UW Digital Financial Services Research Group

Richard Anderson

University of Washington

Seattle, USA

UW DFS Research Group

- Develop and deploy technological solutions to meet specific challenges that impede the introduction and wide scale adoption of DFS

- Build a global academic community focused on computing and DFS technologies

History of the Investment

Improved access to financial services is critical for raising people out of poverty

- Focus from Computer Science and Computing and Development perspectives

- Investment November 2015 – July 2018

Computer Science at University of Washington

- Top five Computer Science department
- Leading research group in Information and Communication Technologies for Development (ICTD)
- Significant, high impact projects:
  - Open Data Kit, Community Cellular, Projecting Health
- Many successful graduates in ICTD
- Long term collaborations with PATH and the Department of Global Health

Successes of the project

- Research results in Security, Software Engineering, Usability, Gender, Mobile Applications, Communication Technology, and Data Science
- Strong Academic Papers
- DFS Workshops (Seattle and Lahore)
- Global Community of Researchers
- CTO of Nala
- Expert group on Technology and Mobile Money

DIGITAL FINANCIAL SERVICES
RESEARCH GROUP
UNIVERSITY OF WASHINGTON

This presentation

- Building a global research community in DFS

- DFS and gender

- Technology for mobile money

- UW Pesa

Building a Global Research Community in Digital Financial Services

- Promote scholarship
  - High impact area
  - Breaks disciplinary boundaries and academic boundaries
- Create centers of expertise in different countries
- Link individual researchers
- Capacity development to train students and researchers

DIGITAL FINANCIAL SERVICES
RESEARCH GROUP
UNIVERSITY OF WASHINGTON

FSP May 8, 2018

ICTD
PAKISTAN 2017
16th - 19th, November
Avari Hotel Lahore, Pakistan

Pakistan FinTech Center

- ## Work with Pakistan
  - Pakistan has low financial inclusion
  - Pakistan has many conditions that suggest readiness for DFS
  - Grad students from Pakistan & personal connections
  - Partnership with Information Technology University (ITU), Lahore

- ## ITU FinTech Center
  - Founded in 2016
 - Funding from ITU and Karandaaz

DIGITAL FINANCIAL SERVICES
RESEARCH GROUP
UNIVERSITY OF WASHINGTON

Building the ITU FinTech Center

- Staffing at ITU
- Project initiation with faculty
- Collaborative projects
- Workshops
- Plan to transfer UW developed infrastructure

ITU and UW Projects

- Detect SMS Fraud

- Study ROSCAs to evaluate potential for digitization

- Analyze Telenor mobile phone data to understand handset distribution

- Interview of women mobile money agents

```
Waseela-e-haq
program ki taraf
se apkay Rs.25200
rupay aya
hain.apka ye
number03314311169
BISP mein
register tha.ap
is number per
03017073199 call
karein
```
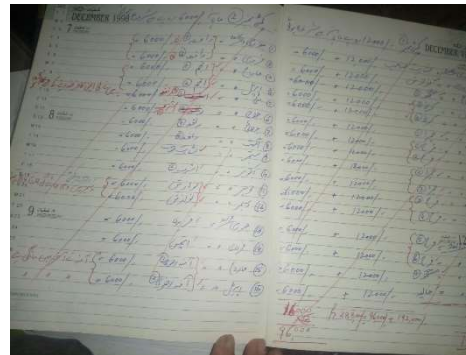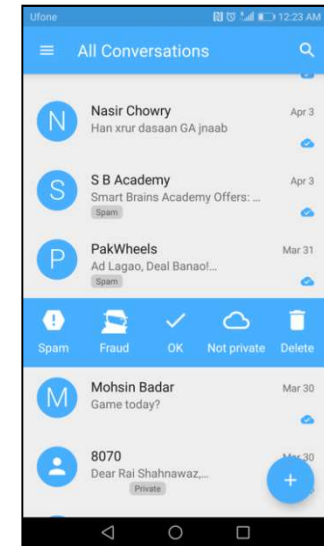
Gender and Mobile Money

- World wide, financial inclusion is lower for women
- Impact of financial inclusion of women improves family outcomes

Study of Gender

- Formative
  - Asset based, identify opportunities
  - Broader goals than adoption of DFS
- Build on technological expertise
  - Technology use and access
  - Identify technology opportunities
- Multi-country
  - Ghana
  - Pakistan
  - Kenya

FSP May

Women Owned Businesses

- Women with small business are candidates for adoption of DFS
- Preliminary findings from interview based studies
  - Substantial quantity of transactions
  - Freedom of movement
  - Cash works pretty well
  - OTC use through male family members
  - Intermixed family and business finances
  - Importance of savings for dowry
- Likely direction of the work
  - What are the services on top of DFS that bring value to the women

Technology in the Family

- Highly variable, multiple dimensions
- Restrictions on access
- Lag in quality for women's access
  - Interest in feature phones
- Shared phone use cases
- Opportunities for large scale studies

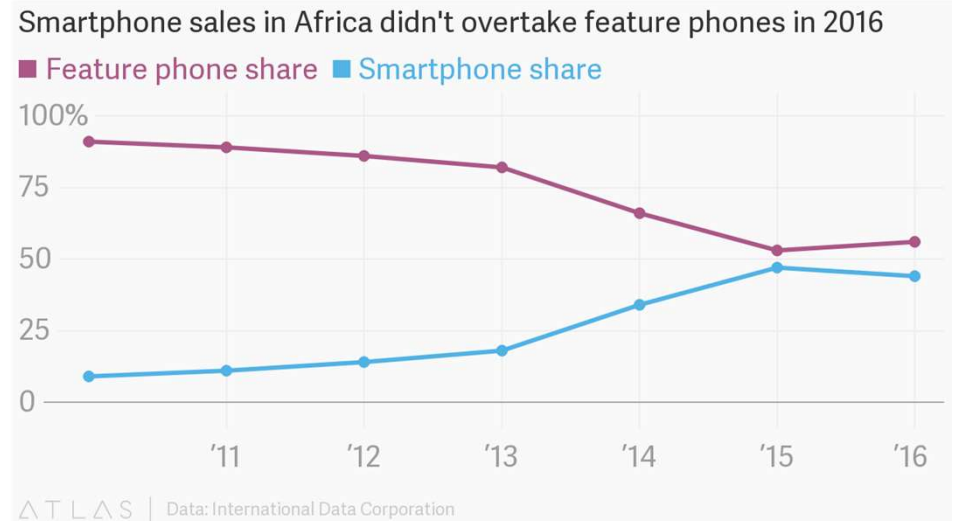# Technology and Mobile Money

- Mobile technology enables digital financial services
- Diverse range of technology topics
  - Handsets
  - USSD
  - ThinSims
  - Security
  - Interledger
  - Biometrics
  - India Stack

Handsets

- ## Need for supporting basic mobile phones

- ## Performance range of smart phones
  - ## Introduction of intermediate phones

Smartphone sales in Africa didn't overtake feature phones in 2016
■ Feature phone share ■ Smartphone share

ATLAS | Data: International Data Corporation

Home > Mobiles > Google Mobiles > Google Pixel XL Price in Pakistan   SKU: 15345

Google Pixel XL
by Google
Google Pixel XL smartphone was launched in October 2016 The phone comes with a 5.50-inch touchscreen display with a resolution of 1440 pixels by 2560 pixels at a PPI of 534 pixels per inche

105,999 PKR

Buy Now →

OR

Call us: +92 311 163 4275

Item Condition: New
Shipping Info: 24 - 48 Hours
Stock Info: On Order

Home > Mobiles > GFive Mobiles > GFive President Smart 2 Price in Pakistan   SKU: 12350

GFive President Smart 2
by GFive
GFive presents Smart series 2, an excellent model for those who value functionality and high quality technology and at the same time does not want to overpay for unnecessary features. GFive Smart 2 modern smartphone is designed for two SIM-cards and supports almost everything, that maximizes your chances of communication.
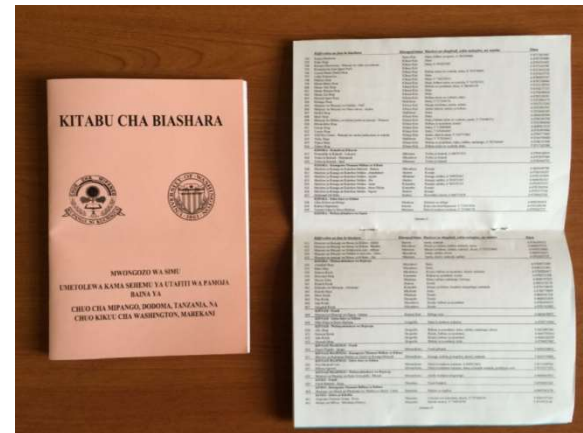
5,289 PKR

Buy Now →

OR

Call us: +92 311 163 4275

Item Condition: New
Shipping Info: 24 - 48 Hours
Stock Info: Available

# Unstructured Supplementary Service Data (USSD)

- Protocol used for many mobile money systems

- Work on tools for implementing USSD applications and gateways to USSD services

- eKichabi – USSD Yellow Pages deployed in Tanzania
 - Third party application

Perrier et al. (2015) USSD : The Third Universal App

ThinSims

- SimApp: Application embedded in a sim card
- ThinSim: Overlay that allows external SimApps
- Proposed for various mobile money systems
- Security issue: Man in the middle attack
 - Proof of concept on multiple vulnerabilities
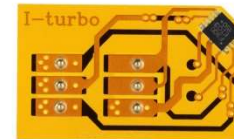
Phipps et al. (2018) ThinSIM-based Attacks on Mobile Money Systems

DIGITAL FINANCIAL SERVICES
RESEARCH GROUP
UNIVERSITY OF WASHINGTON
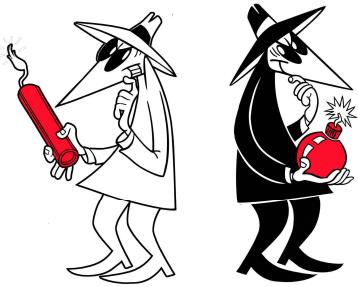
Security

- Audits of DFS applications demonstrate many vulnerabilities

- Interviews with software developers expose challenges in creating secure applications
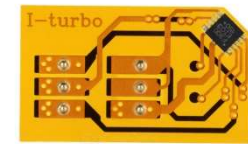
- Need for security validation tools
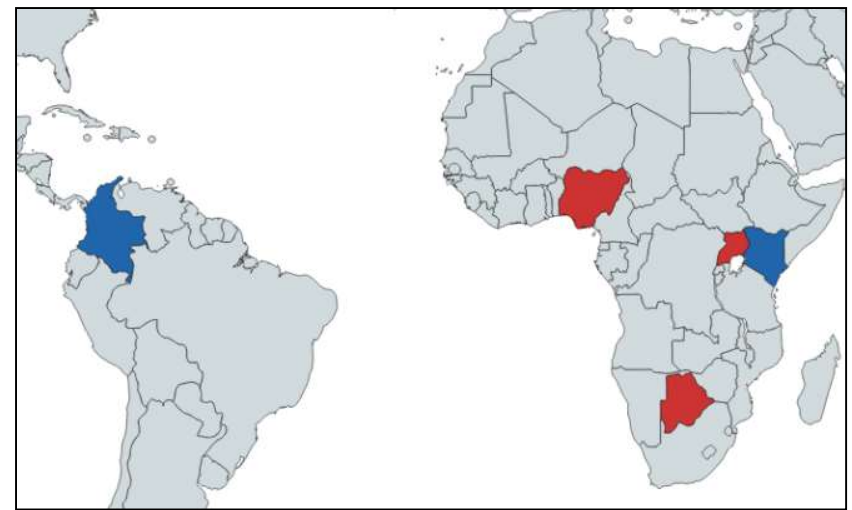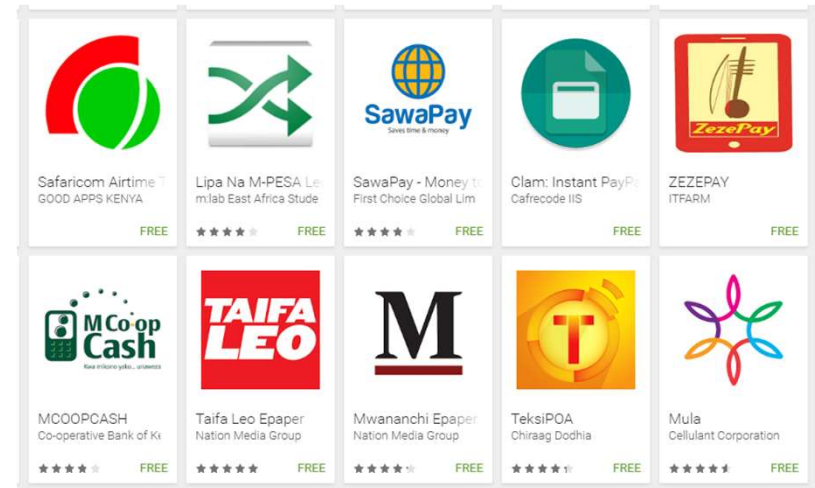
Castle, Pervaiz et al. (2016): Let's Talk Money: Security Challenges of Mobile Money

Technology Explorations

- USSD
- SimApps
- ThinSims
- Interledger Protocol
- Blockchain
- Voice biometrics
- Fingerprint recognition
- India Stack

UW Pesa

- Implement a local mobile money system
- Demonstration site for mobile money technologies
- Testbed for experimentation
- Create shared academic infrastructure
  - Release components as open source
  - Set up at ITU and other universities
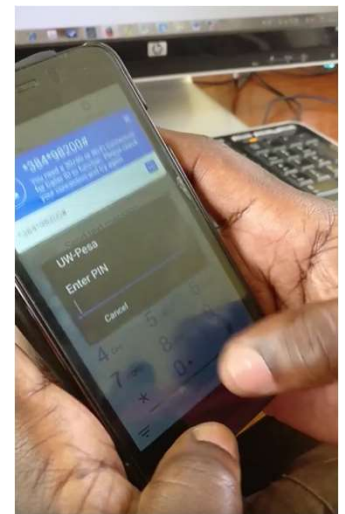
Challenge behind UW Pesa

- Implement USSD based mobile money

- Become a "Telco" – run USSD from a local cellular base station

  - Osmocom open source GSM network (with patches to get USSD to work)

Demo

- Clarice Larson – UW Pesa on basic mobile phones over USSD from a Cellular Base Station Radio

- Demonstrate mobile money functionality
  - Agent Cash In, Person to Person Transfer, Agent Cash Out
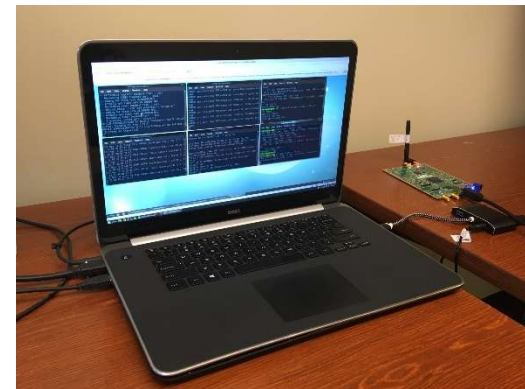
Collaborators

The UW Digital Financial Services Research Group

Richard Anderson
anderson@cs.washington.edu

For more information visit: dfs.cs.washington.edu

Matthew Johnson, 185 E Stevens Way NE, Seattle, WA 98195,

United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
SPECIAL TEMPORARY AUTHORIZATION

EXPERIMENTAL	WL9XOD
(Nature of Service)	(Call Sign)

XT FX MO	0623-EX-ST-2018
(Class of Station)	(File Number)

NAME _____ University of Washington _____

This Special Temporary Authorization is granted upon the express condition that it may be terminated by the Commission at any time without advance notice or hearing if in its discretion the need for such action arises. Nothing contained herein shall be construed as a finding by the Commission that the authority herein granted is or will be in the public interest beyond the express terms hereof.

This Special Temporary Authorization shall not vest in the grantee any right to operate the station nor any right in the use of the frequencies designated in the authorization beyond the term hereof, nor in any other manner than authorized herein. Neither the authorization nor the right granted hereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934. This authorization is subject to the right of use of control the Government of the United States conferred by Section 706 of the Communications Act of 1934.

Special Temporary Authority is hereby granted to operate the apparatus described below:

Purpose Of Operation:
Test and demonstration of USSD based mobile financial services applications for low literate users in developing regions.

Station Locations
(1) Seattle (KING), WA - NL 47-37-25; WL 122-20-46; MOBILE: Within the Gates Foundation administrative offices, within 0.5 km, centered around NL 47-37-25; WL 122-20-46

Frequency Information

Seattle (KING), WA - NL 47-37-25; WL 122-20-46; MOBILE: Within the Gates Foundation administrative offices, within 0.5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
905-915 MHz	MO		1 W (ERP)	2.0E-6 %
		300KG7W		
		300KGXW		
950-960 MHz	FX		100 mW (ERP)	2.0E-6 %
		300KG7W		
		300KGXW		

FEDERAL
COMMUNICATIONS
COMMISSION

This authorization effective will expire 3:00 A.M. EST   May 07, 2018   and   October 27, 2018

Page 1 of 2