An Exploration of the Handset Technology Landscape

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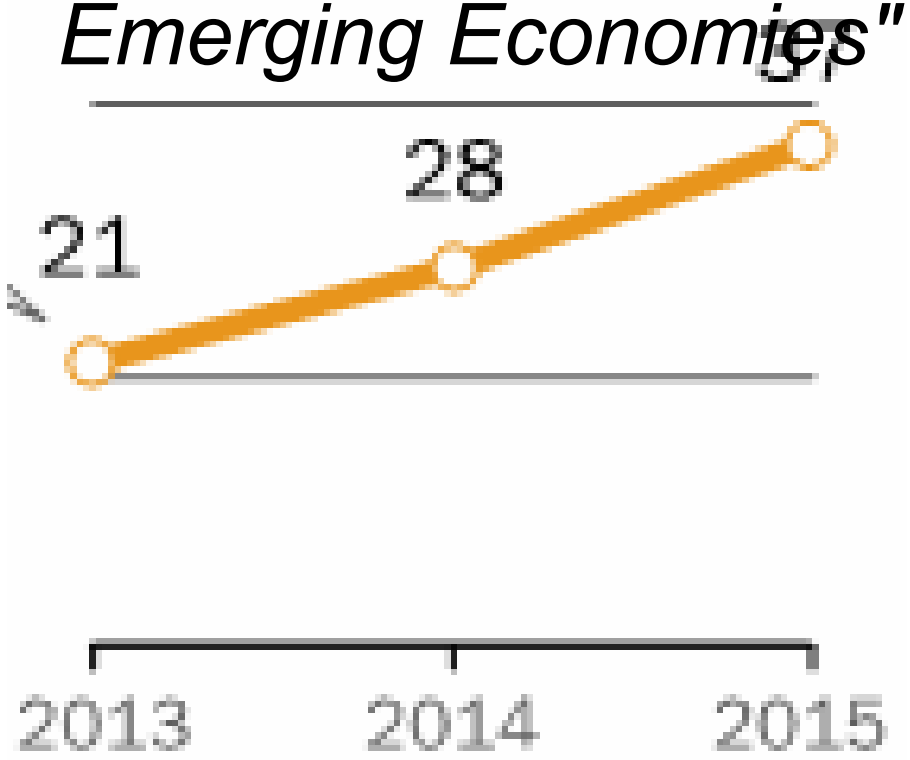
Smartphones are the future?

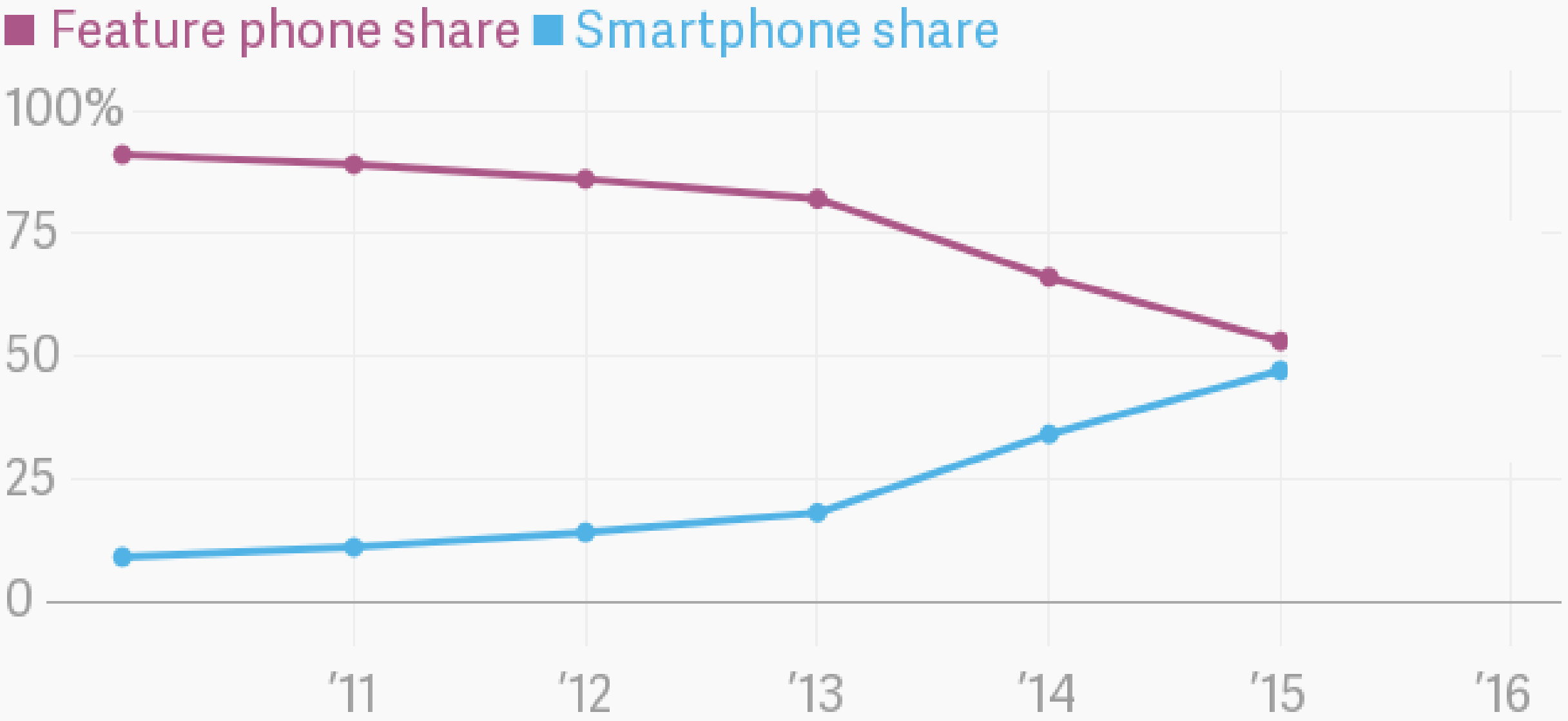
"**Unlike old-fashioned "dumb" phones** or even feature phones, smartphones can accommodate sophisticated financial services in a user-friendly way." (Mckinsey)

"Android devices can provide access to data from device sensors, apps, and the OS." (FSP)

Pew: "Adults Who Report Owning A smartphone in Emerging Economies"

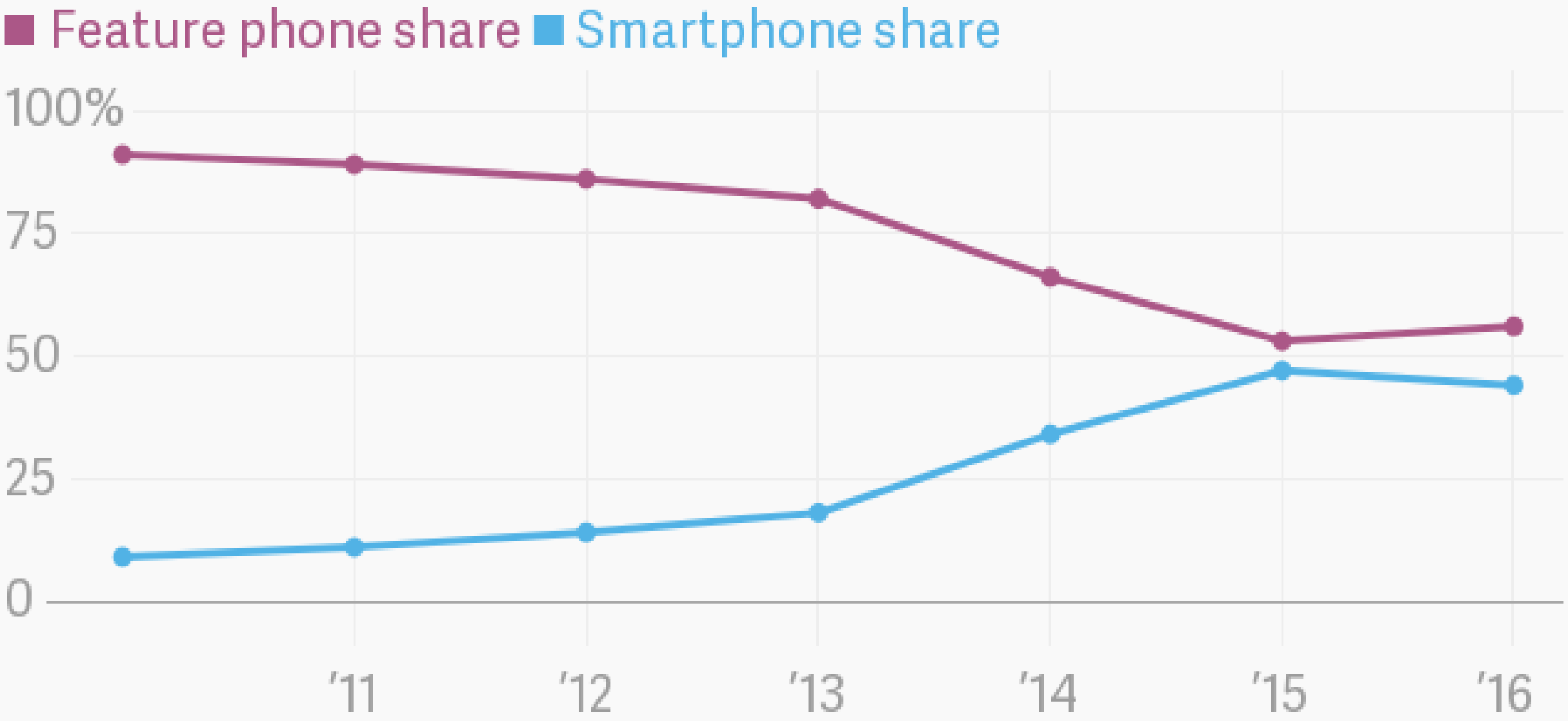


Smartphone sales in Africa



ATLAS | Data: International Data Corporation

Smartphone sales in Africa didn't overtake feature phones in 2016



ATLAS | Data: International Data Corporation

Research Questions

1. **Is the focus of DFS on smartphones sufficient?**
   a) What does the handset landscape look like?
   b) What do we mean by smartphone, feature phone, etc.?
2. **What are the processes of application development, installation, distribution, and use on feature phones?**

Outline

1. **Term-setting and classification**
2. Application Development Process
3. Feature phone app platforms

Pew Research Study on Smartphones, 2015:

“Q72: Some **cellphones are called "smartphones" because they can access the internet and apps**. Is your cellphone a smartphone, such as an iPhone, a Blackberry … ?”

Is this a smartphone?

- It has
  - Only LTE access
  - An app store*
  - Wifi
  - A voice assistant
  - A front and rear camera
- But it looks like

Handsets Attributes

- Battery life (mAh)
- Data access (2, 3, 4 G)
- Multimedia ability (video, camera)
- Input mode (keypad, keyboard, touch)
- How they run apps
- Operating System (OS) type

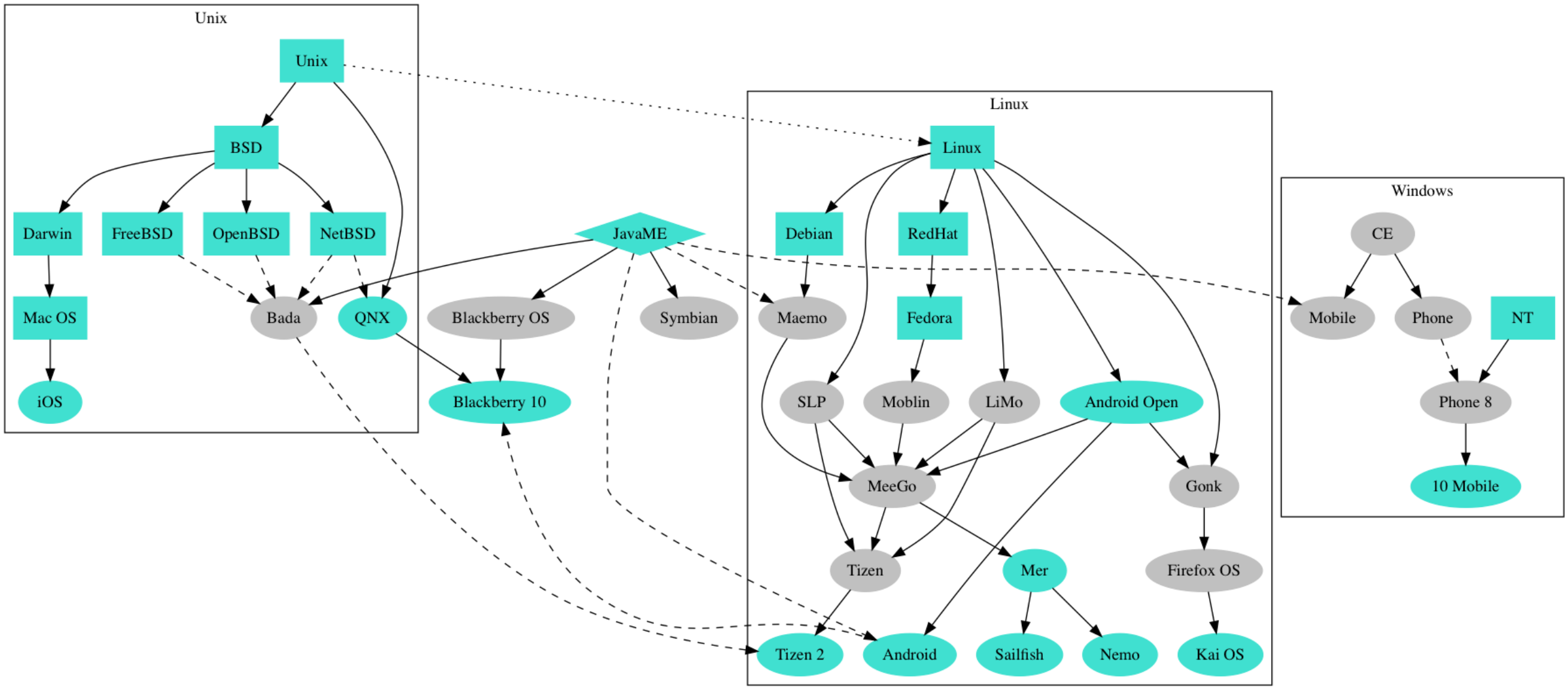
Classification of Operating Systems

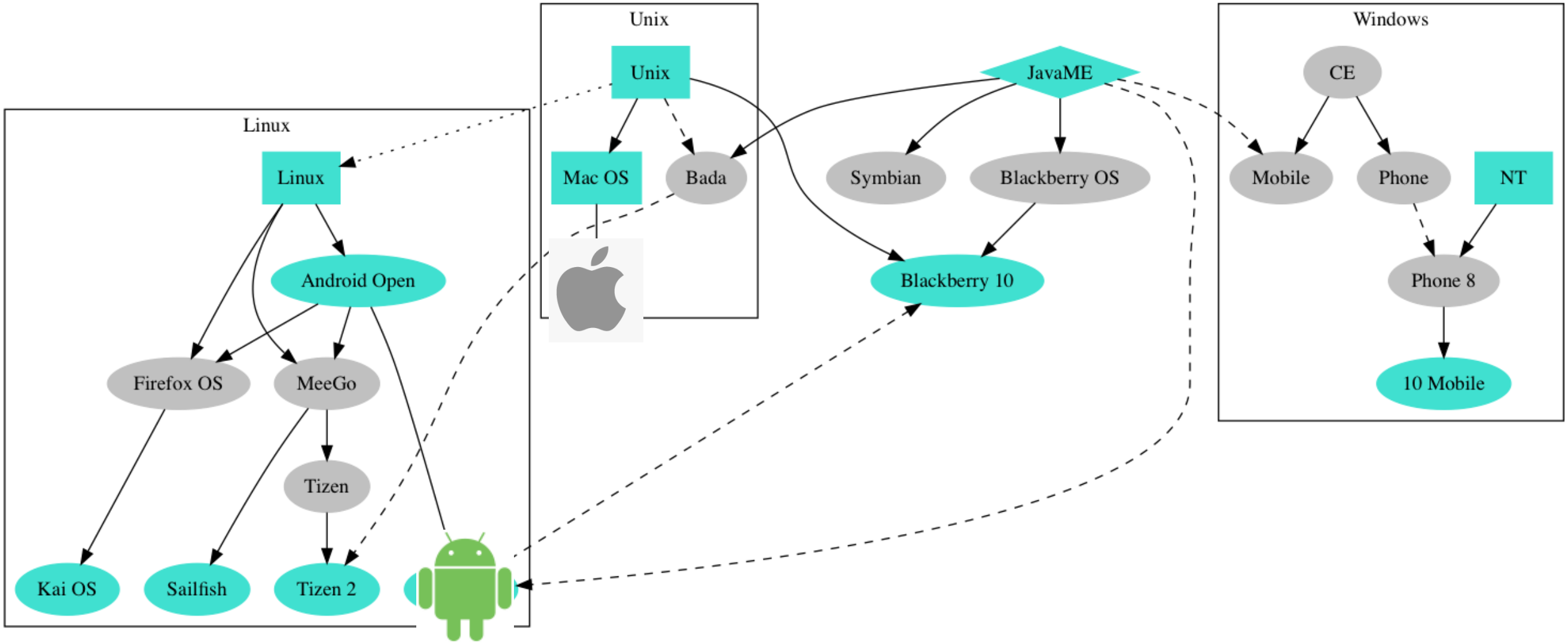
Basic

- Proprietary
- Runs off of firmware
- Not “smart”

Smart

- Has an app store
- Is one of
  - **Android** **(83%)**
  - **iOS** **(15%)** (IDC)
  - Windows Mobile (1%)
  - BlackBerry
  - Tizen
  - Sailfish OS


Unix
Unix
BSD
Darwin
FreeBSD
OpenBSD
NetBSD
Mac OS
iOS
Bada
QNX
JavaME
Blackberry OS
Blackberry 10
Symbian
Linux
Linux
Debian
RedHat
Maemo
Fedora
SLP
Moblin
LiMo
Android Open
MeeGo
Gonk
Tizen
Mer
Firefox OS
Tizen 2
Android
Sailfish
Nemo
Kai OS
Windows
CE
Mobile
Phone
NT
Phone 8
10 Mobile


Unix
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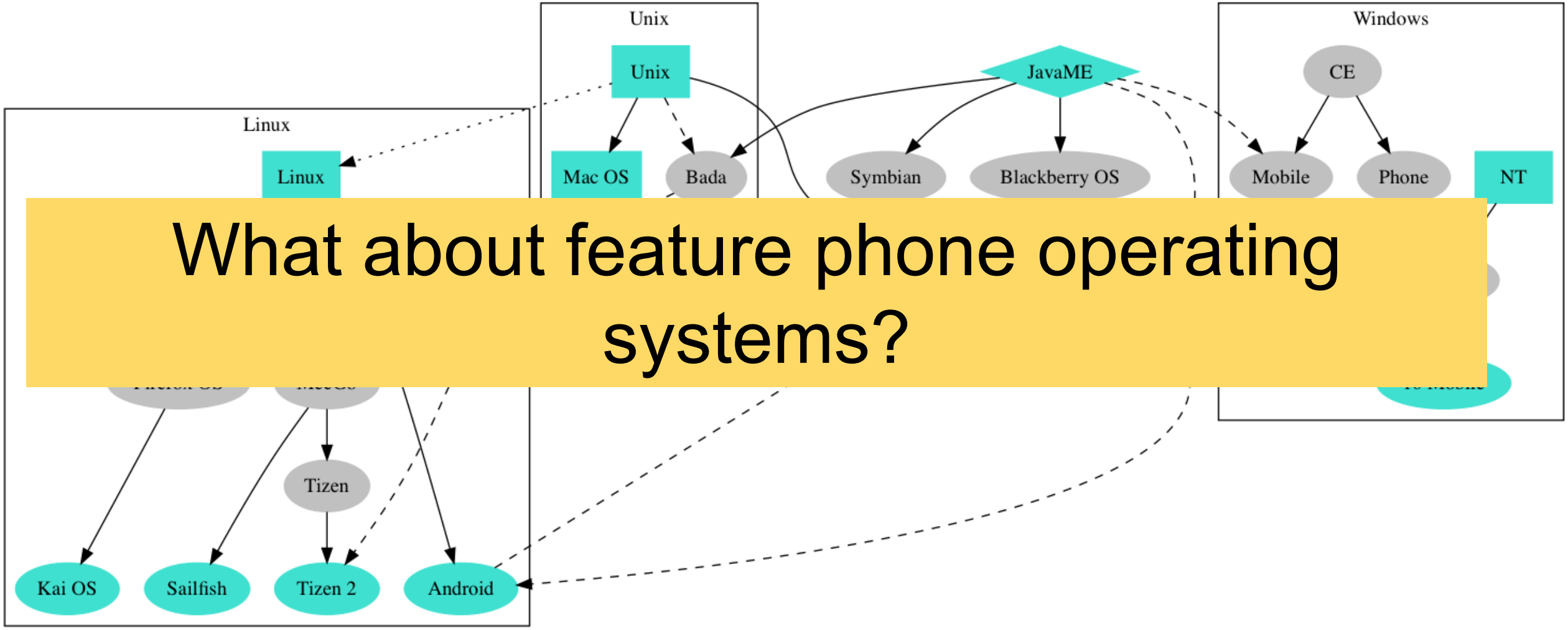
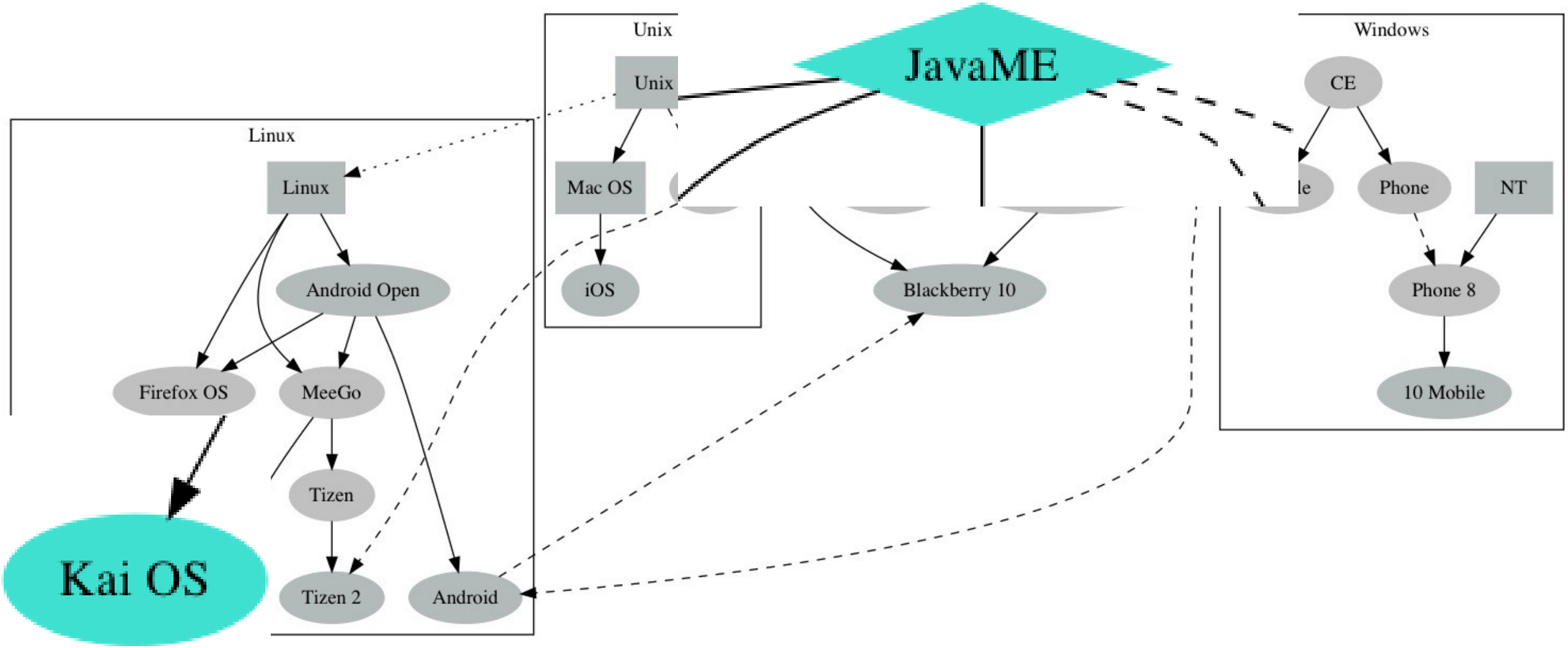
Mac OS
Bada
Linux
Linux
Android Open
Firefox OS
MeeGo
Tizen
Kai OS
Sailfish
Tizen 2
JavaME
Symbian
Blackberry OS
Blackberry 10
Windows
CE
Mobile
Phone
NT
Phone 8
10 Mobile

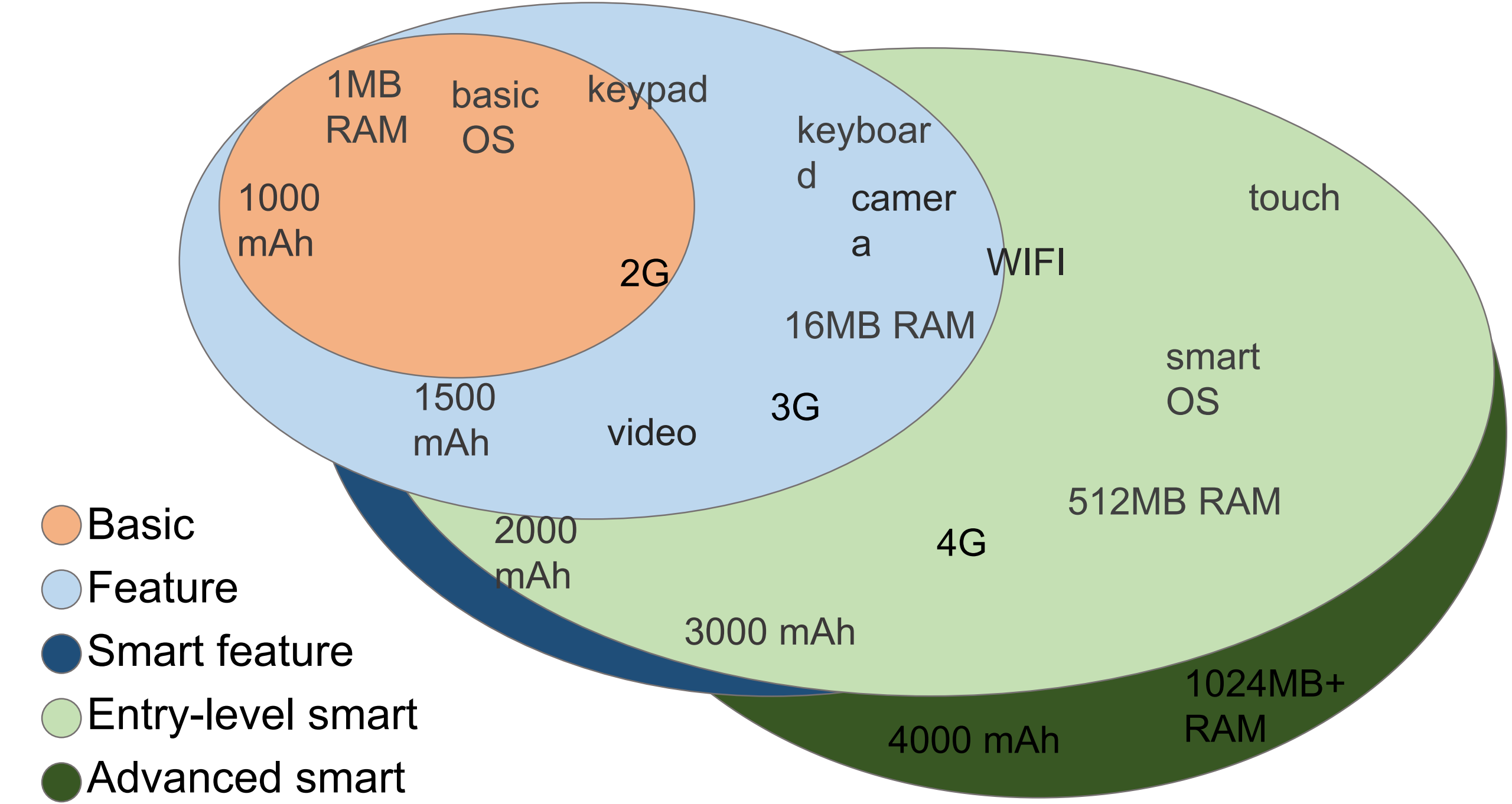


What about feature phone operating systems?


JavaME
Unix
Unix
Mac OS
iOS
Linux
Linux
Android Open
Firefox OS
MeeGo
Tizen
Tizen 2
Android
Kai OS
Blackberry 10
Windows
CE
Phone
NT
Phone 8
10 Mobile

Classification of Handsets

- Basic
- Feature
- **Smart feature**
- **Entry-level smartphone**
- Advanced smartphone


1MB RAM
basic OS
keypad
1000 mAh
2G
keyboard
camera
WIFI
touch
16MB RAM
smart OS
1500 mAh
3G
video
512MB RAM
2000 mAh
4G
3000 mAh
1024MB+ RAM
4000 mAh
Basic
Feature
Smart feature
Entry-level smart
Advanced smart

Outline

1. Term-setting and classification
2. **Application Development Process**
3. Feature phone app platforms

	Examples
SMS	As receipts, M-Pesa
USSD	M-Pesa (Tanzania)
IVR	EcoBank
SIM app	M-Pesa (Kenya)
Thin-sim	Equity Bank (Kenya
Browser	EcoBank
Feature phone app	
Smartphone app	PayTM (India)

Paytm

Bottlenecks

USSD	Functionality, Telco contracts
SIM app	Deployment, functionality
Browser	Data cost, security
Feature phone app	Deployment, engineering, functionality
Smartphone app	Reach, engineering

Costs

- Handset
  - Energy
  - Network
  - Hardware
- Application
  - MNO contract?
  - Developer time

The Technology Depends On:

- Who is the developer?
- Does application require multimedia?

- Does population have home electricity?
- What is population’s network coverage?
- What is distribution of handsets in population?

Probable DFS Paths

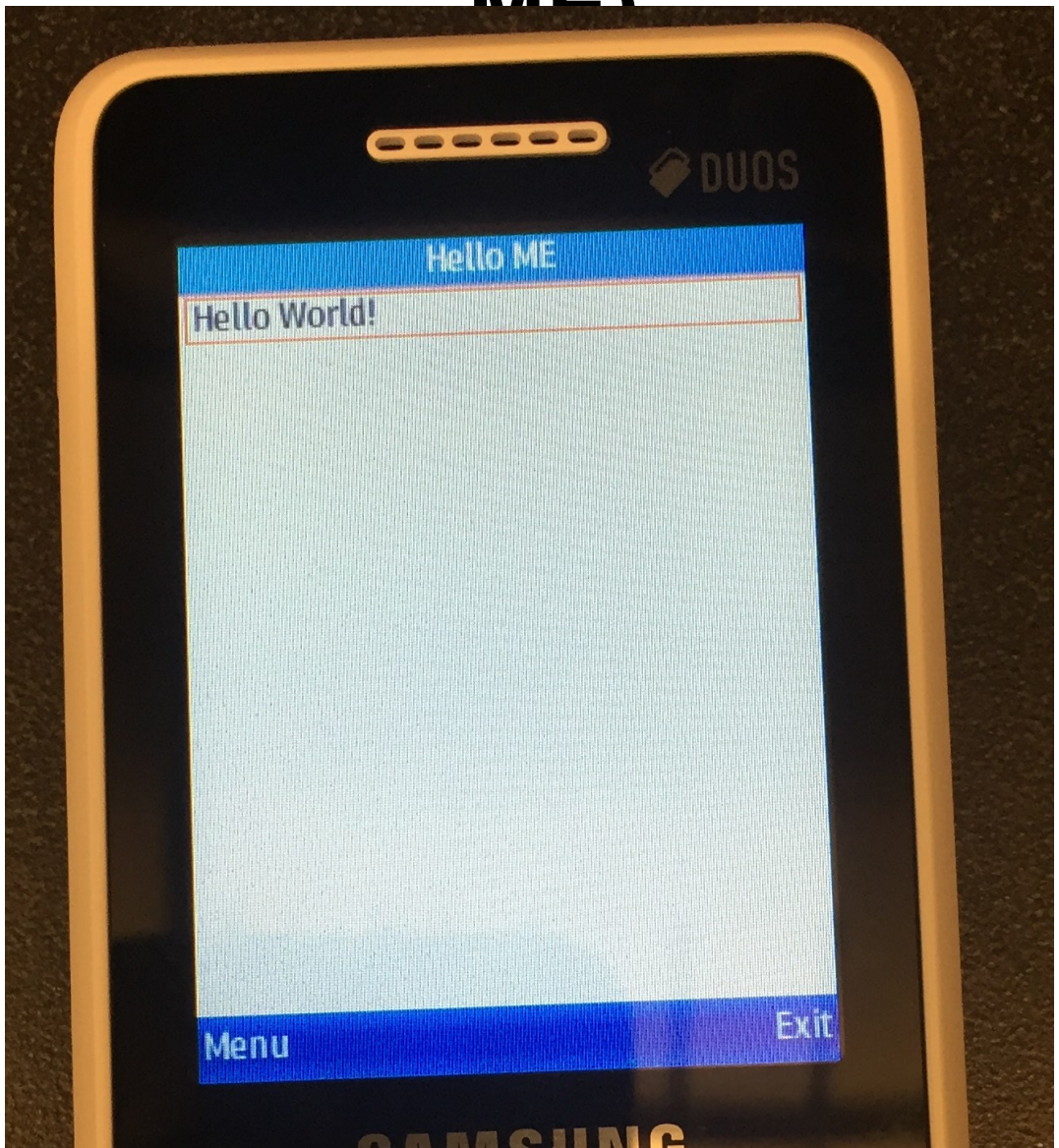
- Telco
  - USSD + sim toolkit + (optional) smartphone app, SMS
- Bank
  - Smartphone app + (rarely) thin sim
- Startup
  - Smartphone app + (sometimes) USSD
- **Desired**
  - Feature phone app

Native Feature Phone Apps

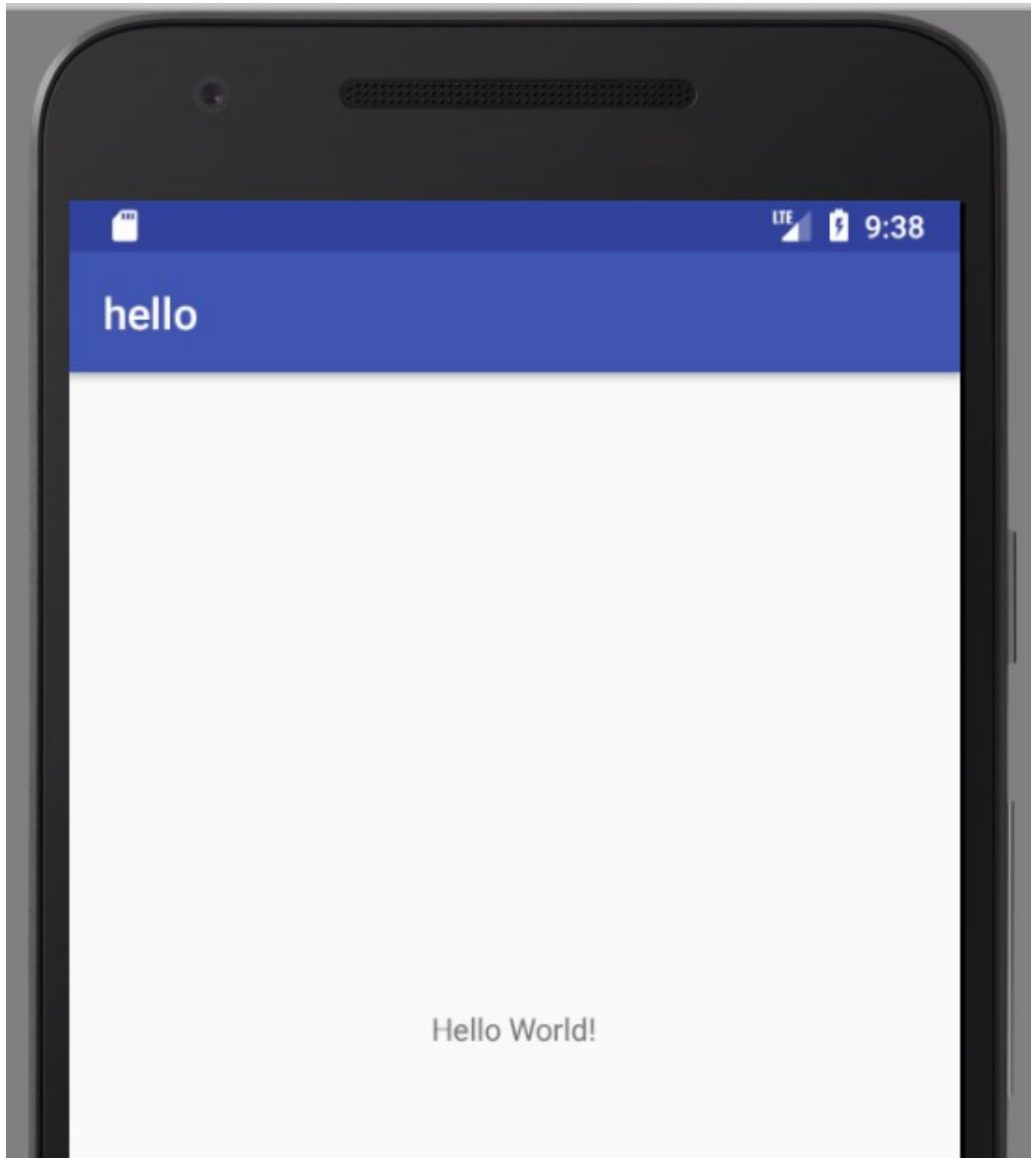
- JavaME
  - Opera/Bemobi App Store or side-load
  - Compatibility issues

- Proprietary OS
  - MNO
  - Scalability issues

Basic (Java ME)



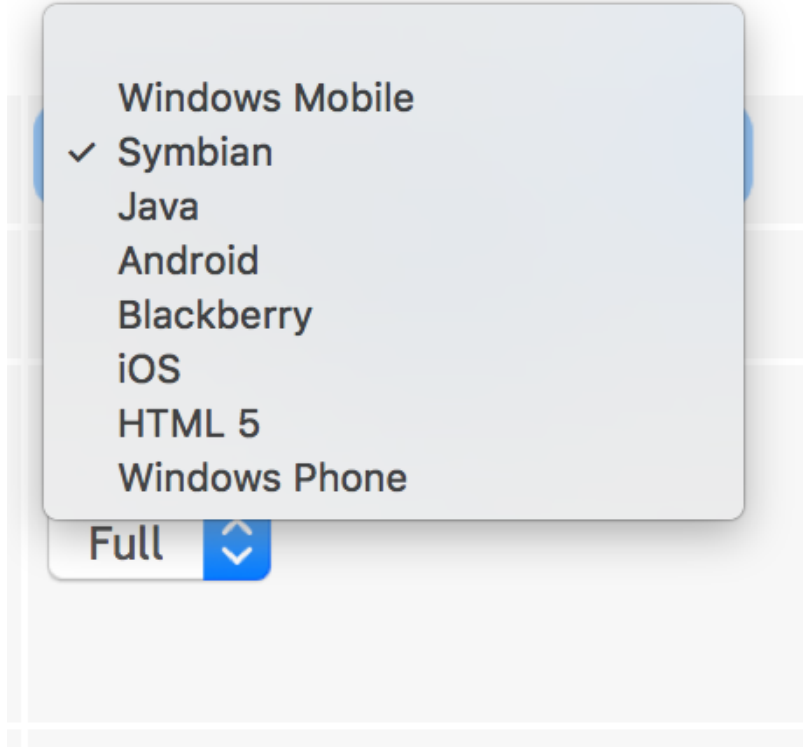
Smart (Android)

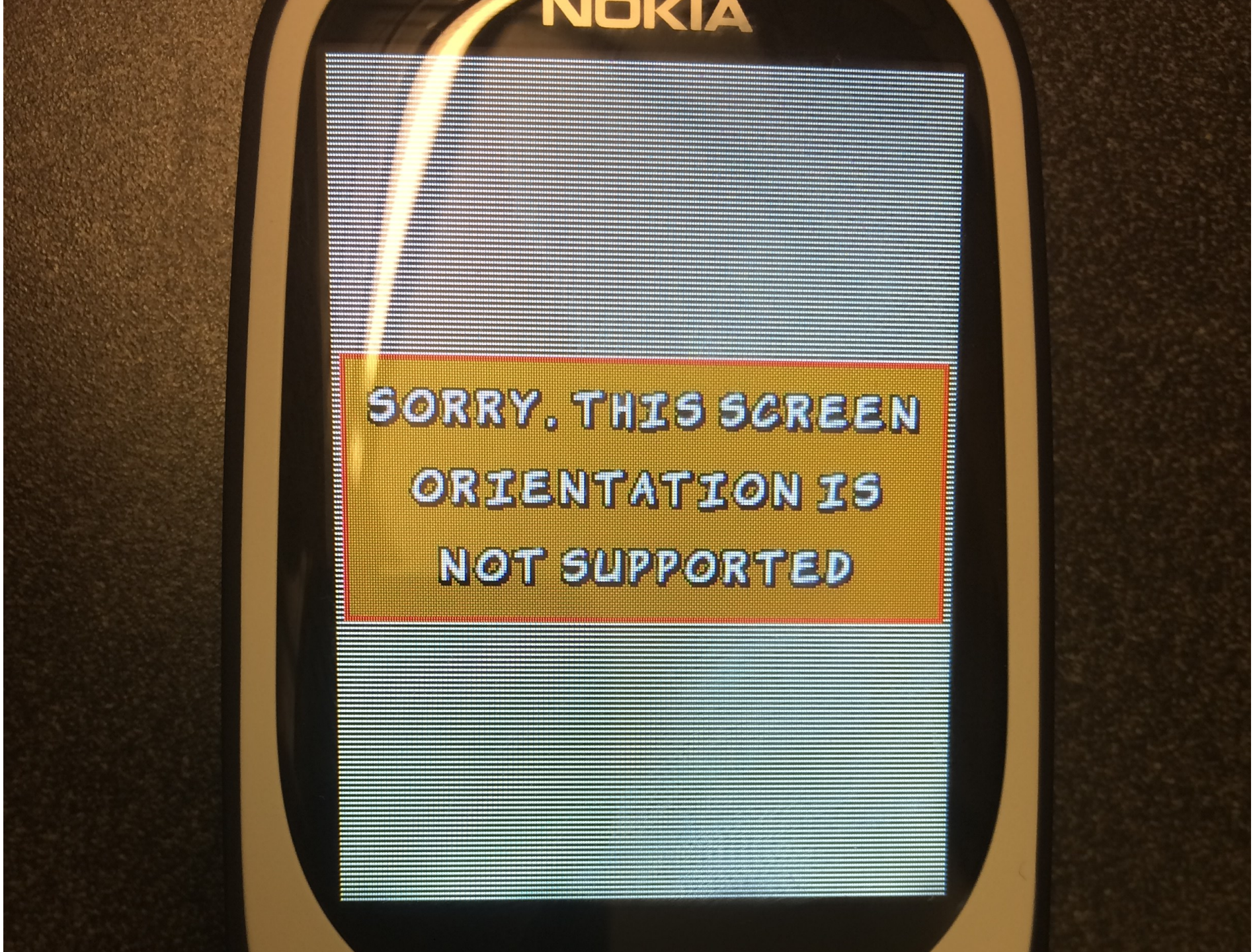


	Basic (Java ME)	Smart (Android)
0 to 60	20 hours	2 hours
Phones Operable	Some	Almost all
Distribute	Preinstalled, Bemobi	Google Play Store

Opera/ Bemobi Mobile S e

- 6745 handset models run JavaME
  - Acer E200 to ZTE Yoigo F233
  - 136 makes
- 273 handset models run Symbian




NOKIA
SORRY. THIS SCREEN
ORIENTATION IS
NOT SUPPORTED

Outline

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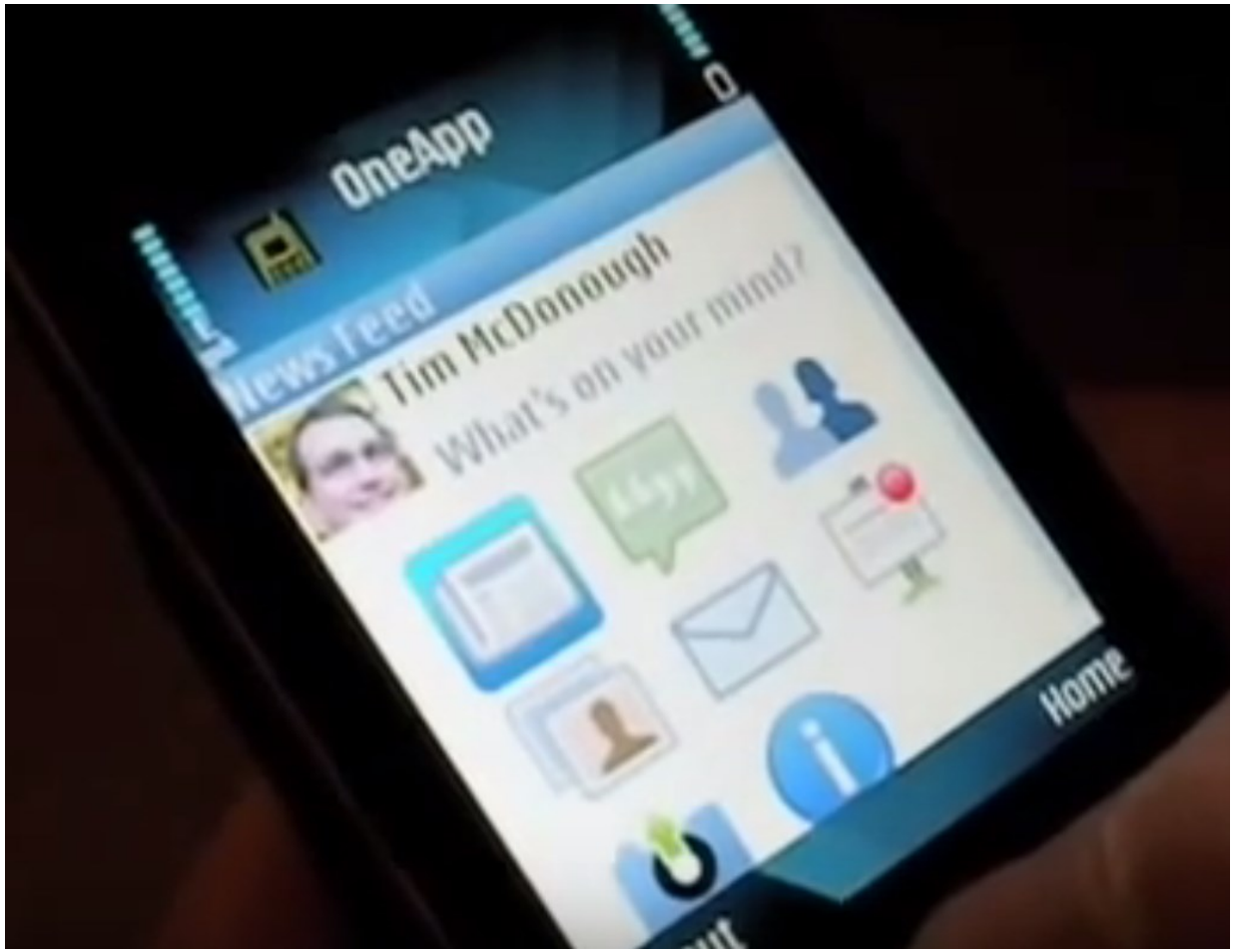
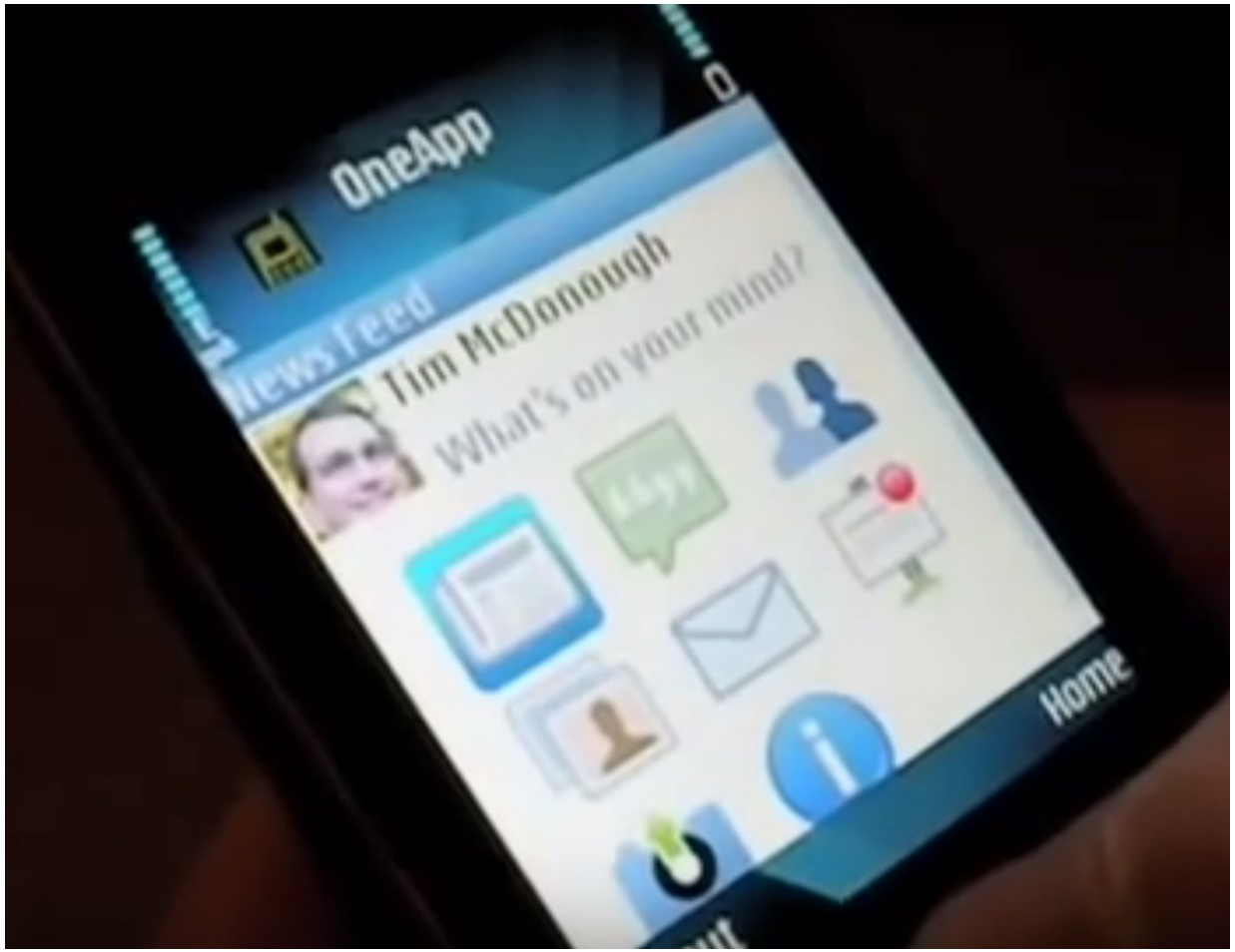
2. Application Development Process
3. **Feature phone app platforms**

“A new software application designed for feature phones …OneApp expands the capabilities of these handsets to deliver new apps and services”



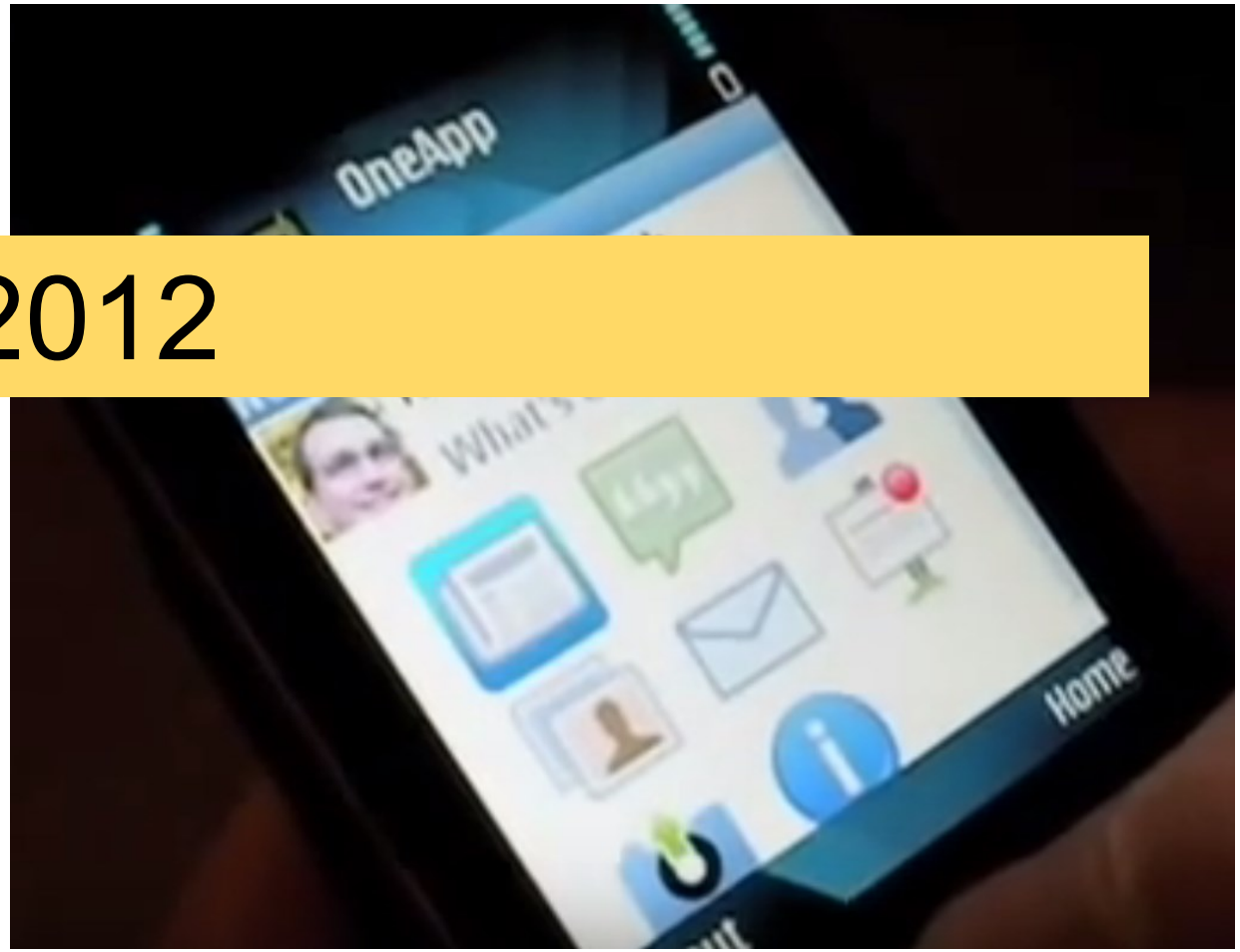
“MOBILE WALLET
Transactions made easy.
Top off airtime, pay bills, buy tickets, or send money to a friend or family member—no more lines and no bank account needed!"



“MOBILE WALLET

RIP 2012

Top off airtime, pay bills, buy tickets, or send money to a friend or family member—no more lines and no bank account needed!"



UPDATE: You won't be able to use WhatsApp on the following platforms for:

- Nokia Symbian S60 after June 30, 2017
- BlackBerry OS and BlackBerry 10 after December 31, 2017
- Windows Phone 8.0 and older after December 31, 2017
- Nokia S40 after December 31, 2018
- Android versions 2.3.7 and older after February 1, 2020

Is this a smartphone?

- It has
  - Only LTE access
  - An app store*
  - Wifi
  - A voice assistant
  - A front and rear camera
- But it looks like

Is this a smartphone?

$2.50

42GB DATA

Validity: 28 days

Free voice calls | Unlimited Data

Unlimited SMS | Jio Apps

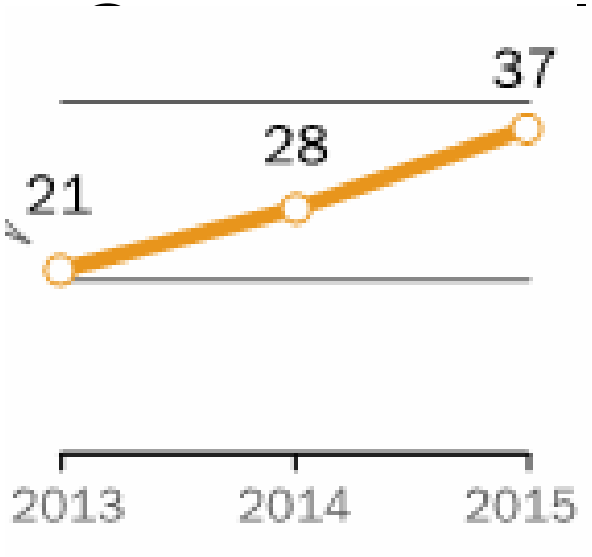
India **Featurephone** Shipment Market Share (%)	Q4 2016	Q4 2017
JIO	-	26%
SAMSUNG	25%	15%
MICROMAX	9%	9%
ITEL	11%	7%
NOKIA HMD	-	6%
OTHERS	55%	37%

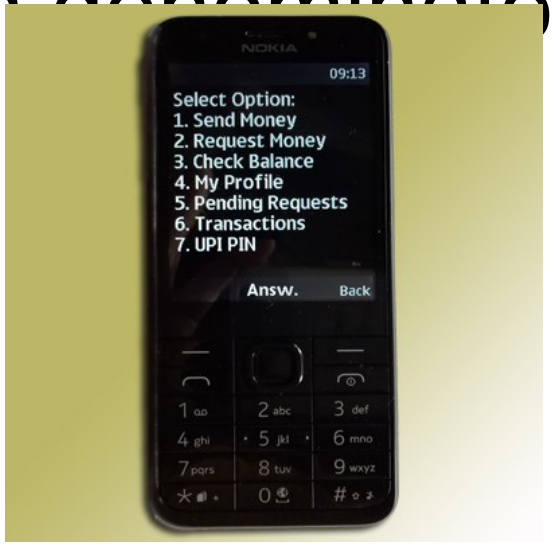
Jio Phone

- Exemplifies continued demand for feature phones
- Easier development with HTML5
- Adoption despite no open app environment
- Data cost model

Future(s) of Open Platforms

1. Smartphones take over world
2. Jio-like phones are a viable middle and low end
3. [illegible]d, use least common denominator





Open Questions

1. **What is the handset distribution and usage data over time for various developing regions?**
2. What policies will help create our desired world?

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1. What is the handset distribution and usage data over time for various developing regions?
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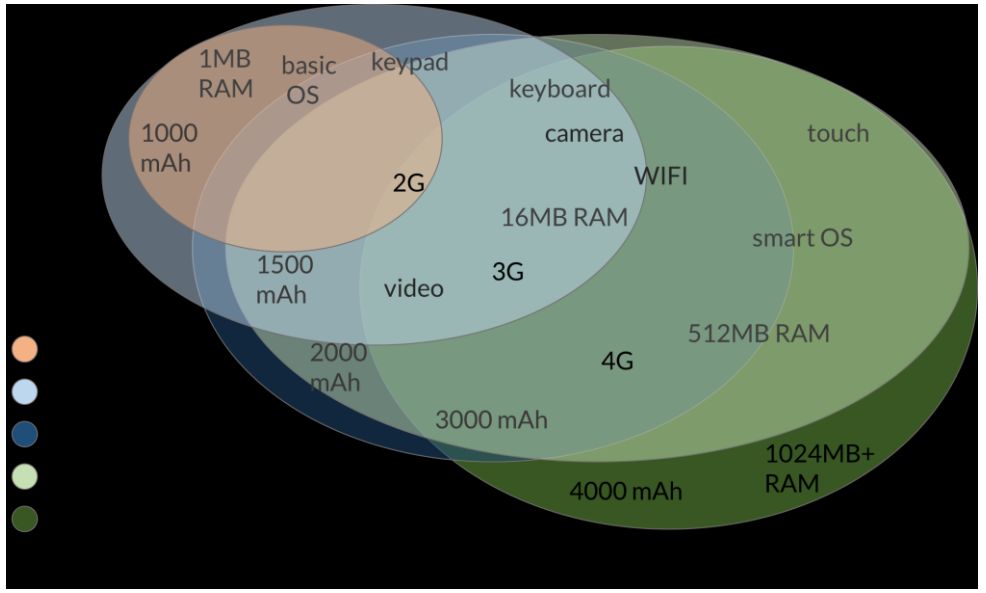
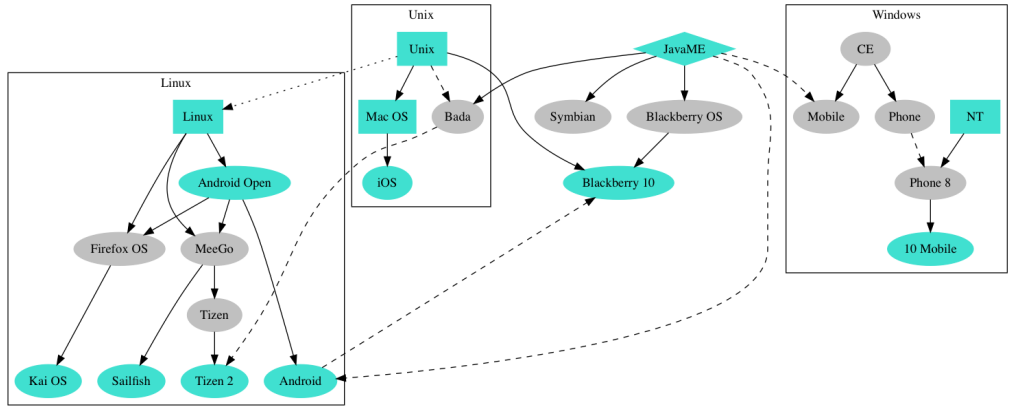
Questions?

1. We can’t abstract DFS from the devices
2. Handset classifications are conveniences
3. Consider app. development, deployment and cost





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