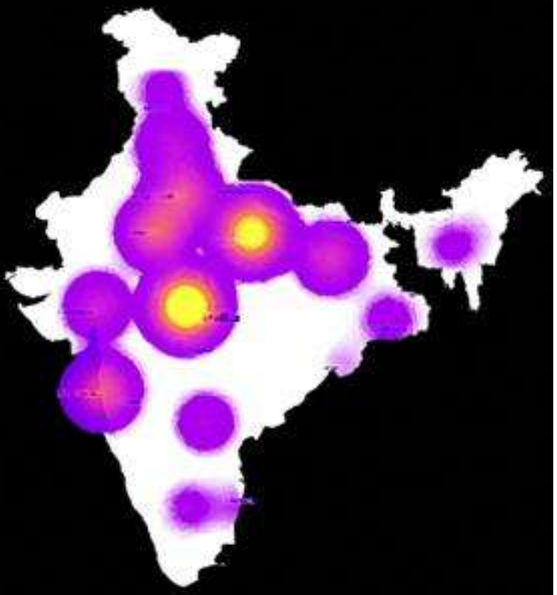


2. Demonstrated that low-income low-literate people, rural residents, and blind people can moderate their digital community without any outside support

Two Significant Contributions

1. Built the first community-moderated voice-based social media service that connected people, provided them information, and gave them digital equity



2. Demonstrated that low-income low-literate people, rural residents, and blind people can moderate their digital community without any outside support

Baang service in Pakistan

Quarter million calls, messages, and votes

Today's Talk

Overcoming Challenges of Voice-based Social Computing Systems

1 Content Moderation

Scalability ✓

2 Financial Sustainability

Poor Sustainability

3 Set Up & Connectivity

Poor Replicability

Would users pay for calling a service they deeply value?

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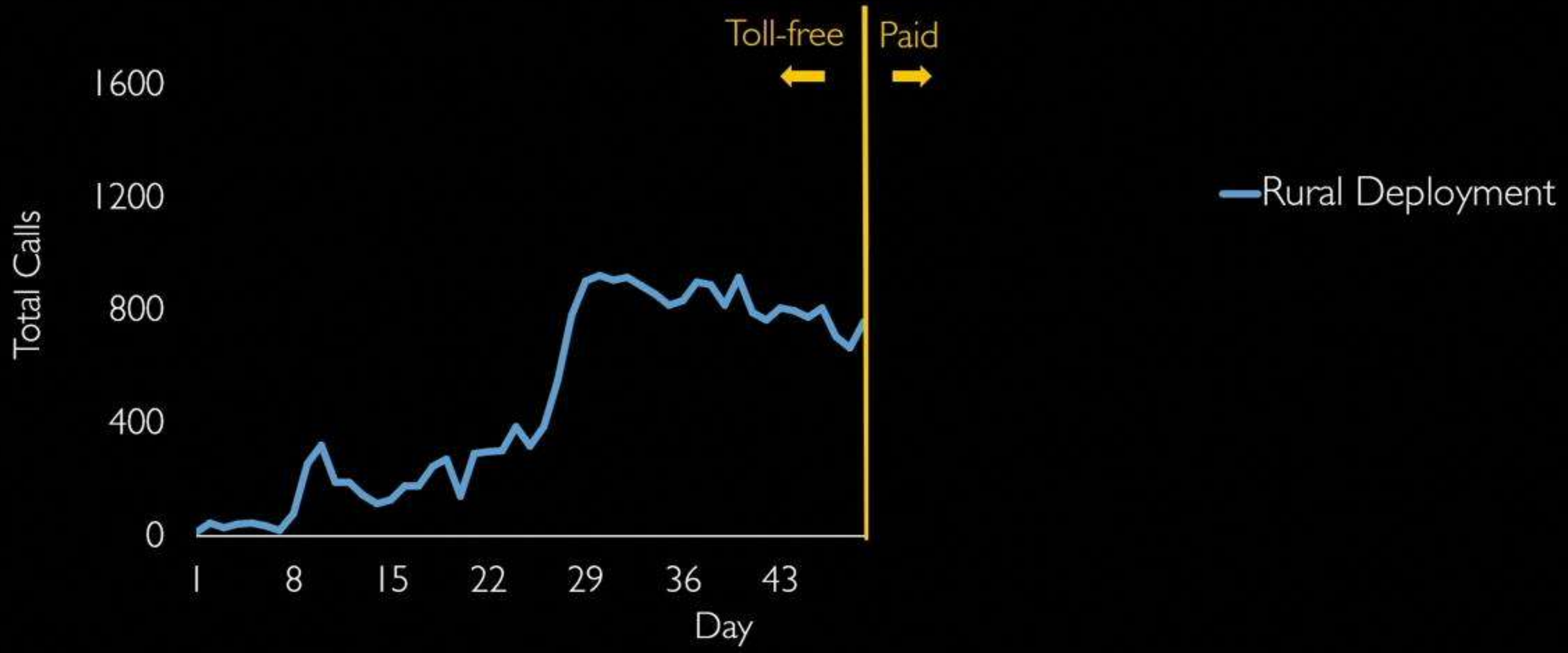

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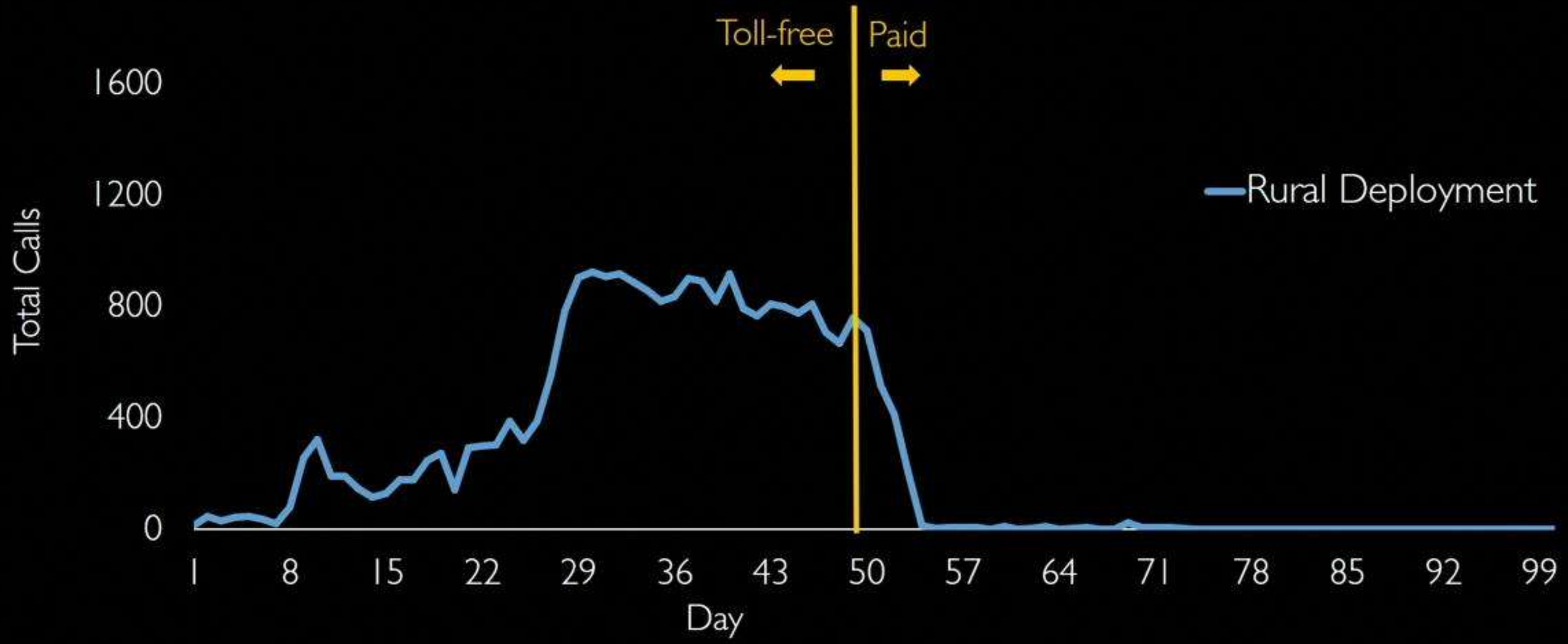
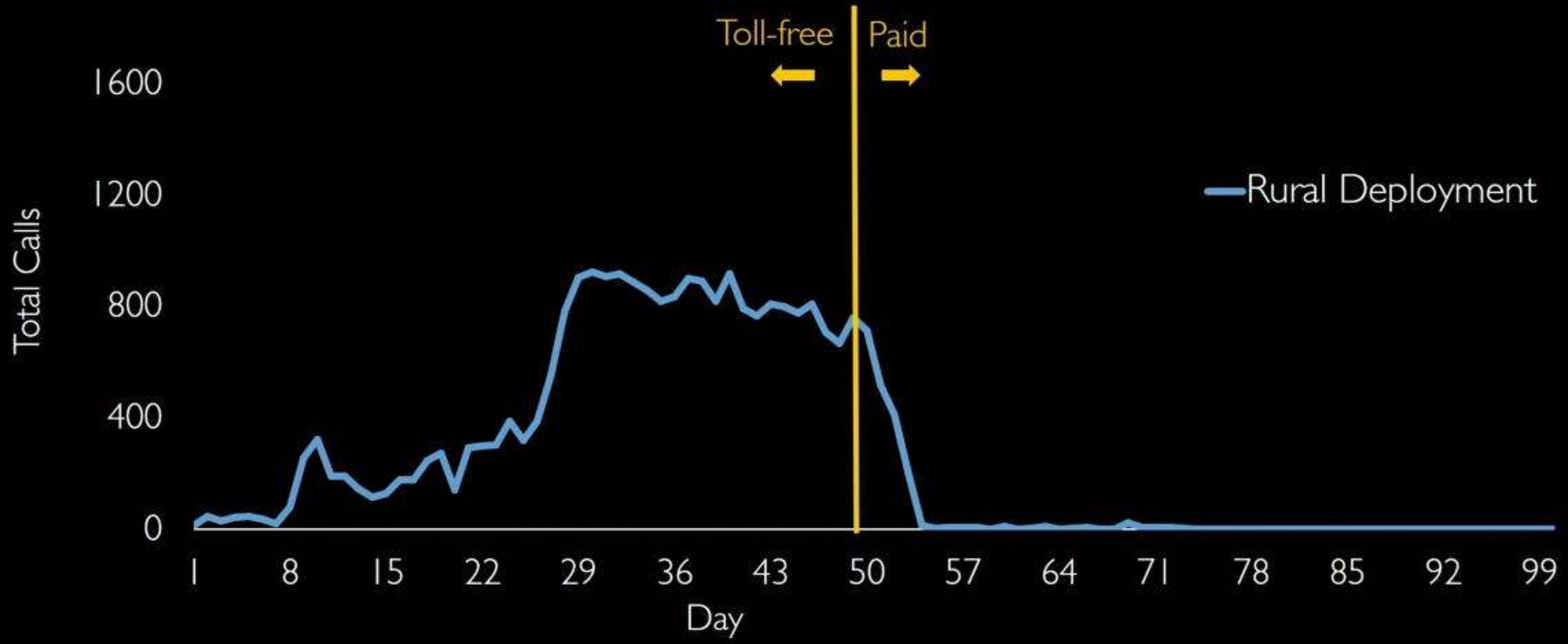


Can incentives prompt people to pay for voice call costs?



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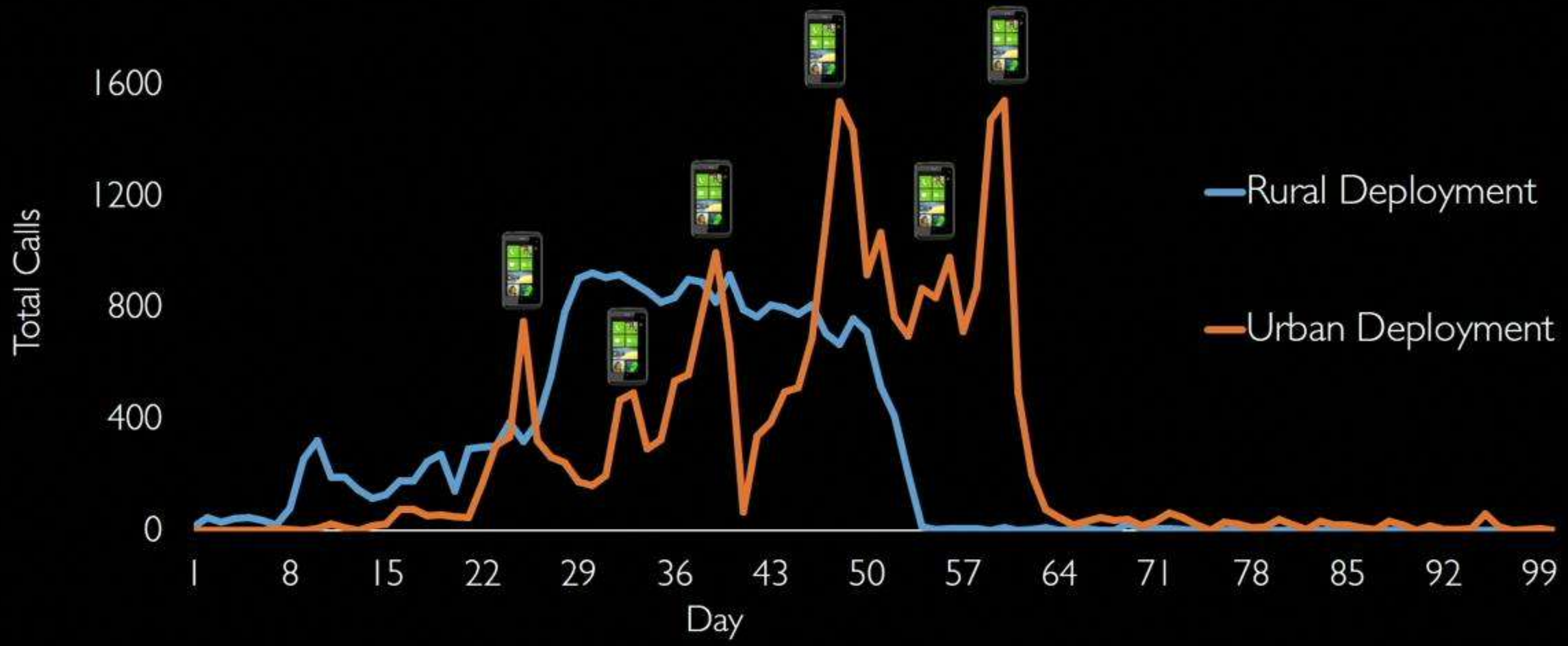

Can we use data channel instead of voice channel?

Record a message

Record a message and a photo

Listen to messages

[D'Silva et al. DEV 14]

Can we use data channel instead of voice channel?

Record a message

Record a message and a photo

Listen to messages

internet.org by facebook

[D'Silva et al. DEV 14]

Can we use data channel instead of voice channel?

Record a message

Record a message and a photo

Listen to messages

internet.org by facebook

Only a few users of these services own a smartphone and use the Internet

[D'Silva et al. DEV 14]

Key Idea: Using Profits from Crowd Work to Address the Financial Sustainability Challenge

RQ: Can users complete useful work on their mobile phones to get free airtime to use these services?

7 Million Workers in $5 Billion Gig Economy

amazon mechanical turk

CrowdFlower

7 Million Workers in $5 Billion Gig Economy

amazon mechanical turk CrowdFlower

Inappropriate for people who are illiterate or who do not have connectivity

7 Million Workers in $5 Billion Gig Economy

amazon mechanical turk CrowdFlower

Inappropriate for people who are illiterate or who do not have connectivity

Khanna et al. DEV10 Zyskowski et al. CSCW15

7 Million Workers in $5 Billion Gig Economy

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Inappropriate for people who are illiterate or who do not have connectivity

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Ambitious Goal

How can I provide earning opportunities to illiterate people and basic mobile phone users?

7 Million Workers in $5 Billion Gig Economy

amazon mechanical turk CrowdFlower

Inappropriate for people who are illiterate or who do not have connectivity

Khanna et al. DEV10 Zyskowski et al. CSCW15

Ambitious Goal

How can I provide earning opportunities to illiterate people and basic mobile phone users?

New Crowdsourcing Marketplace

New Crowdsourcing Marketplace

What is a compelling problem that can be divided into voice-based microtasks and generate $$$?

Speech Transcription

More than $60 Billion Industry

Hindi Speech

मेरे प्यारे भाइयो-बहनो
इस बार जब मैं मन की
बात को लेकर आप लोगों
के सुझाव देख रहा था तो
मुझे पांडिचेरी से
.....

Hindi Text

Speech Transcription

More than $60 Billion Industry

High accuracy, High cost

Hindi Speech

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Hindi Text

High accuracy, High cost

SPEECHPAD

High accuracy, High cost

Low accuracy, Low cost

Speech Transcription

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मुझे पांडिचेरी से
.....

Hindi Text

High accuracy, High cost

SPEECHPAD

High accuracy, High cost

Low accuracy, Low cost

Poor accuracy or high cost for transcription of low-resource languages and accents like Hindi and Indian English

Key Idea: Using Profits from Crowd Work to Address the Financial Sustainability Challenge

Research Goals

1. Design a voice-based phone-based crowdsourcing marketplace
2. Facilitate transcription of low-resource languages and accents
3. Generate profits to provide earnings and free airtime to users

Respeak System

Combining Benefits of Human Intelligence and ASR Systems

Respeak System

Combining Benefits of Human Intelligence and ASR Systems

✗

Respeak System

Combining Benefits of Human Intelligence and ASR Systems

✗

Key Idea

ASR engine

Text obtained from ASR engine

✓

Respeak System


Respeak System
Engine
User App

Respeak System

Engine

User App

Respeak

Smartphone app for
low-income students

[Vashistha et al. CHI 17]
Best Paper Honorable Mention

Respeak System

Engine

User App

Respeak

Smartphone app for low-income students

[Vashistha et al. CHI 17]

Best Paper Honorable Mention

BSpeak

Accessible app for blind people

[Vashistha et al. CHI 18]

Respeak System

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[Vashistha et al. CHI 17]

Best Paper Honorable Mention

BSpeak

Accessible app for blind people

[Vashistha et al. CHI 18]

ReCall

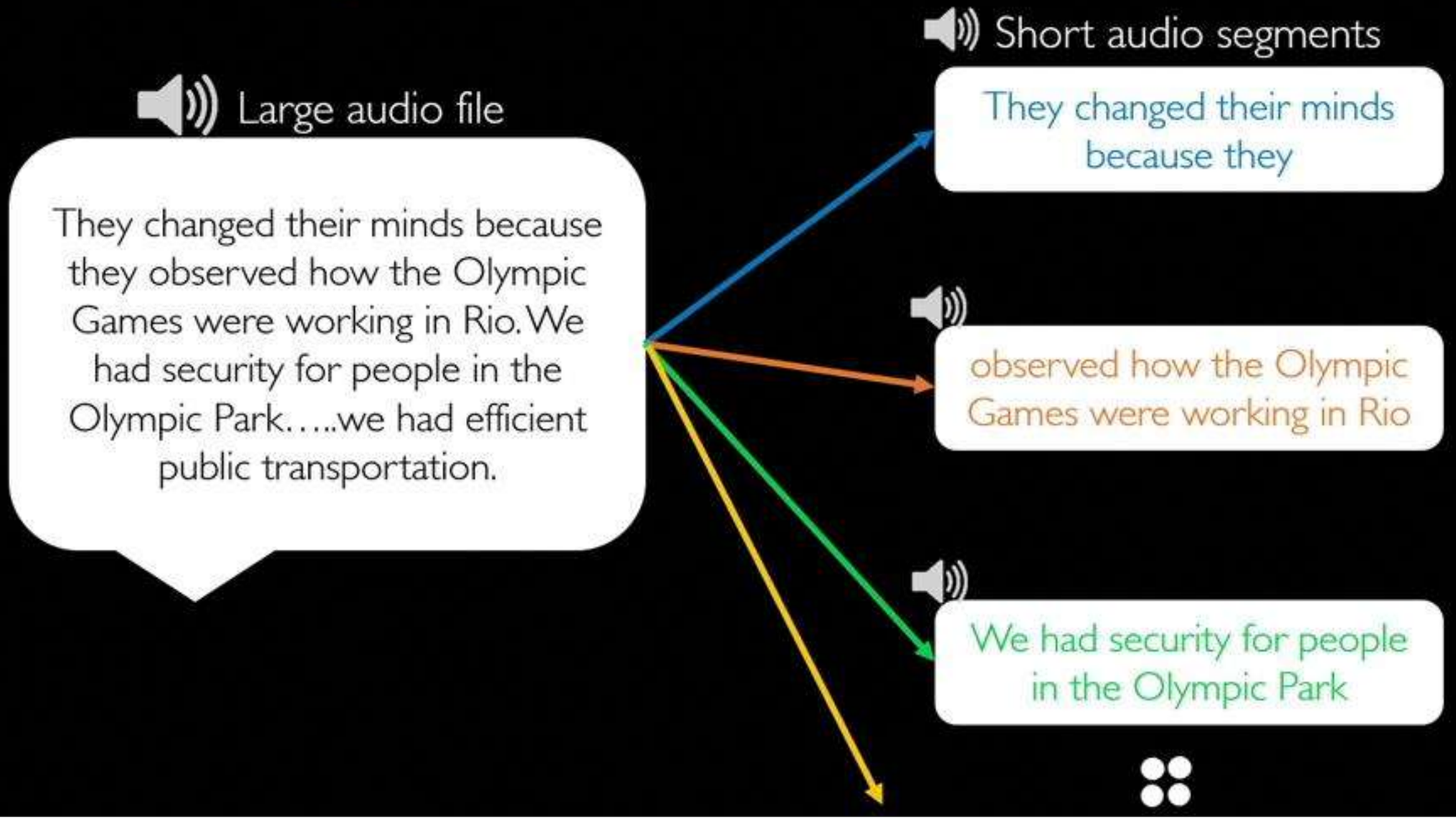
IVR app for rural residents

[Vashistha et al. CHI 19]

Respeak's Design – The Engine

Respeak's Design – The Engine

Step 1: Segmentation



Respeak's Design – The Engine

Step 1: Segmentation

Large audio file

They changed their minds because they observed how the Olympic Games were working in Rio. We had security for people in the Olympic Park…..we had efficient public transportation.

Step 2: Distribution to App users

Short audio segments

They changed their minds because they

observed how the Olympic Games were working in Rio

We had security for people in the Olympic Park

Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

Listen to segment

Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

Listen to segment → Remember the content

Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

Listen to segment → Remember the content → Repeat content into ASR

Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

Listen to segment → Remember the content → Repeat content into ASR → Verify transcript




Respeak's Design – the Smartphone and Basic Phone App

Step 3: User perform tasks

A blind user using the smartphone app

Women using the IVR app

Respeak's Design – The Engine

Transcripts generated by
re-speaking the segment

Short audio segment:

They changed their minds because they

The changed their blinds they

They changed their minds because

They change the minds because they

Respeak's Design – The Engine

Transcripts generated by re-speaking the segment

Short audio segment:

They changed their minds because they

The changed their blinds they

They changed their minds because

They change the minds because they

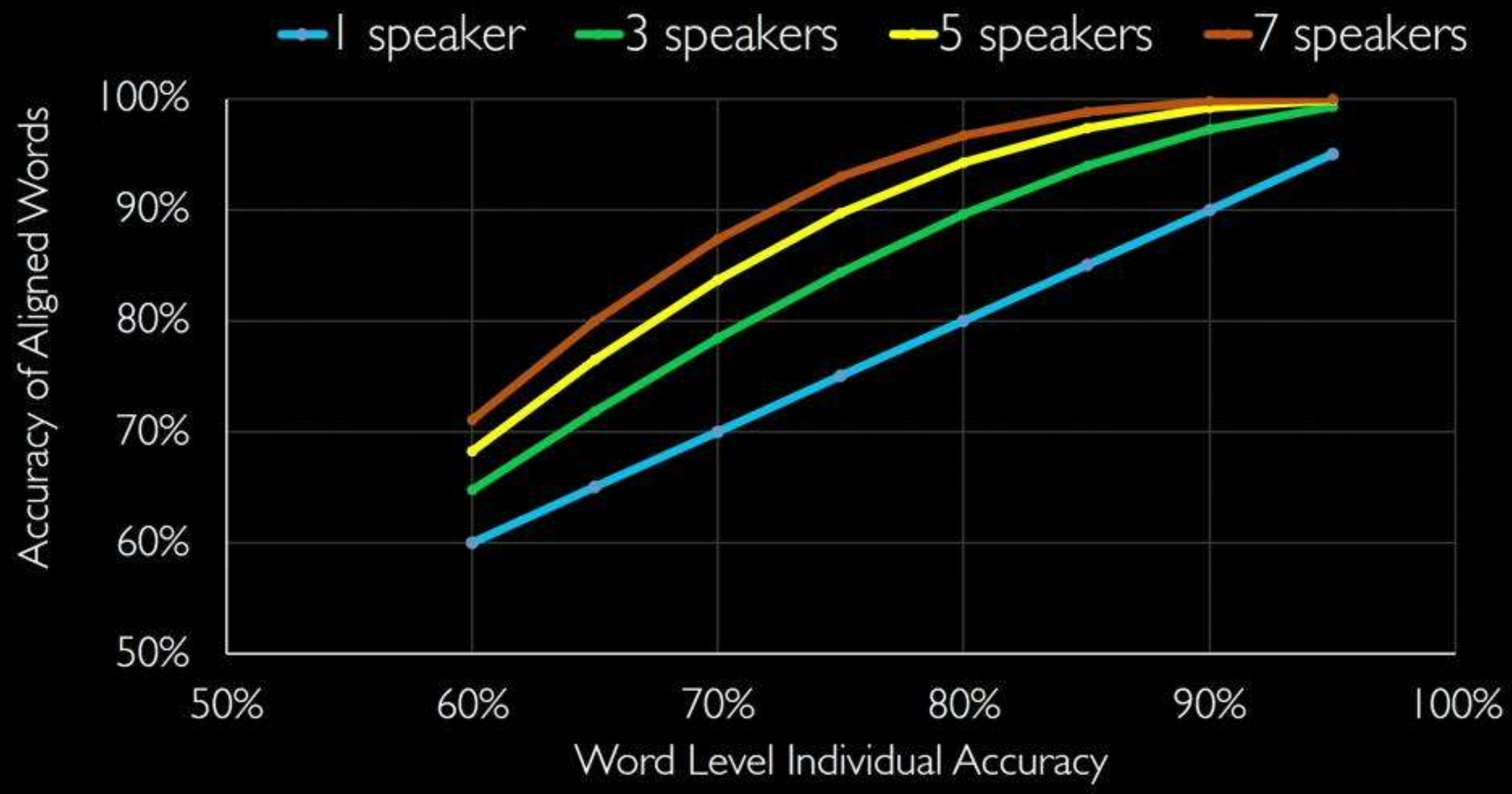
Step 4: Merging using multiple string alignment and majority voting

the	changed	their	blinds	———	they
they	changed	their	minds	because	———
they	change	the	minds	because	they
they	changed	their	minds	because	they

Best estimation transcript for the segment

They changed their minds because they

Expected Improvement in Accuracy from Majority Voting



Respeak's Design – The Engine

Step 5: Final merging

Best estimation transcripts for different segments

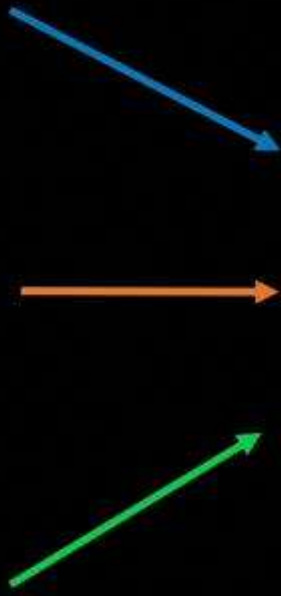
They changed their minds because they

Observed how the Olympic Games were working in Rio

We had security for people in the Olympic Park

Final transcript

They changed their minds because they observed how the Olympic Games were working in Rio We had security for people in the Olympic Park…..we had efficient public transportation




Cognitive Experiments, Usability Studies, Experimental Evaluations
with 67 low-income students, blind people, & rural residents
Listening
Remembering
Re-speaking
Verifying Transcript

Cognitive Experiments, Usability Studies, Experimental Evaluations

with 67 low-income students, blind people, & rural residents

Listening

smart or basic phone?

data or voice?

Remembering

segment length?

sequential or random?

Re-speaking

speaking or typing?

phone type? data or voice?

Verifying Transcript

reading or listening?

Accessibility & Usability Comparison

amazon mechanical turk

Usability & Performance Comparison

Field Deployments with 73 Low-Income Indian People

Five hours of Hindi content → 4,124 micro tasks

Field Deployments with 73 Low-Income Indian People

Five hours of Hindi content → 4,124 micro tasks

Respeak
25 students
1 month

Field Deployments with 73 Low-Income Indian People

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25 students
1 month

BSpeak
24 blind people
2 weeks

Field Deployments with 73 Low-Income Indian People

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24 rural residents
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25 students
1 month

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24 blind people
2 weeks

ReCall
24 rural residents
2 weeks

Users completed 50,000 micro-tasks and earned ₹31,000 ($470)

USD ($) 1 = ₹66

Field Deployments with 73 Low-Income Indian People

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Users completed 50,000 micro-tasks and earned ₹31,000 ($470)

ASR Accuracy
71%

USD ($) 1 = ₹66

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ASR Accuracy
71%

Transcription Accuracy
92%

USD ($) 1 = ₹66

Field Deployments with 73 Low-Income Indian People

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Users completed 50,000 micro-tasks and earned ₹31,000 ($470)

ASR Accuracy
71%

Transcription Accuracy
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Transcription Cost
$1.30 per minute

USD ($) 1 = ₹66

Field Deployments with 73 Low-Income Indian People

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ASR Accuracy
71%

Transcription Accuracy
92%

Transcription Cost
$1.30 per minute

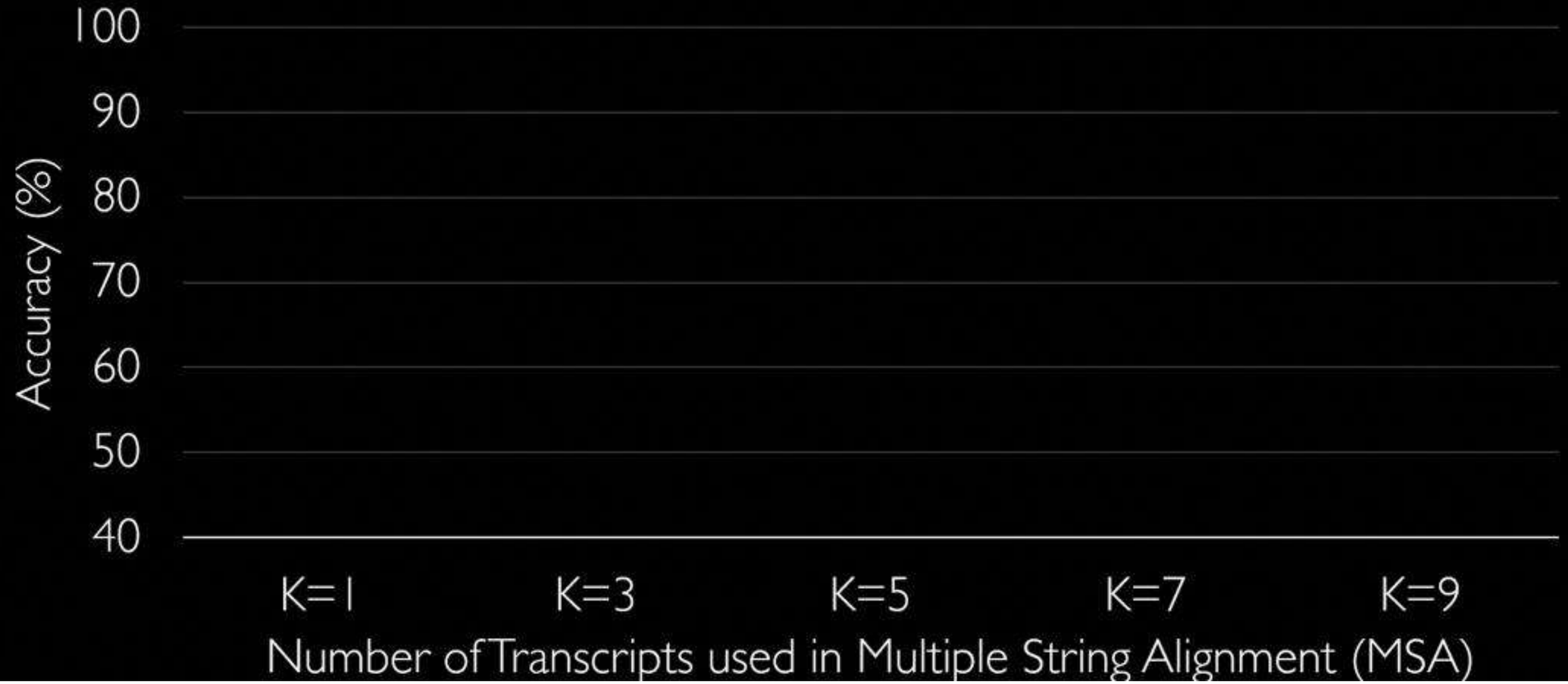
User Earnings
₹50 per hour

USD ($) 1 = ₹66

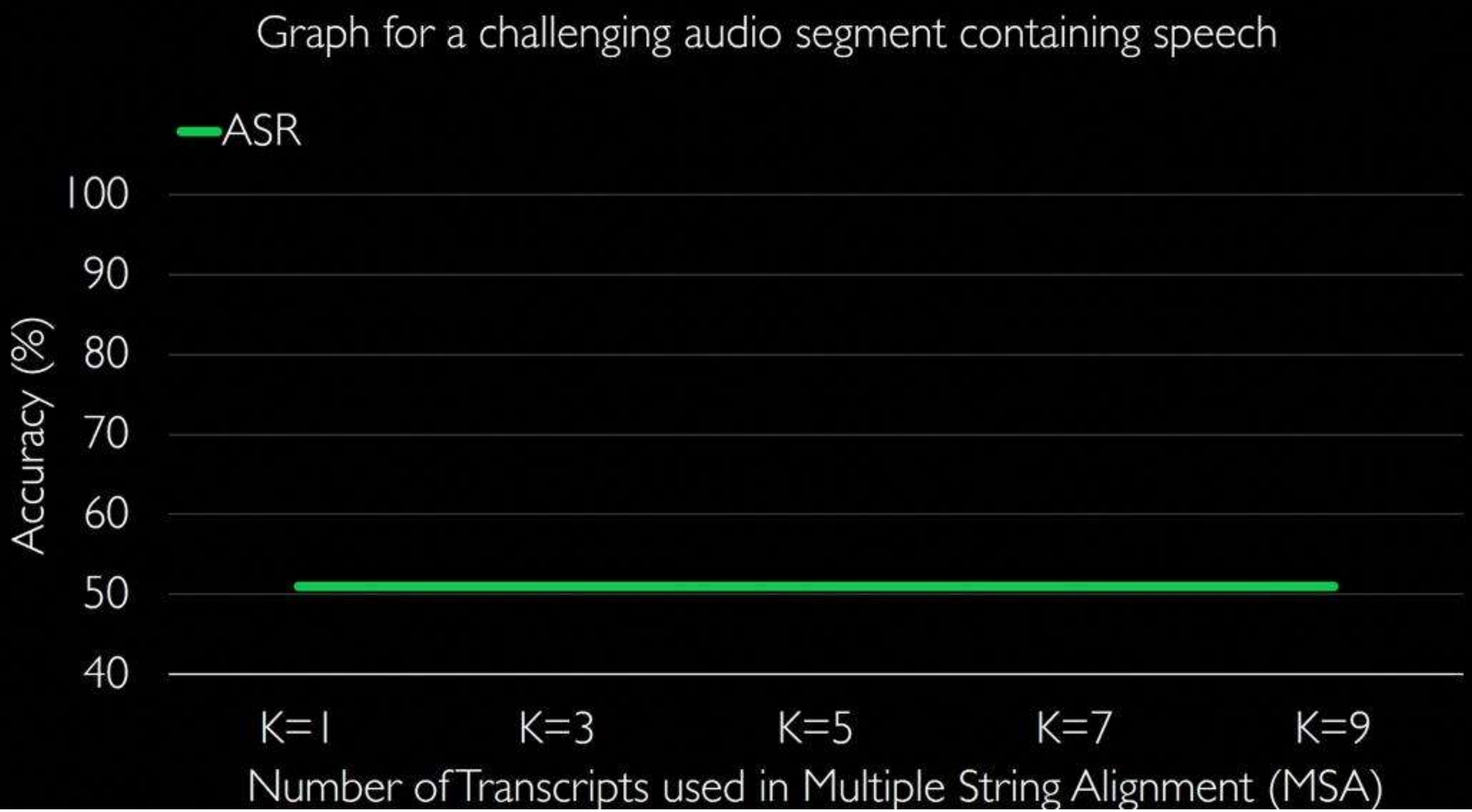
Benefits of Re-speaking and Multiple String Alignment

Benefits of Re-speaking and Multiple String Alignment

Graph for a challenging audio segment containing speech



Benefits of Re-speaking and Multiple String Alignment



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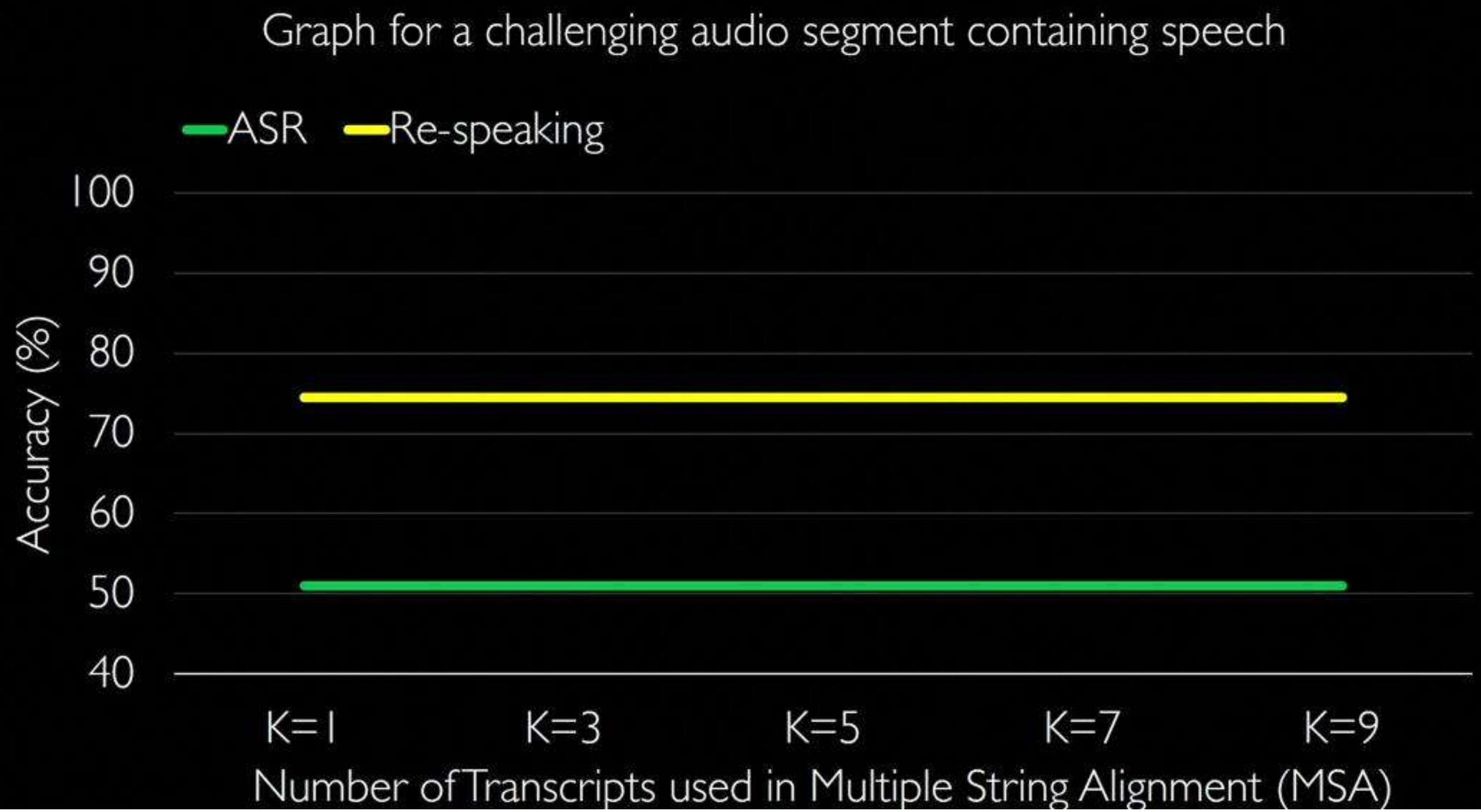

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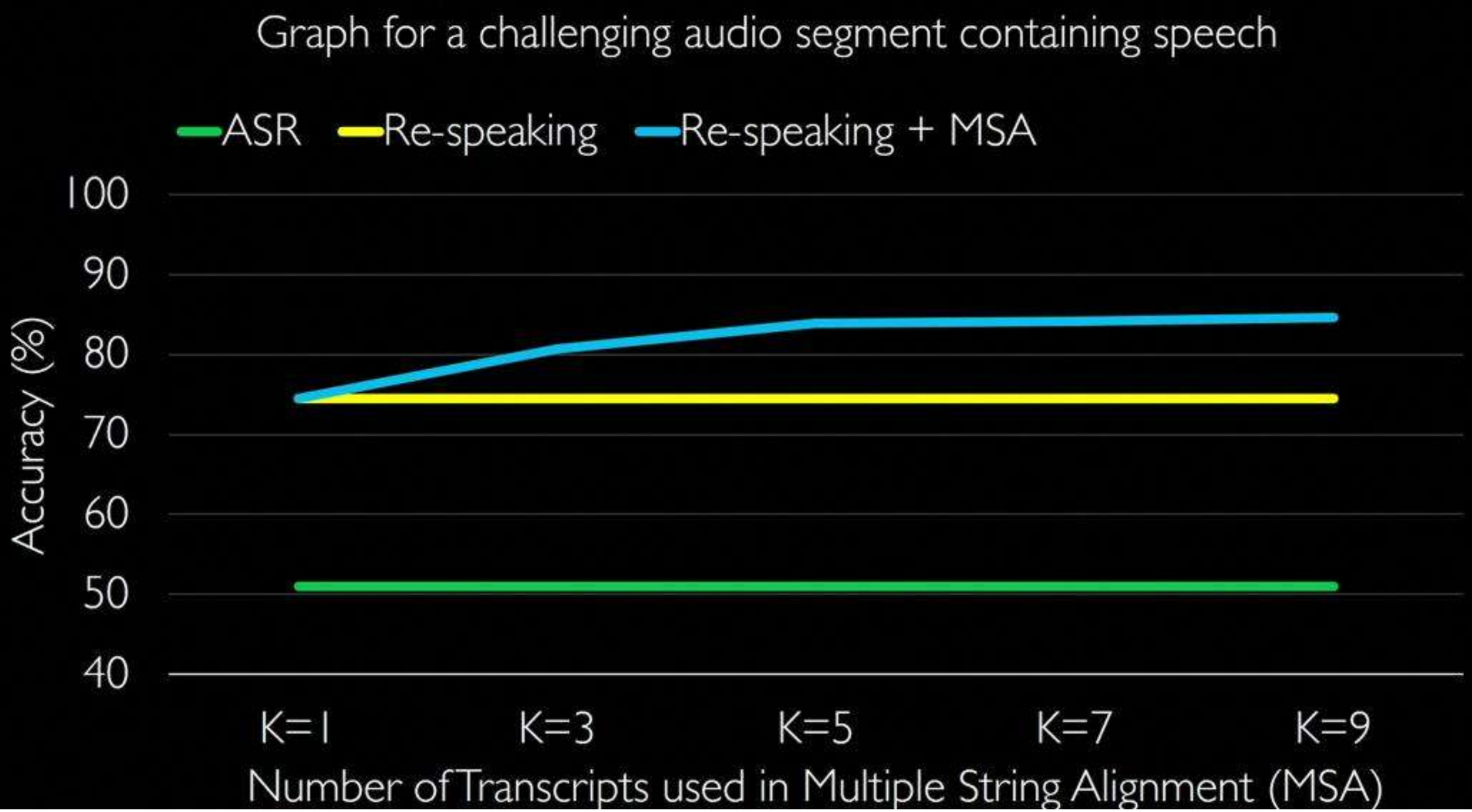

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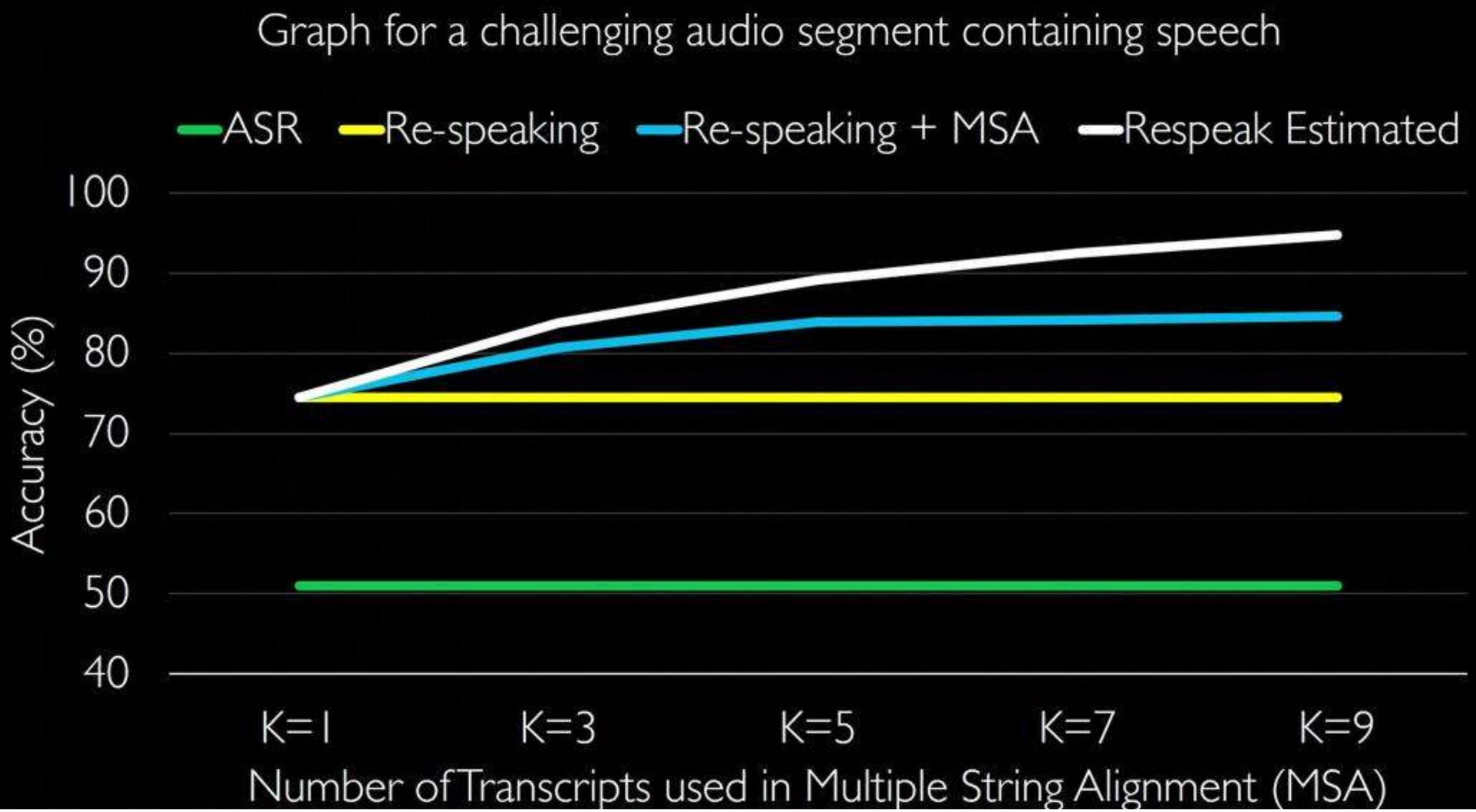

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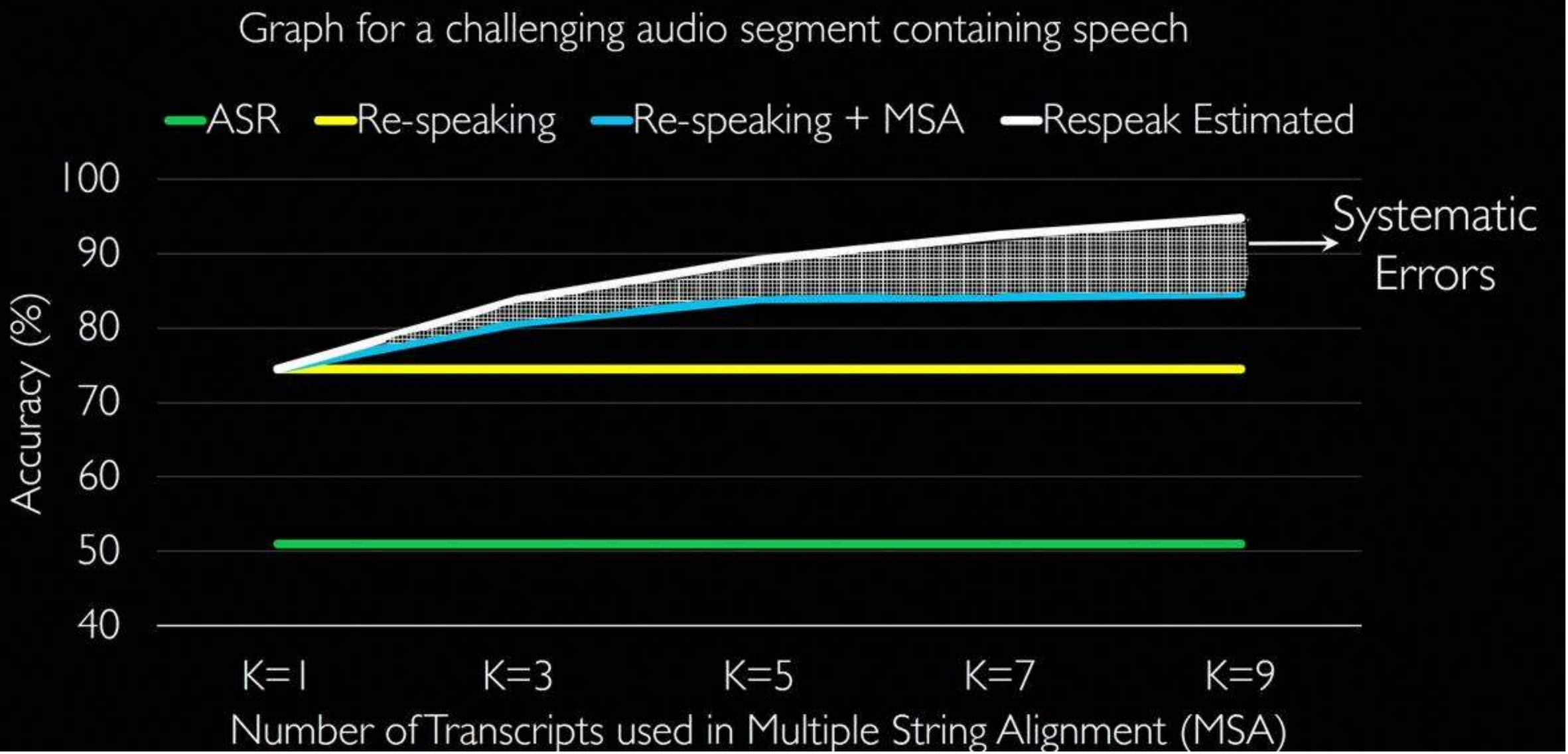


Compared to sighted users, blind users...


Compared to sighted users, blind users...
completed
3x
more tasks
earned
2.5x
more money


Compared to sighted users, blind users...
completed
3x
more tasks
earned
2.5x
more money
"I am grateful to you for creating the app. I earned money for the first time and learned the value of each rupee."


Compared to sighted users, blind users...
completed
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"I am grateful to you for creating the app. I earned money for the first time and learned the value of each rupee."
"The app improved my pronunciation as I was speaking words carefully to get them recognized"


Compared to sighted users, blind users...
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with
14%
less accuracy
at
1.5x
cost
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Lower language skills
"The app improved my pronunciation as I was speaking words carefully to get them recognized"


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completed
3x
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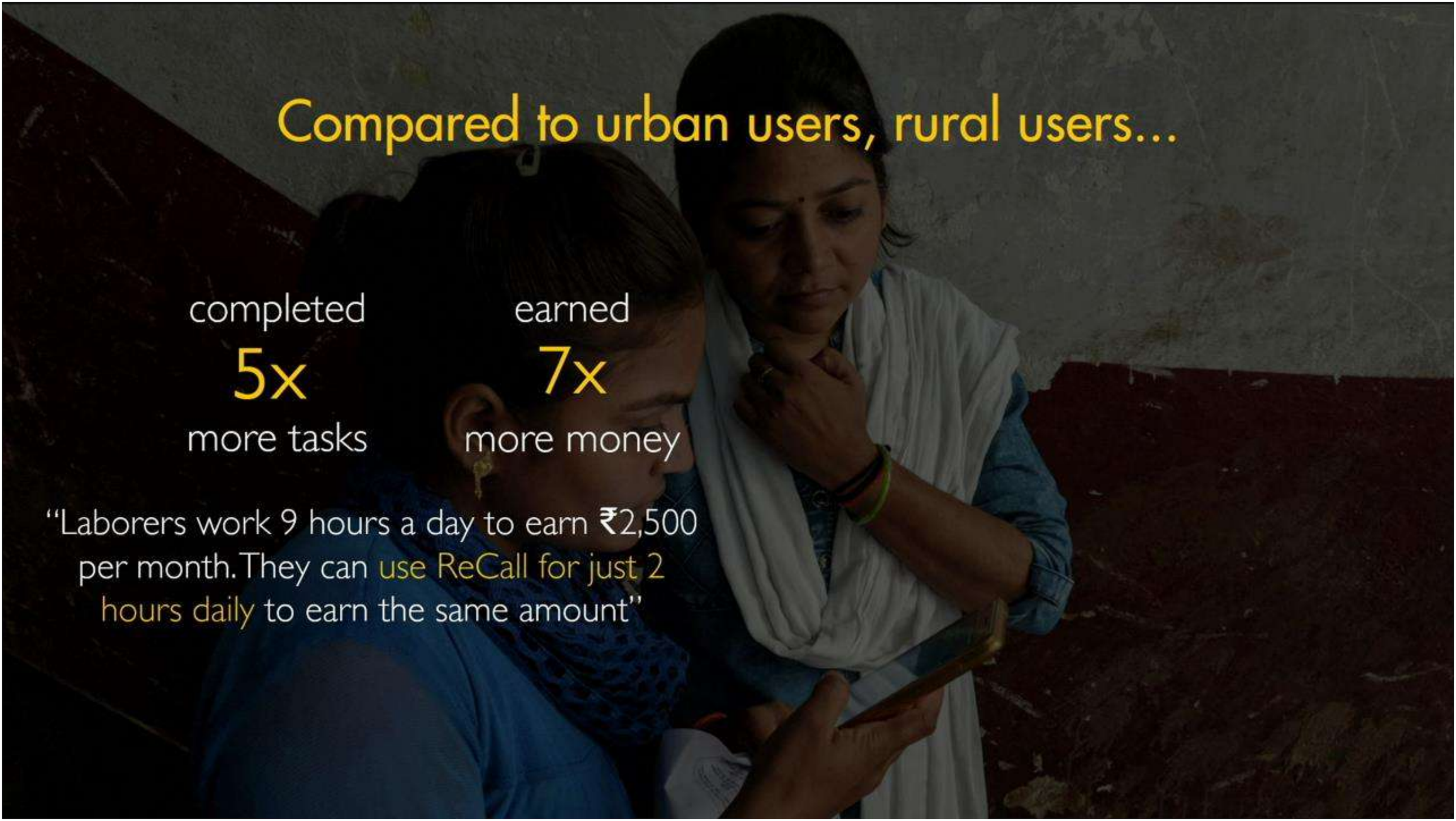
14%
less accuracy
at
1.5x
cost
"I am grateful to you for creating the app. I earned money for the first time and learned the value of each rupee."
Lower language skills
Tasks sent to more people because of poor accuracy
"The app improved my pronunciation as I was speaking words carefully to get them recognized"


Compared to urban users, rural users...


Compared to urban users, rural users...
completed
5x
more tasks
earned
7x
more money


Compared to urban users, rural users...
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5x
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earned
7x
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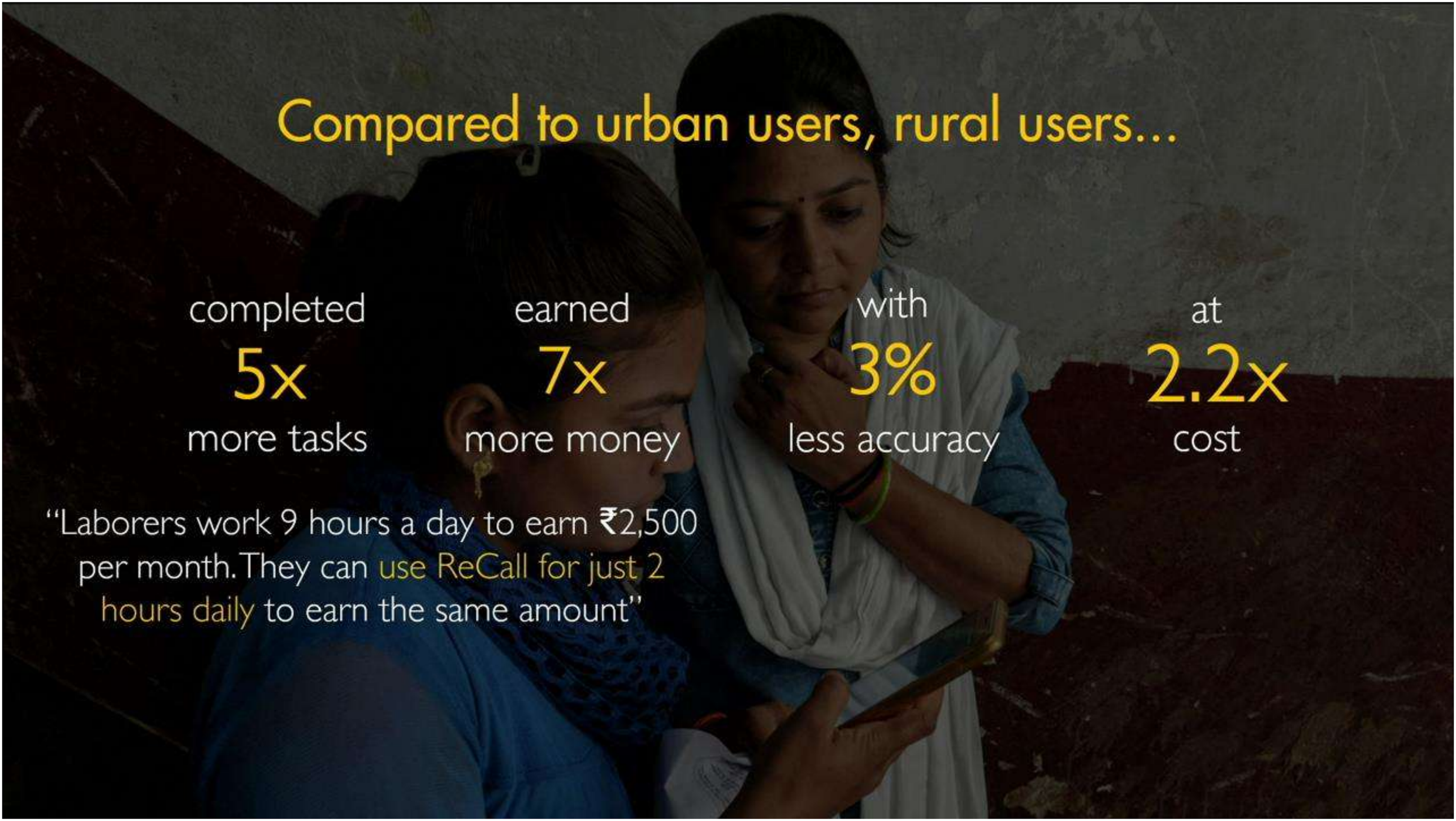
"Laborers work 9 hours a day to earn ₹2,500 per month. They can use ReCall for just 2 hours daily to earn the same amount"


Compared to urban users, rural users...
completed
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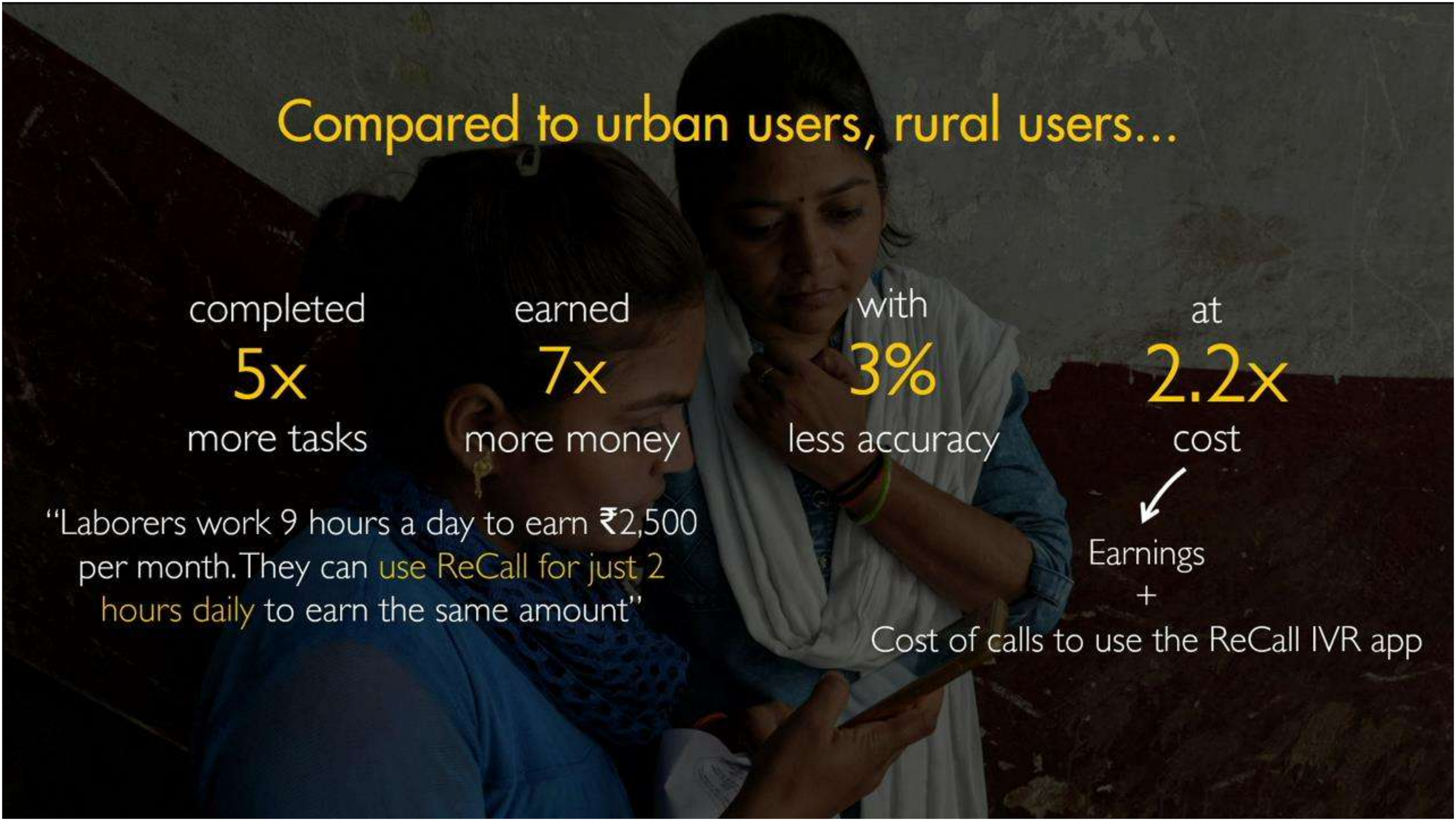
7x
more money
with
3%
less accuracy
at
2.2x
cost
"Laborers work 9 hours a day to earn ₹2,500 per month. They can use ReCall for just 2 hours daily to earn the same amount"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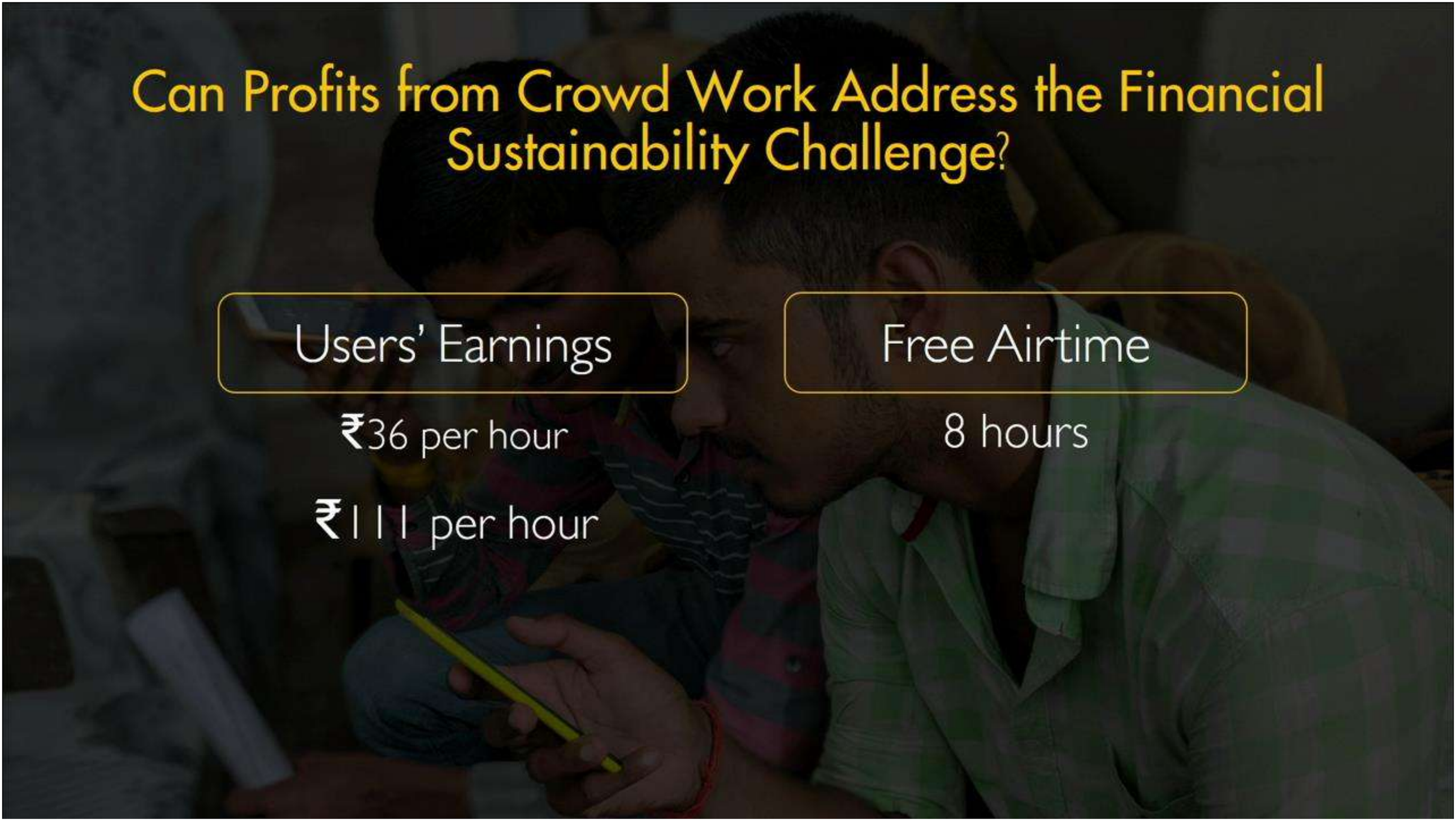
"Laborers work 9 hours a day to earn ₹2,500 per month. They can use ReCall for just 2 hours daily to earn the same amount"
Earnings
+
Cost of calls to use the ReCall IVR app


Can Profits from Crowd Work Address the Financial Sustainability Challenge?
Users' Earnings
Free Airtime


Can Profits from Crowd Work Address the Financial Sustainability Challenge?
Users' Earnings
₹36 per hour
Free Airtime
8 hours


Can Profits from Crowd Work Address the Financial Sustainability Challenge?
Users' Earnings
₹36 per hour
₹111 per hour
Free Airtime
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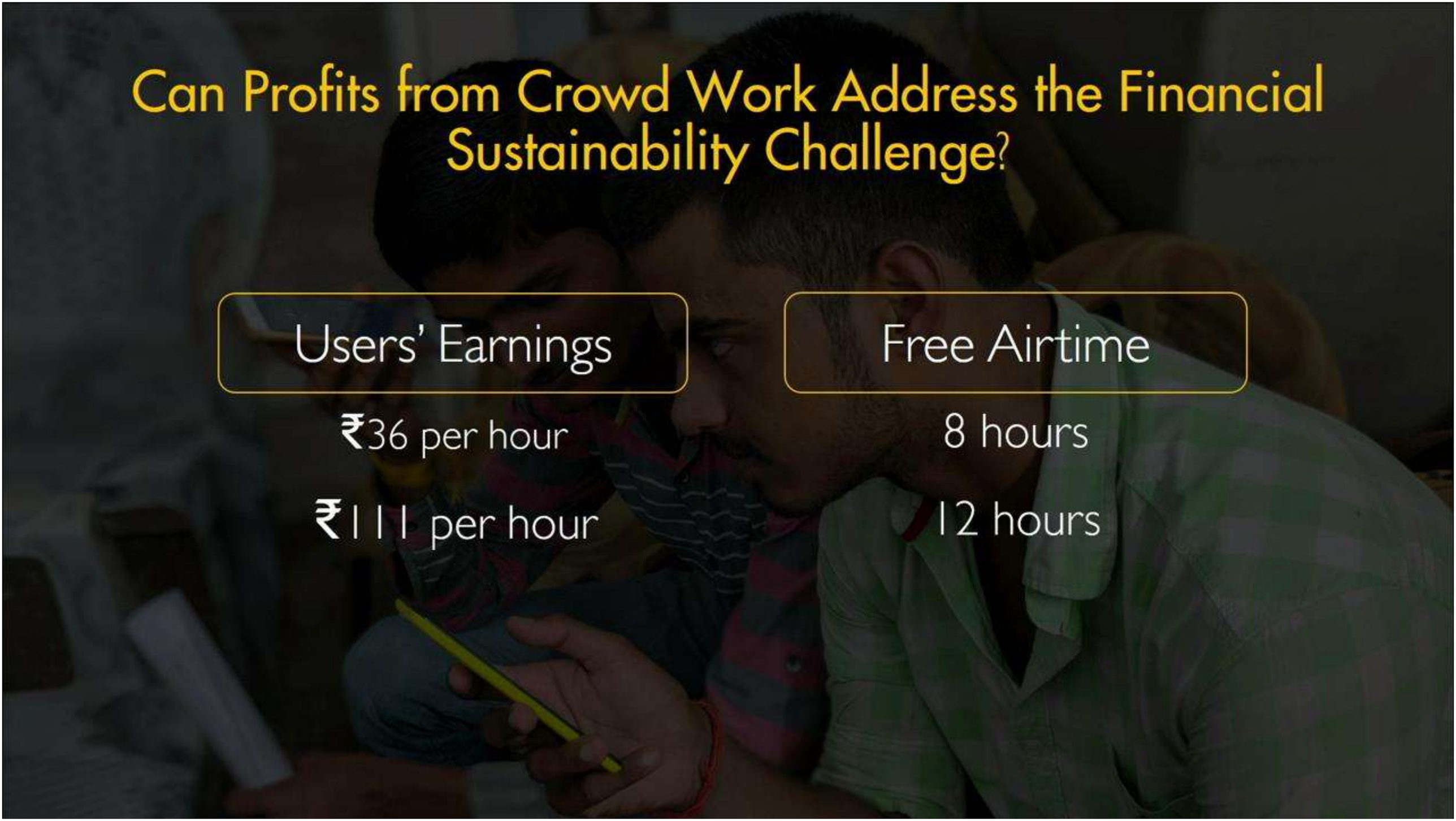
Can Profits from Crowd Work Address the Financial Sustainability Challenge?
Users' Earnings
₹36 per hour
₹111 per hour
Free Airtime
8 hours
12 hours

Can Profits from Crowd Work Address the Financial Sustainability Challenge?

Users' Earnings	Free Airtime
₹36 per hour	8 hours
₹111 per hour	12 hours

Integrated ReCall with Sangeet Swara!

Three Significant Contributions

Three Significant Contributions

1. Built the first voice-based crowdsourcing marketplace for illiterate people and basic mobile phone users

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2. Demonstrated that low-income students, blind people, and rural residents can vocally transcribe audio files

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2. Demonstrated that low-income students, blind people, and rural residents can vocally transcribe audio files

3. Showed that the profits provide earnings as well as airtime to users, thereby addressing the financial sustainability challenge

Three Significant Contributions

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3. Showed that the profits provide earnings as well as airtime to users, thereby addressing the financial sustainability challenge

Strong Commercialization Interest by Social Enterprises

Today's Talk

Overcoming Challenges of Voice-based Social Computing Systems

1. Content Moderation
2. Financial Sustainability
3. Set Up & Connectivity

Scalability ✓

Sustainability ✓

Poor Replicability

Key Idea: A Toolkit to Create Replicable and Connected Voice-based Social Computing Services

[Vashistha et al. NSDR 12]

Key Idea: A Toolkit to Create Replicable and Connected Voice-based Social Computing Services

Phone call

IVR

Junction

Internet

1. Easier to build and maintain
2. Connect unheard voices to global social media platforms

[Vashistha et al. NSDR 12]

Key Idea: A Toolkit to Create Replicable and Connected Voice-based Social Computing Services

Phone call

IVR

Junction

Internet

1. Easier to build and maintain
2. Connect unheard voices to global social media platforms
3. Distributed architecture

[Vashistha et al. NSDR 12]

More than 110,000 Phone Calls from 25,000 Users

More than 110,000 Phone Calls from 25,000 Users

Government of Somaliland

Connecting rural people and government officials

[Gulaid and Vashistha ICTD 13]

More than 110,000 Phone Calls from 25,000 Users

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Voice of America in Mali

Distributing and gathering news in low-resource regions

[Gulaid and Vashistha ICTD 13]

More than 110,000 Phone Calls from 25,000 Users

Government of Somaliland

Connecting rural people and government officials

Voice of America in Mali

Distributing and gathering news in low-resource regions

Women's rights activists in India

Giving voice and digital identity to protestors

[Gulaid and Vashistha ICTD 13]

Recognition, Awards, and Funding

$57,000 USAID
Seed Grant

Winner of Tech Challenge
for Atrocity Prevention

Facebook Access
Innovation Prize

Today's Talk

Overcoming Challenges of Voice-based Social Computing Systems

1. Content Moderation — Scalability ✓
2. Financial Sustainability — Sustainability ✓
3. Set Up & Connectivity — Replicability ✓

Ph.D. Thesis

Created scalable, sustainable, and replicable voice-based social computing systems that can grow at the scale of large Internet websites

How to bring benefits of social computing to people without any phones?

1.7 billion women without a mobile phone

99% of all maternal deaths in developing regions

A Significant Outgrowth

Projecting Health

A Video-based Social Computing Intervention for Maternal Health

Projecting Health

A Video-based Social Computing Intervention for Maternal Health

PATH

Video production

Projecting Health

A Video-based Social Computing Intervention for Maternal Health

PATH

Video production

Video dissemination

Designing and Implementing Projecting Health

Designing and Implementing Projecting Health

How to expand videos' reach and geographic spread?

[Vashistha et al. ICTD 16]

Designing and Implementing Projecting Health

How to expand videos' reach and geographic spread?

[Vashistha et al. ICTD 16]

How to design localized videos to improve users' knowledge gain?

[Vashistha et al. DIS 17]

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How to receive critical feedback from women on videos?

[Vashistha et al. CHI 18]

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[Vashistha et al. DIS 17]

How to receive critical feedback from women on videos?

[Vashistha et al. CHI 18]

110 videos

180 villages

190,000 people

Future Research Plans

Goal: How to bring the benefits of social computing to billions of people who face literacy, language, socioeconomic, accessibility, and connectivity barriers?

Connect

Information

Equity

Goal: How to bring the benefits of social computing to billions of people who face literacy, language, socioeconomic, accessibility, and connectivity barriers?

Framework

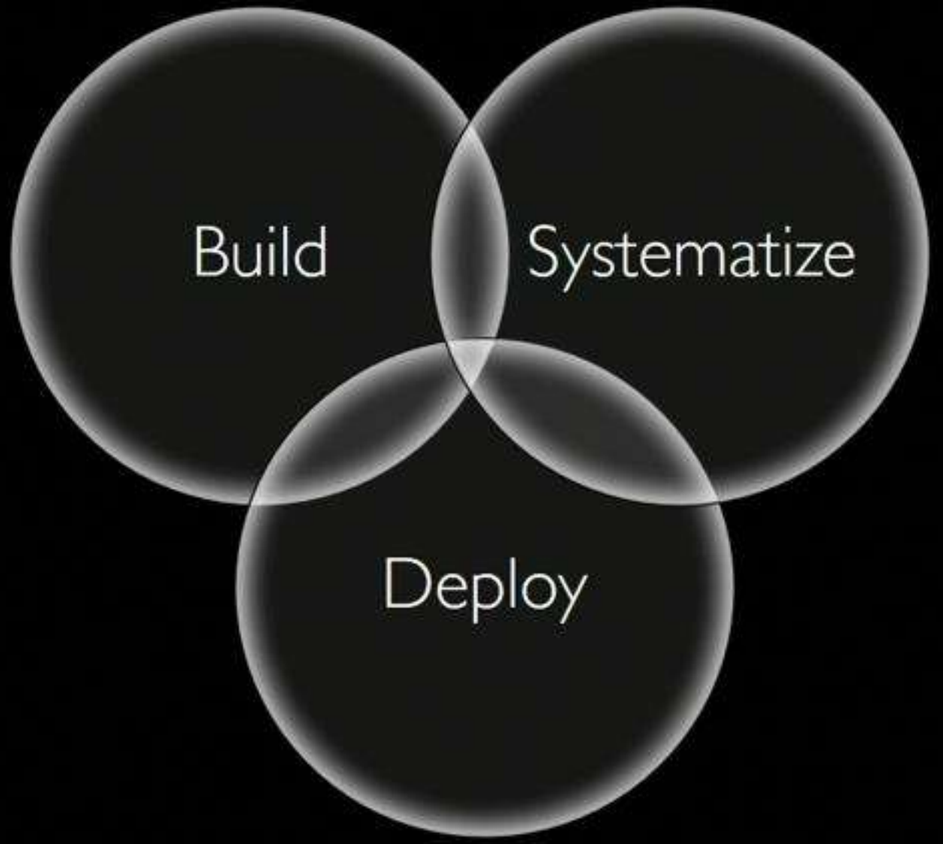
Build social computing systems for **all** people

Systematize production & consumption practices

Deploy systems for social good

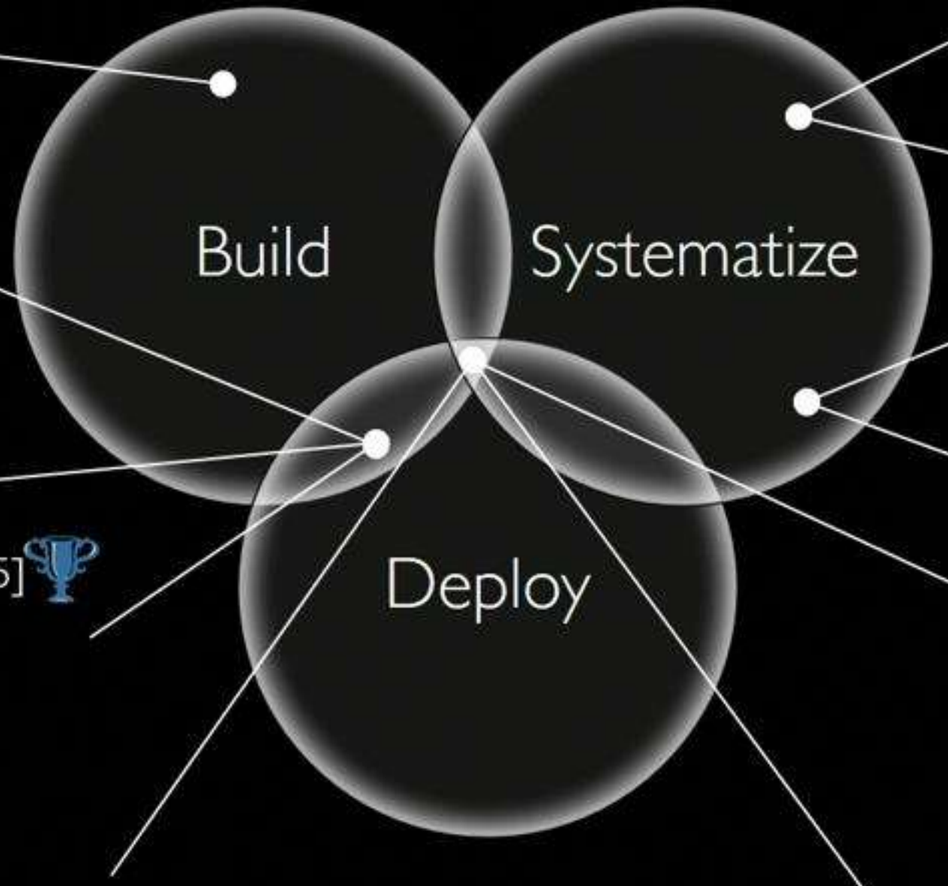
My Research

Social Computing for Social Good in Low-Resource Environments



My Research

Social Computing for Social Good in Low-Resource Environments



Building Toolkit to Create Voice-based Social Computing Systems
IVR Junction [NSDR 12]

Building Social Computing Systems for Indigenous Communities
Citizen Journalism [DEV 14]
Civic Engagement [ICTD 13]

Building Social Media Platforms
Rural, Blind, and Poor Communities [CHI 15]

Building Crowdsourcing Marketplaces
Low-income Students [CHI 17]
Blind People [CHI 18]
Rural Residents [CHI 19]

Social Computing System for Maternal Health
Extending Reach and Spread [ICTD 16]
Examining Localization Approaches [DIS 17]
Reducing Response Bias in Evaluations [CHI 18]

Educational Content Ecosystem for Blind People [DEV 14]

Ag Market Info Systems [ICTD 19]

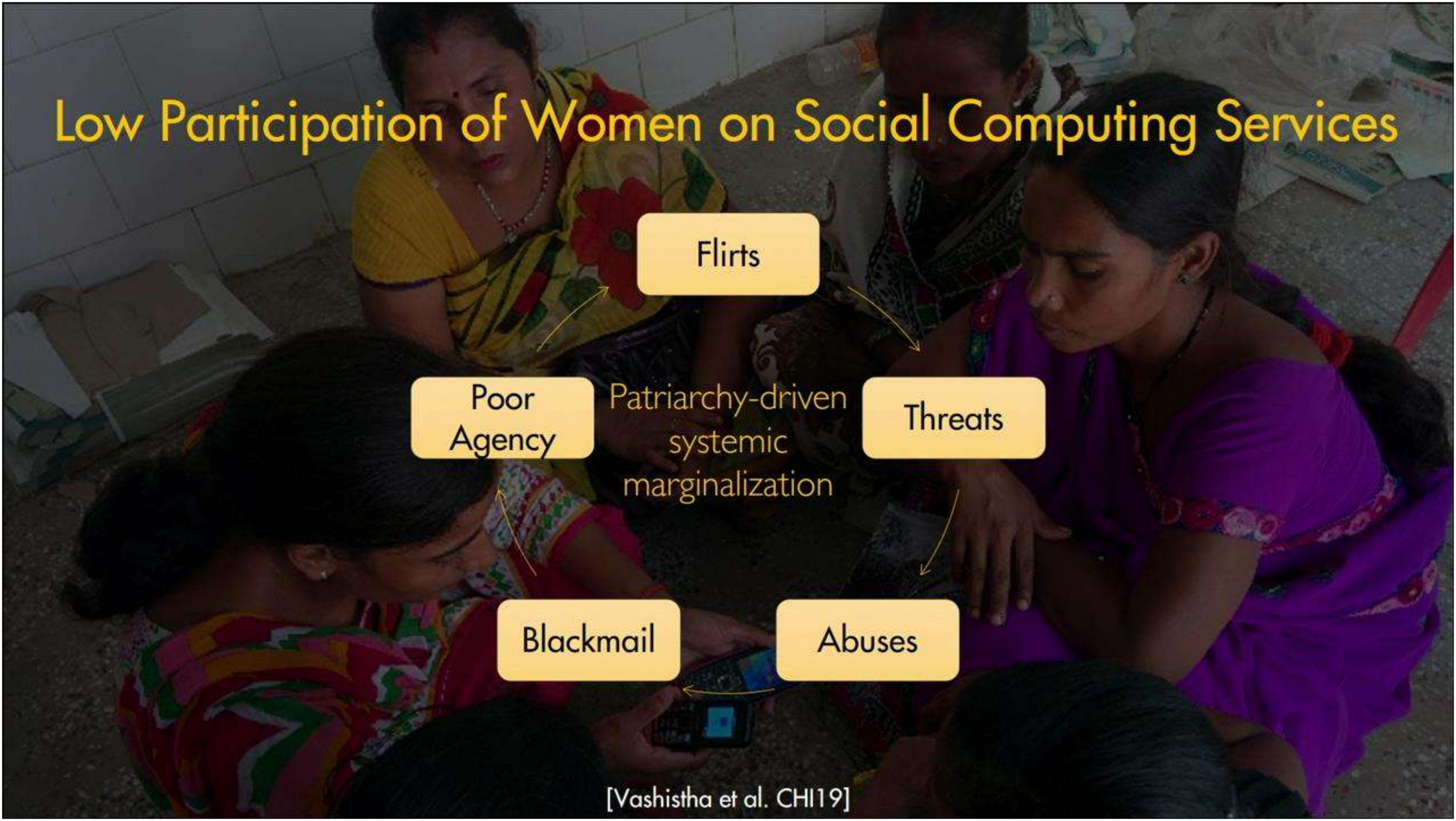
Security & Privacy Risks [COMPASS 18]

Multilingualism on Smartphones [CHI 18]

Incentives, Mechanisms, & Mediums for Sharing Information
Monetary Incentives [CSCW 15]
Crowd Mobilization [INTERACT 15]

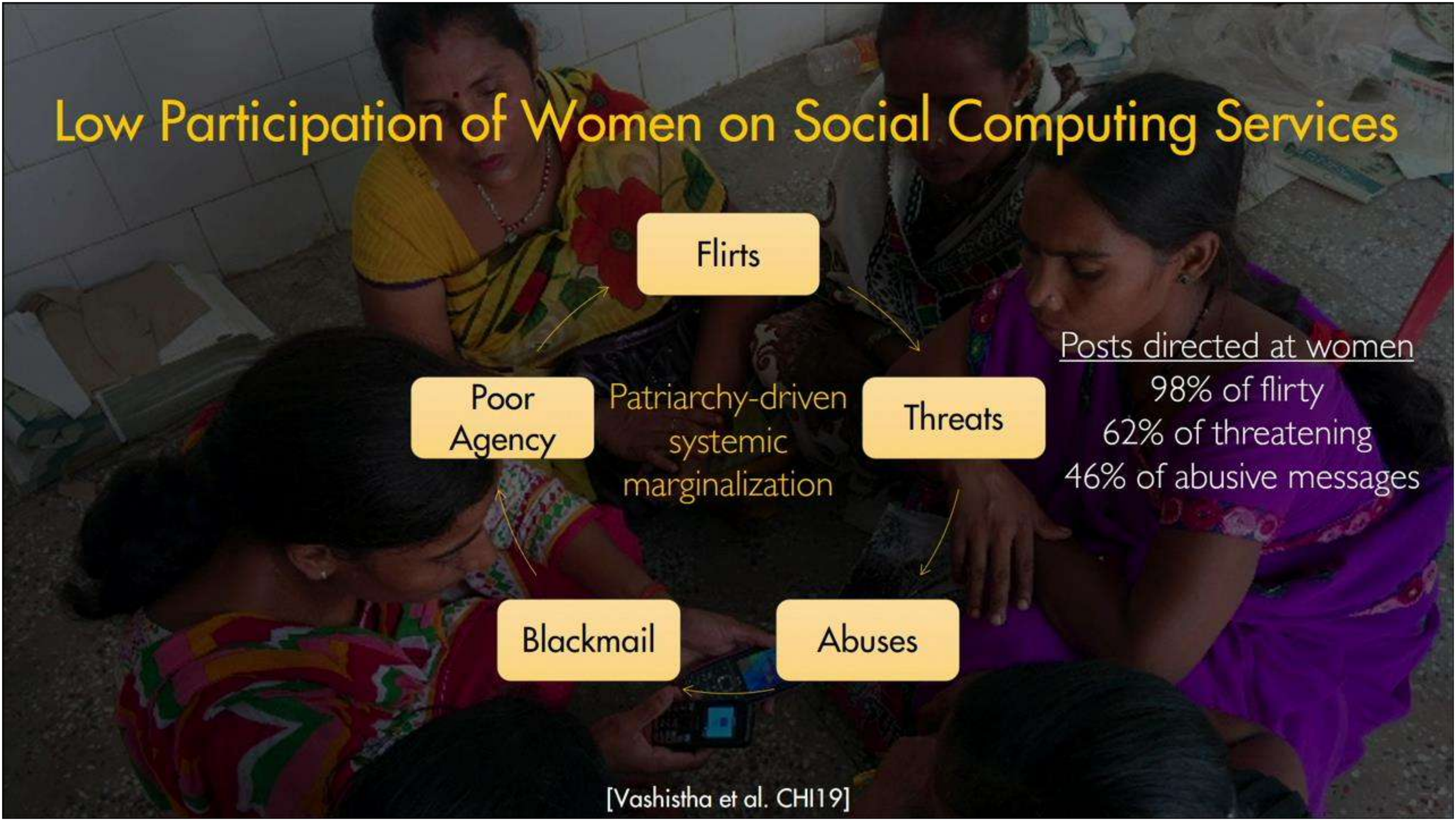
Use and Non-use of Social Computing Systems
Blind people [ASSETS 15, CHI 18]
Low-income Women [CHI 19]

Low Participation of Women on Social Computing Services



[Vashistha et al. CHI19]

Low Participation of Women on Social Computing Services



Posts directed at women

98% of flirty

62% of threatening

46% of abusive messages

[Vashistha et al. CHI19]


Goal: Combating Harassment and Misinformation
on Social Computing Systems


Goal: Combating Harassment and Misinformation on Social Computing Systems
Information Retrieval
Machine Learning
Public Policy


Goal: Combating Harassment and Misinformation on Social Computing Systems
Information Retrieval
Machine Learning
Public Policy
RQ: Which features could identify inappropriate content in local language audio files?

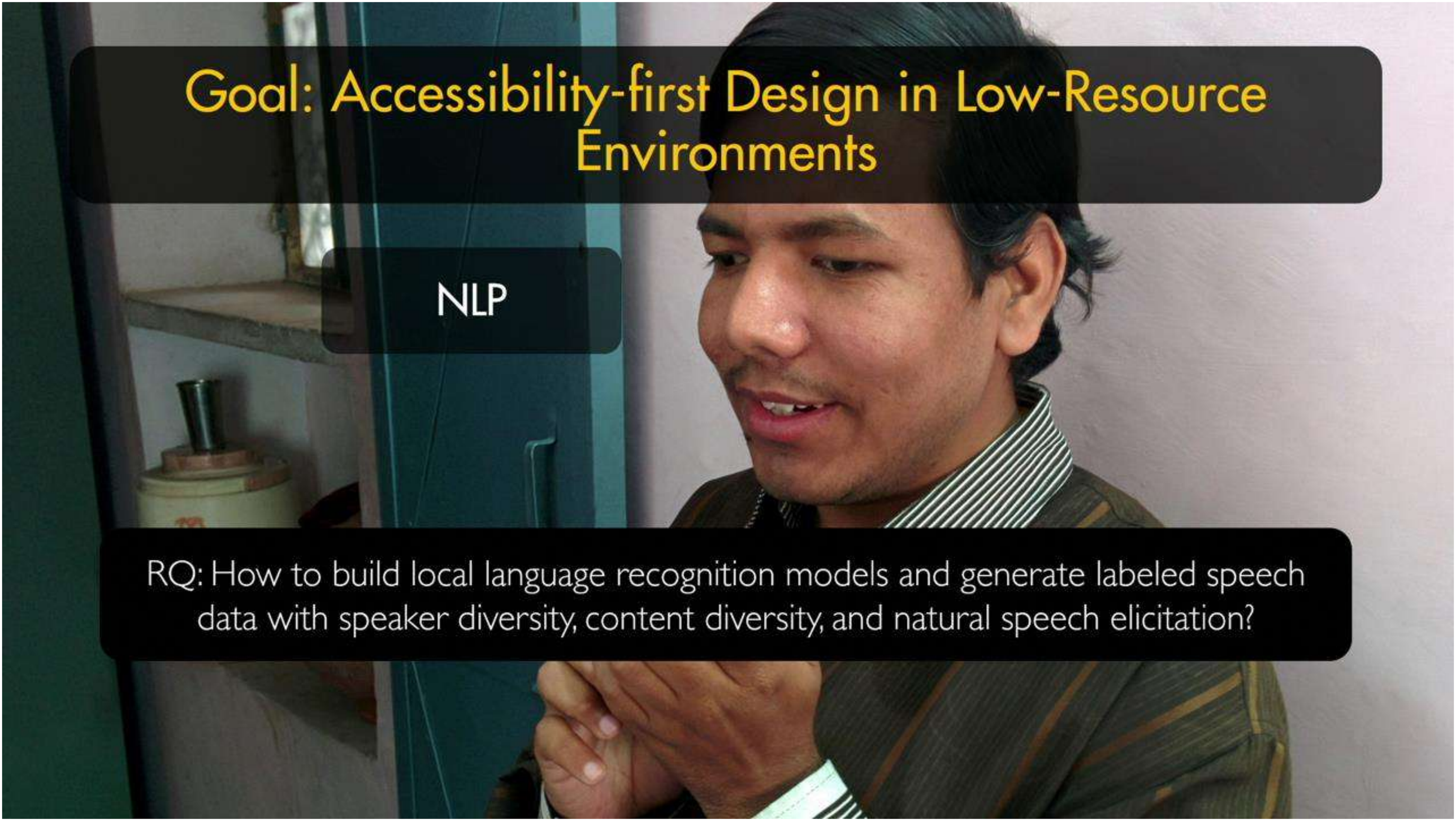

Goal: Combating Harassment and Misinformation on Social Computing Systems
Information Retrieval
Public Policy
Machine Learning
RQ: How to identify interconnected networks and interrelated activities of those spreading disinformation?


Goal: Combating Harassment and Misinformation on Social Computing Systems
Information Retrieval
Machine Learning
Public Policy
RQ: How to address situations where the collective ignorance of community members eclipse their collective intelligence?

1 Billion People with Disabilities Worldwide

1 in 7 people

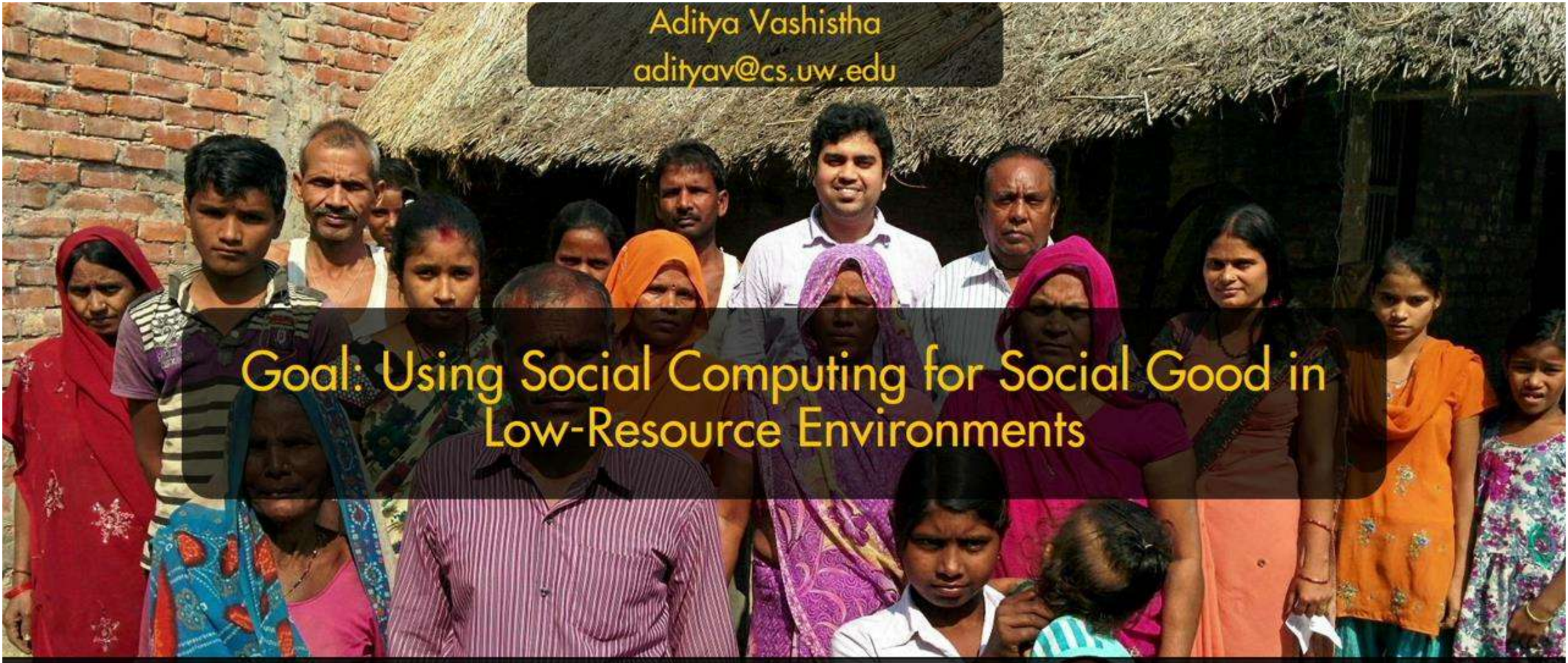
Goal: Accessibility-first Design in Low-Resource Environments


Goal: Accessibility-first Design in Low-Resource Environments
NLP
RQ: How to build local language recognition models and generate labeled speech data with speaker diversity, content diversity, and natural speech elicitation?


Goal: Accessibility-first Design in Low-Resource Environments
NLP
HCI
RQ: How to build local language conversational agents that improve access of health, education, and employment resources for people with disabilities?


Estimated 220,000 Users in Low-Resource Environments
PATH
USAID
Microsoft Research
EnAble India
To empower people with disabilities
facebook
HUMANITY UNITED
accessnow
VOA
U.S. AGENCY FOR GLOBAL MEDIA
UNITED STATES BROADCASTING BOARD OF GOVERNORS

Aditya Vashistha
adityav@cs.uw.edu



Goal: Using Social Computing for Social Good in Low-Resource Environments

PATH
USAID
Microsoft Research
EnAble India
To empower people with disabilities
facebook
HUMANITY UNITED
accessnow
VOA
U.S. AGENCY FOR GLOBAL MEDIA
UNITED STATES BROADCASTING BOARD OF GOVERNORS