

CSE 482 b

Winter 2022

Lecture 03

Announcements

- Online for the time being
 - This week, lectures Tuesday and Thursday
 - Next week,
 - Tuesday, January 18 – meetings with groups
 - Thursday, January 20 – group presentations – initial project pitches
- Kichabi groups
 - Six android phones are available as loaners
 - Moto G, Play



eKichabi: Information Access through Basic Mobile Phones in Rural Tanzania

Galen Weld, Trevor Perrier, Jenny Aker, Joshua Blumenstock, Brian Dillon,
Adalbertus Kamanzi, Editha Kokushubira, Jennifer Webster, Richard Anderson
CHI '18 – April 22, 2018

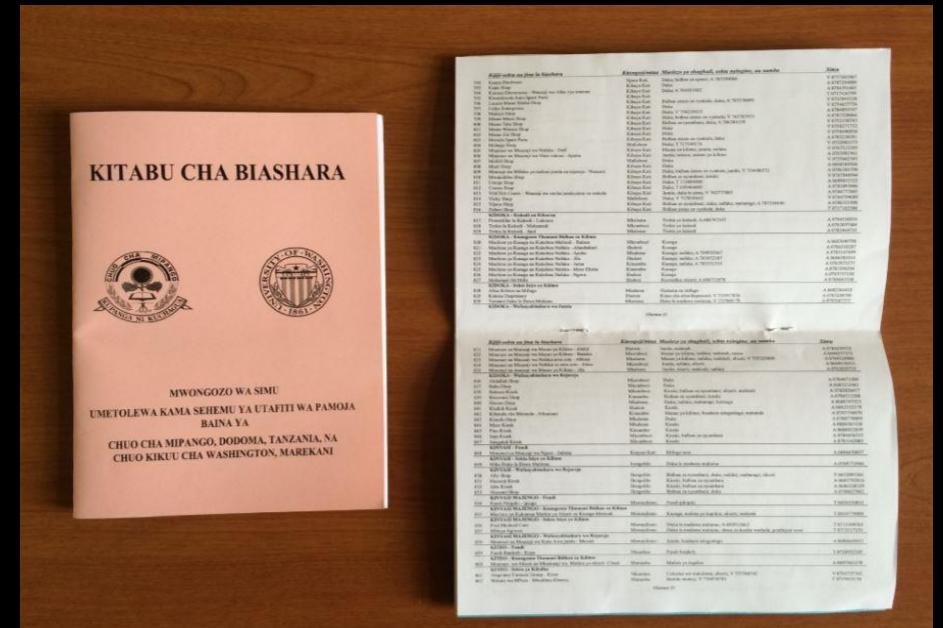
Previous Work

Brian Dillon, Joshua Blumenstock,
Jenny Aker, starting 2014

Survey of ~1500 businesses,
distributed paper phone books

Found positive economic effects of
having access, and of being listed

This project stems from 2 sources...



Research Questions

Develop and deploy a electronic phonebook – eKichabi

Assess:

- **Feasibility** – is it possible?

Is USSD a suitable technology for deploying a search- and browse-based information service in rural Tanzania?

- **Usability** – is it usable?

How well can the target users search for phone numbers, and what are the approaches users take to find a number?

- **Acceptability** – is it viable in the long term?

Does the electronic version of the phone directory meet people's needs, and is it something they will use on a day to day basis?

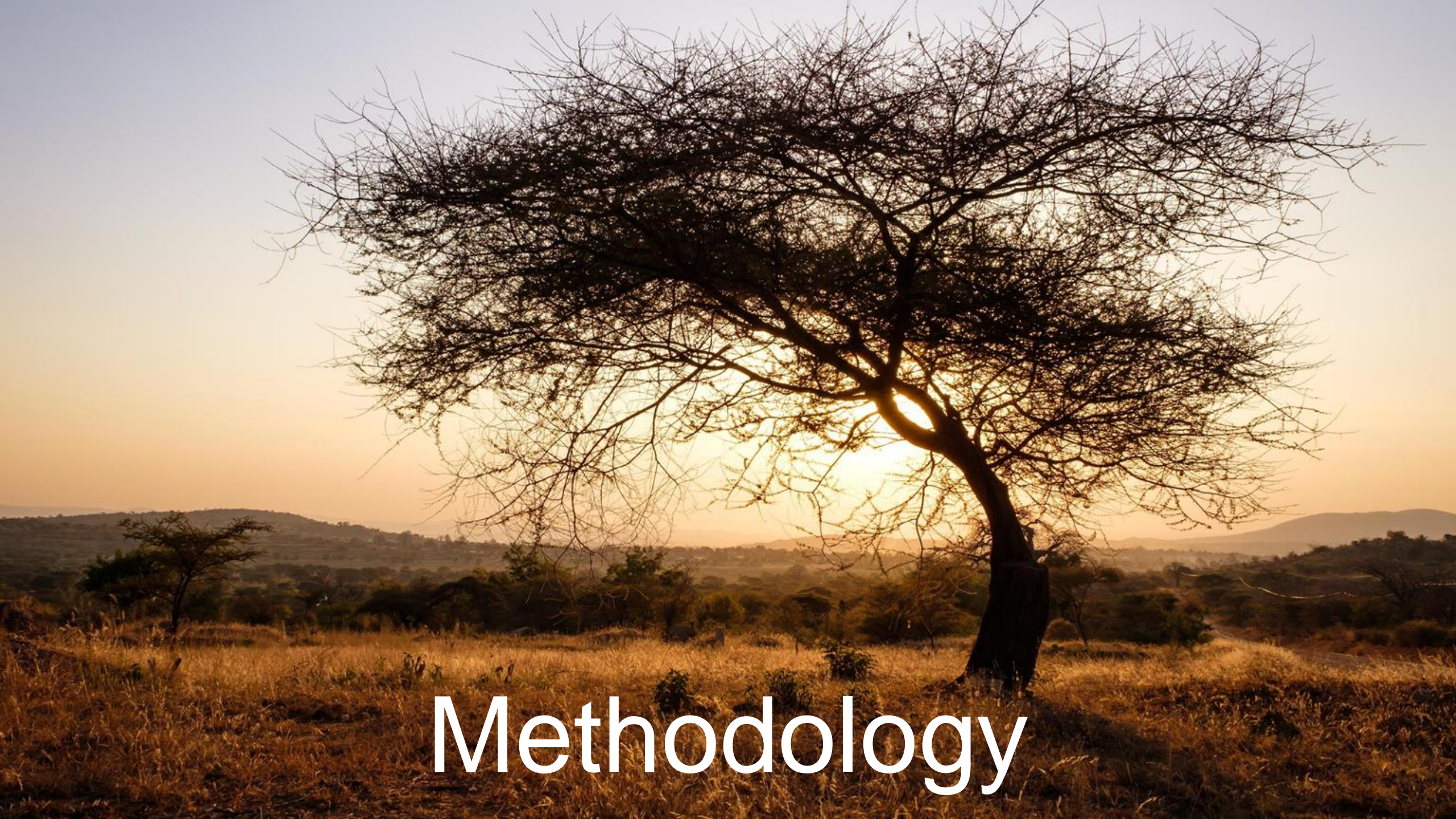
Why USSD?

The Third Universal App (Perrier et al.)

In designing for *basic* mobile phones, a number of options:

- SMS – stateless, and text based
- IVR – stateful, and voice based
- **USSD** – stateful, and text based – best of both!

Primary considerations: Cost, and Usability



Methodology

June 2017 *Phase 0: Application Prototyping*

early July 2017 *Phase 1: Focus Groups* (n≈40)

late July 2017 *Phase 2: Initial Deployment* (n=107)

early Aug. 2017 *Phase 3: Phone Surveys* (n=107)

Phase 0: Application Prototyping

Three usage modes:

- Browse by Location
- Browse by Sector
- Search



Select an option:

1. *Browse by Location*
2. *Browse by Sector*
3. *Search*
4. *Help*

User Input: 1

1. *All Businesses (9)*
or *Select Subvillage*
2. *Kiteo - Marumba*
3. *Kiteo - Matinga*
4. *Kiteo - Muya*
5. *Kiteo - Nkundusi*
99. *Back*

User Input: 1

Select District

1. *Babati Mjini*
2. *Chamwino*
3. *Chemba*
4. *Dodoma Urban*
5. *Kiteo*
0. *Next*
99. *Back*

User Input: 5

Select Business

1. *Ally Kiosk*
2. *Amiri Shop*
3. *Chavai Kiosk*
4. *Fundi Baiskeli*
5. *Genge la Mama Mtaa*
0. *Next*
99. *Back*

User Input: 1

Select Village

1. *Busi*
2. *Keikei*
3. *Kinyasi*
4. *Kiteo*
5. *Kwadelo*
0. *Next*
99. *Back*

User Input: 4

Ally Kiosk

Location:

Kiteo - Matinga

Phone: T653965711

Business Found

Phase 1: Focus Groups

6 villages over 1 week,
several groups per village

3-12 participants per group

Discussed paper and
electronic Kichabi

Iterated on application
design



Phase 2: Initial Deployment

Four villages, 10-30 participants per village – 107 participants total

Diverse range of ages, genders, literacy, experience with phones

Enrollment:

Meeting of ~2 hrs, covering short code, whitelisting, main 3 browsing modes, and plenty of examples

Study lasted 30 days, participants used their own phones

Phase 3: Phone Surveys

Follow-up with deployment participants

Addressed topics unavailable from logging

Gathered anecdotes

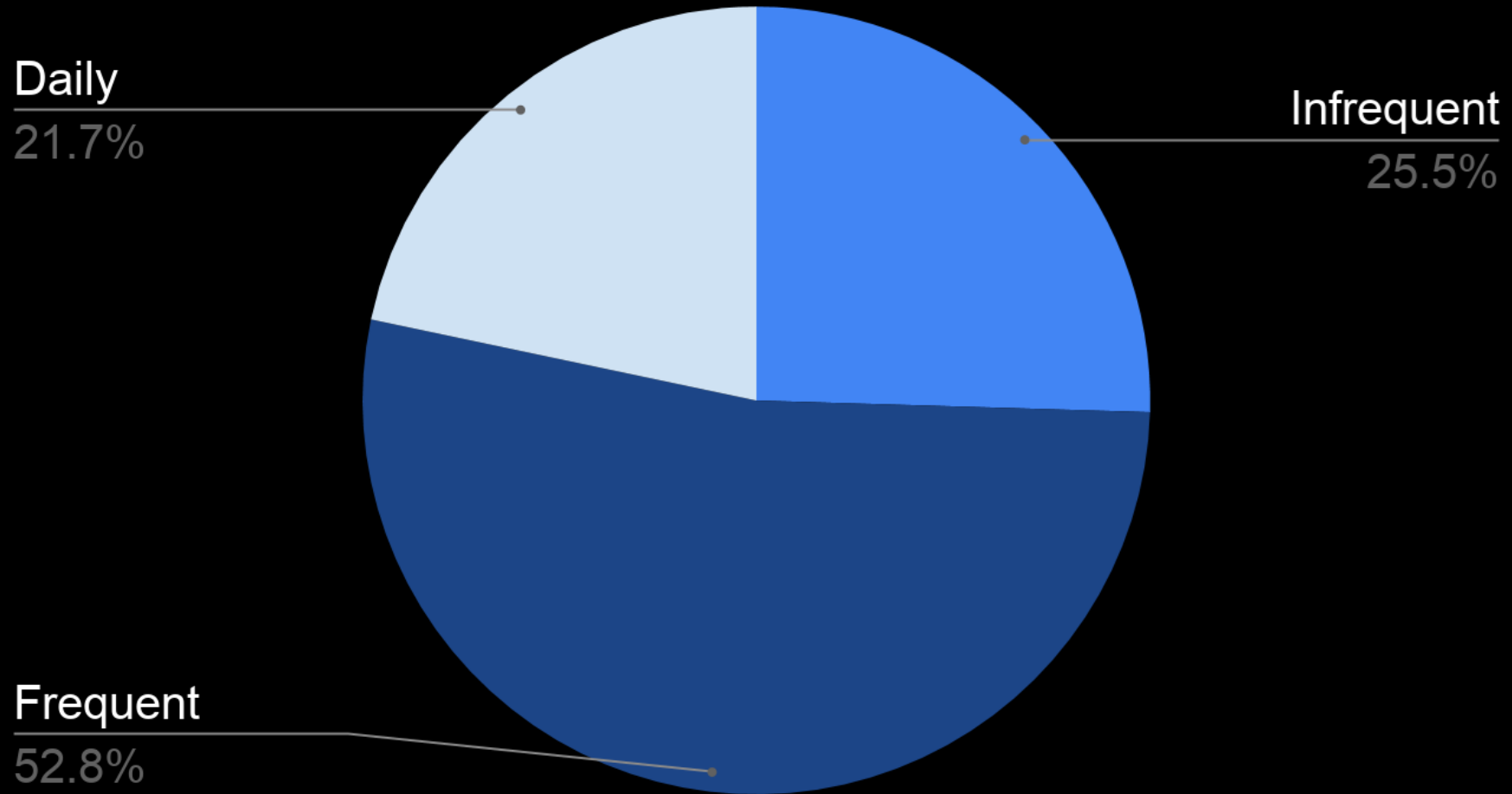




Results

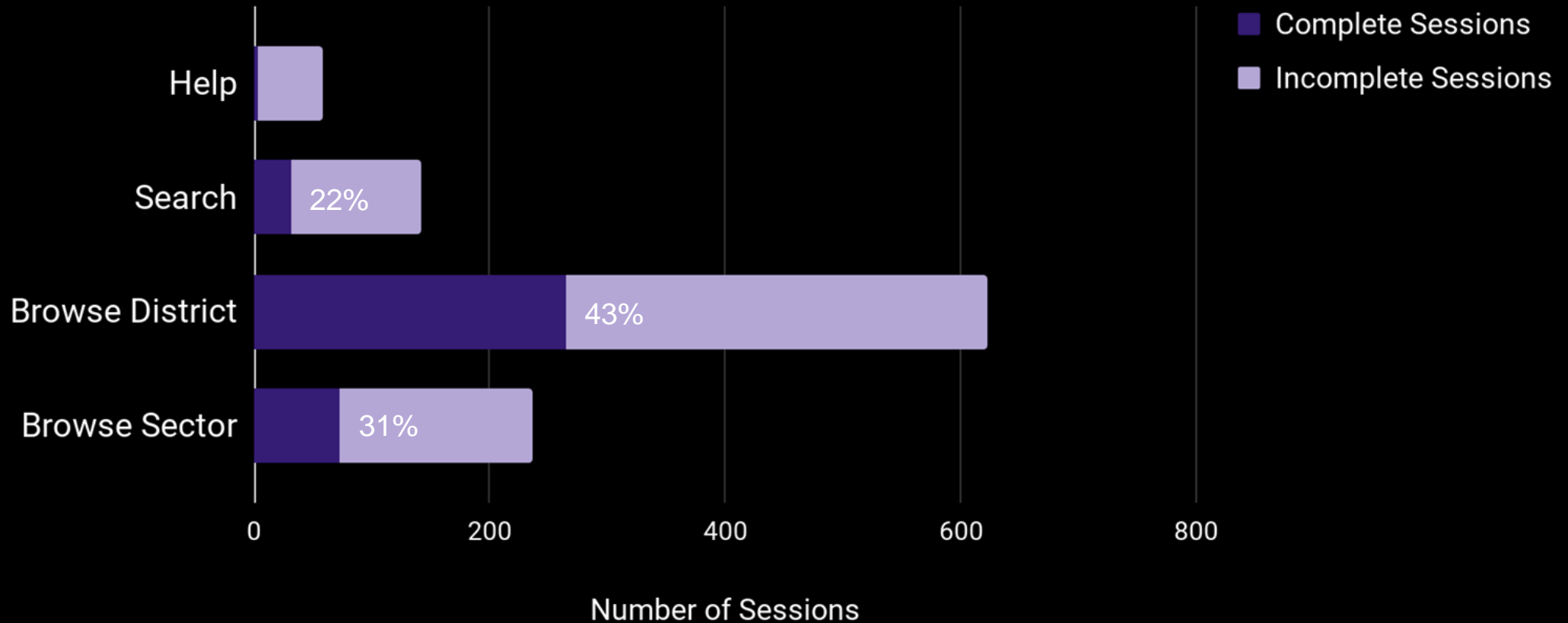
Usage

Session Frequency Per Participant (30 day duration)



Usage Modes

Number of Sessions by Usage Mode



Survey Findings

“I looked up the business in Itiso and called a boda boda guy to seek the transport.”

“I am a crop trader, and I called merchants in Dodoma to inquire about prices for my crops. I called several businesses to find who would give me the best prices.”

“I called a seed vendor in Kondoa, and negotiated over the phone, then he drove the seeds [to my village].”

Application Accessibility

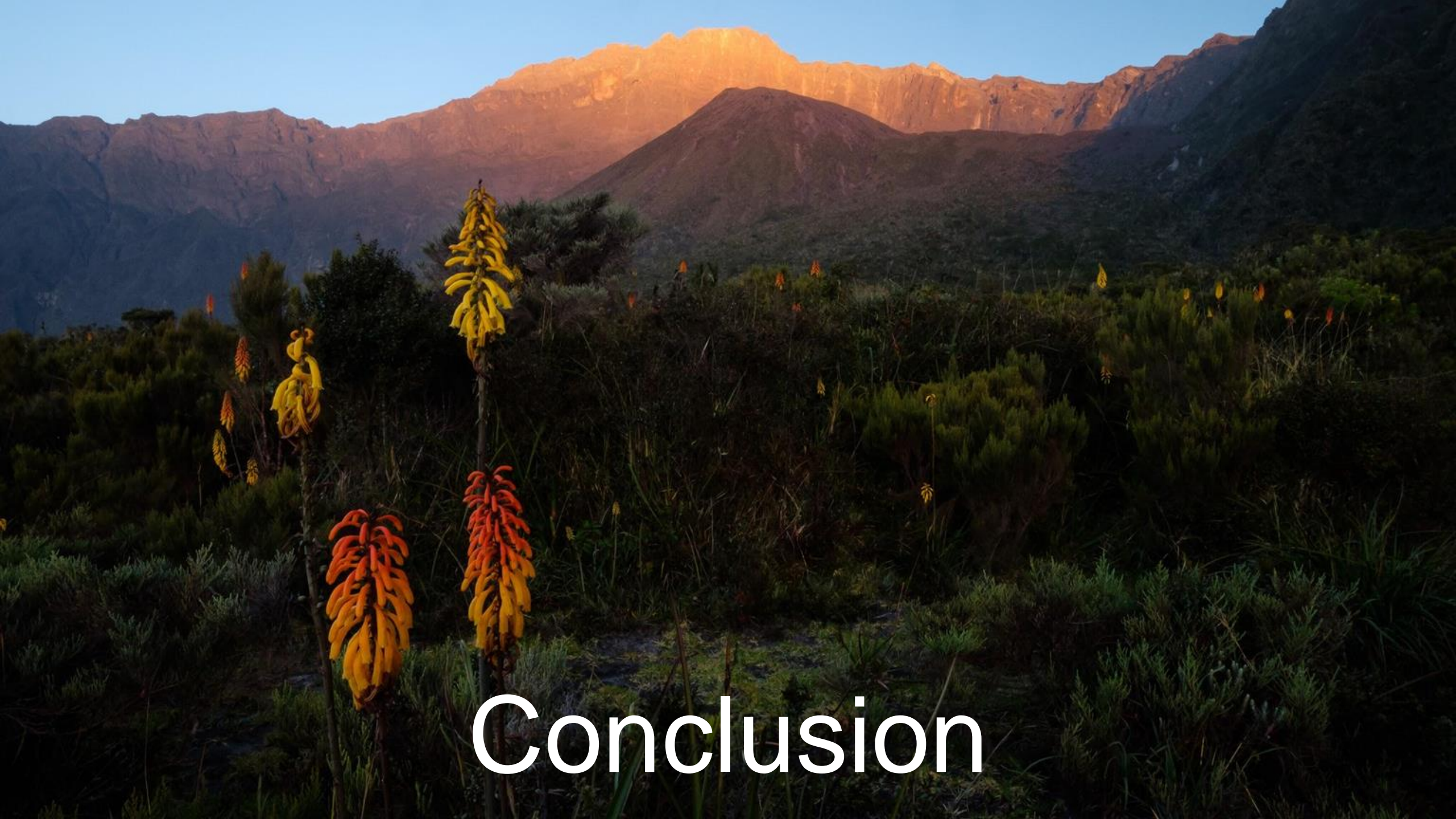
Search – surprising that it was popular!

Potentially easier for those with poor eyesight.

Familiarity with other USSD applications improves fluency

Mobile Money

Airtime Top-up



Conclusion

Feasibility – Successfully demonstrated deployment of USSD-based information seeking application with thousands of entries.

Usability – Application was usable. Scrolling through long lists, and text entry for search were all handled.

Acceptability – Fulfilled an unmet need for business information to participants. Useful in many situations...

Future Work

Self-enrollment into the system

Scalability – more hierarchy in menus increases confusion

Cost and business models for expansion

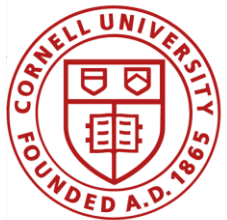


BILL & MELINDA
GATES *foundation*



THE **HITACHI**
FOUNDATION

amazon catalyst



Cornell University



W PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING



Thank You



eKichabi 2.0

Reboot of eKichabi

- Initial results demonstrated
 - Basic directory information is useful and in demand
 - Basic phone version is feasible
 - Needs to be low cost
 - Scalability depends on having a mobile phone version

Mobile phones in Africa

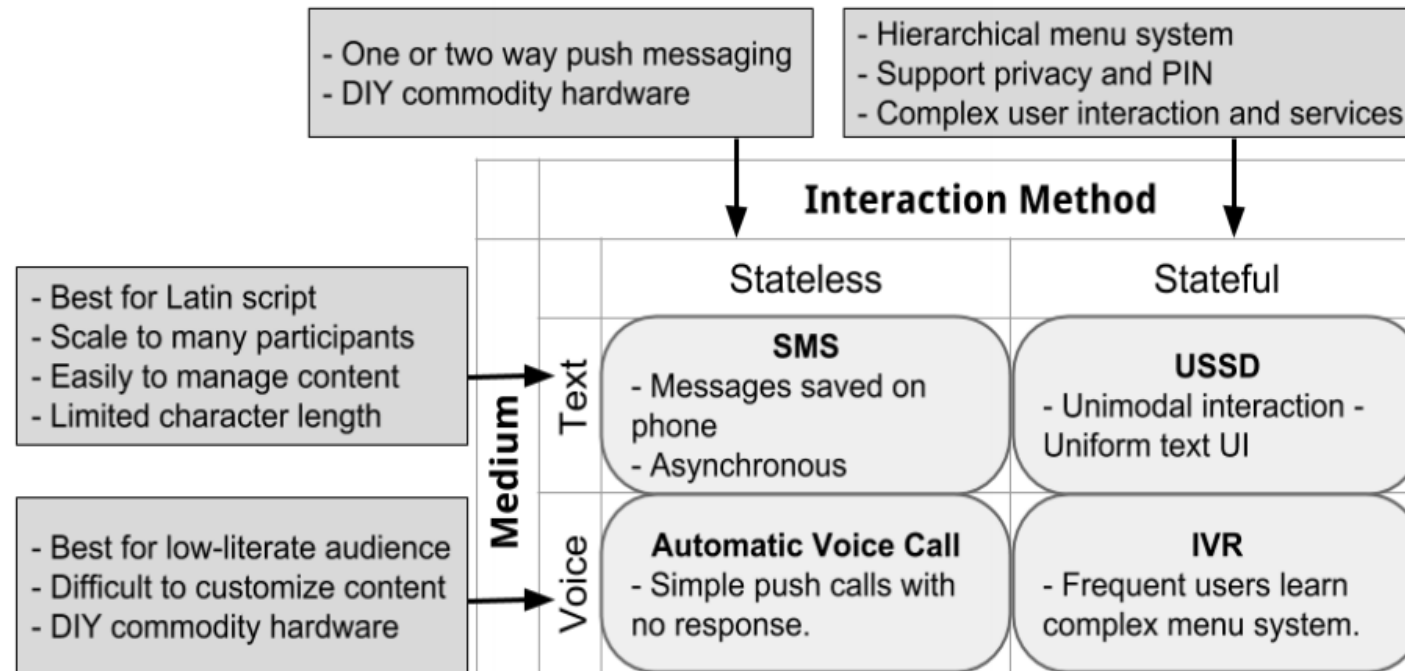
- Mobile phone technology leap frogged land lines
- Essentially everyone has access to a mobile phone
- Smartphones are dominant in urban markets
 - Data is relatively low cost (2 dollars per GB, pre-paid)
 - Phone models – lower cost Android models
 - Some deployment issues around low cost phones
- Rural areas are a mix of basic phones and smart phones
 - There is a big issue around charging phones in areas with poor grid power
 - Cellular coverage may be inconsistent

USSD Unstructured Supplementary Service Data

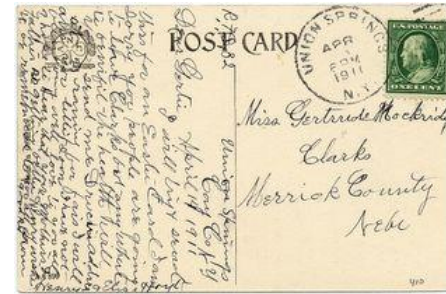


- Session based protocol for communicating by text between handset and service provider
- Initiated with a short code, e.g., *144# to check Safaricom balance
- 160 character strings sent back and forth between handset and provider until session is terminated
- Key differences from SMS
 - Synchronized communication
 - Direct with service provider: better security
 - Does not leave messages on the phone
- Applications
 - Adding services to cell service
 - Mobile Money
 - Yellow Pages Directory

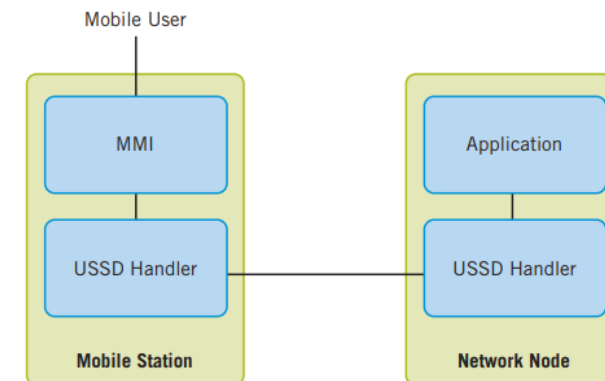
Universal Apps



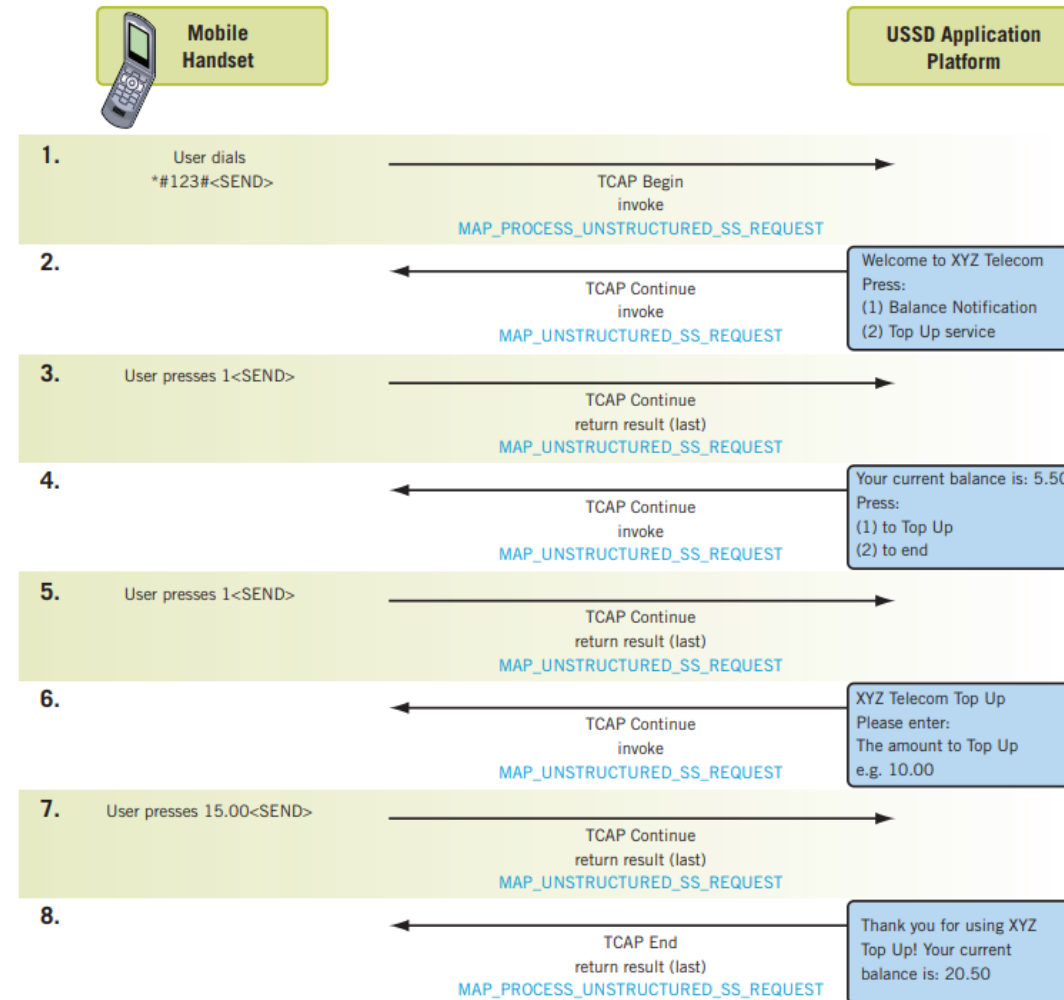
USSD Protocol



- Networking: Post cards vs. phone calls
- Session opened between mobile operator and handset
 - Can be opened in either directions
 - Fixed size messages with header and text payload
 - Phone number (short code) can trigger USSD app
 - Timeouts on operations
 - Session time out



USSD Protocol



Implementation of USSD

- Implement through a carrier
 - Option in US
- Implement through a Gateway service
 - Africa's Talking
 - Telerivet



eKichabi 2.0 Plans

- Cornell et al.
 - Establish a team of enumerators in Tanzania to conduct business census in a region
 - Develop a research protocol on impact of an electronic phone directory
 - Conduct baseline surveys
 - Randomize implementations across study area
 - See what happens
- UW
 - Support development and deployment of directory services
 - Develop smartphone and USSD version of the system
 - USSD services a subset of total services

Capstone questions to be addressed by prototypes

- Basic system architecture
- Mobile client
 - Basic services
 - Advanced services
 - User interface
 - Integration with USSD
- Registration module
 - Design workflow for scaling
 - Registration tools (SMS, Web, Mobile App)
 - Support for managing agents (mobile app)
 - Verification process

Other possible things to explore and consider

- Business opportunities around system
- Security issues
- Targeting lower literacy users
- Multilingual design
 - Swahili necessary for Tanzania (but google translate is sufficient at this stage)
 - Develop with an English version as well