MOBILE WORLD

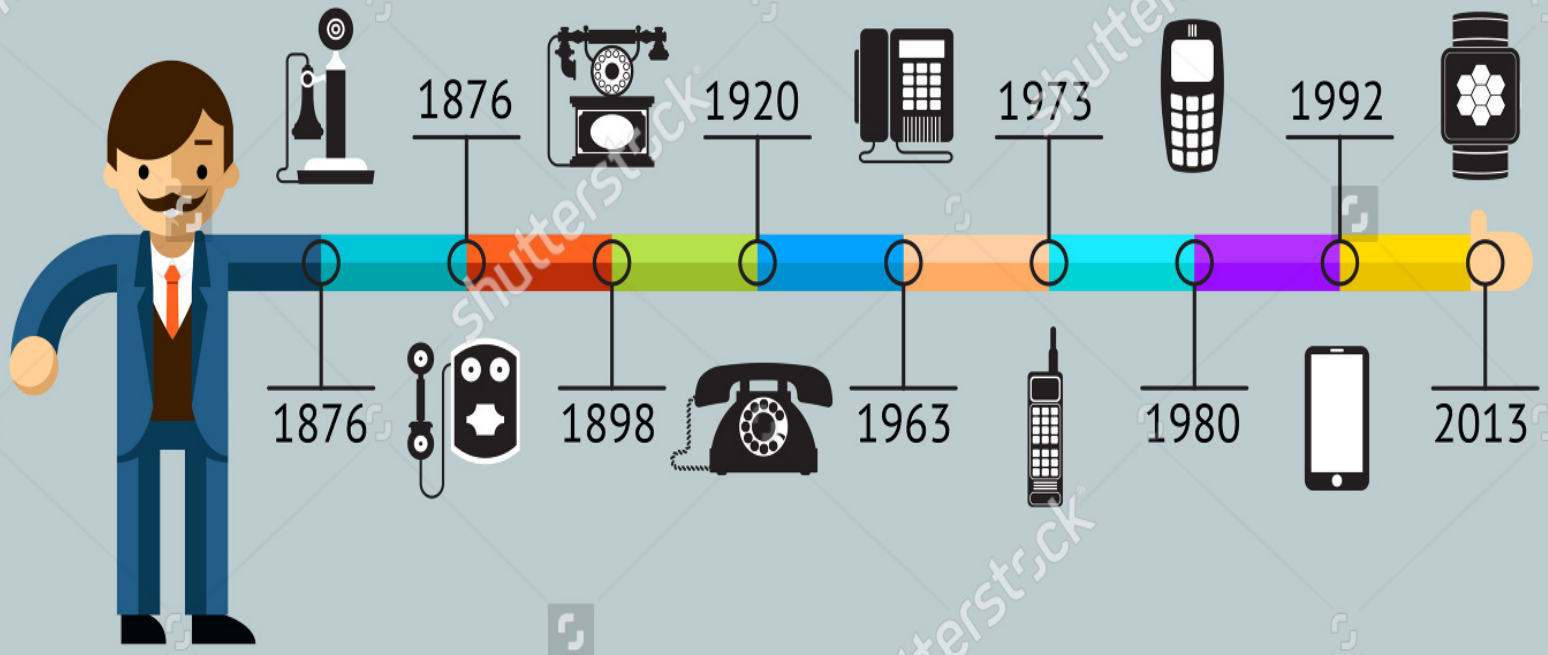
BLM5134 – WEEK 4

MOBILE COMPUTING

- Mobile Computing is a technology that allows transmission of data, voice, and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link.

  - Mobile Communication
  - Mobile Hardware
  - Mobile Software

Evolution of Phones



(Dis)Advantages of Mobile Computing

Computing

- Locational Flexibility
- Saves Time
- Enhances productivity
- Entertainment

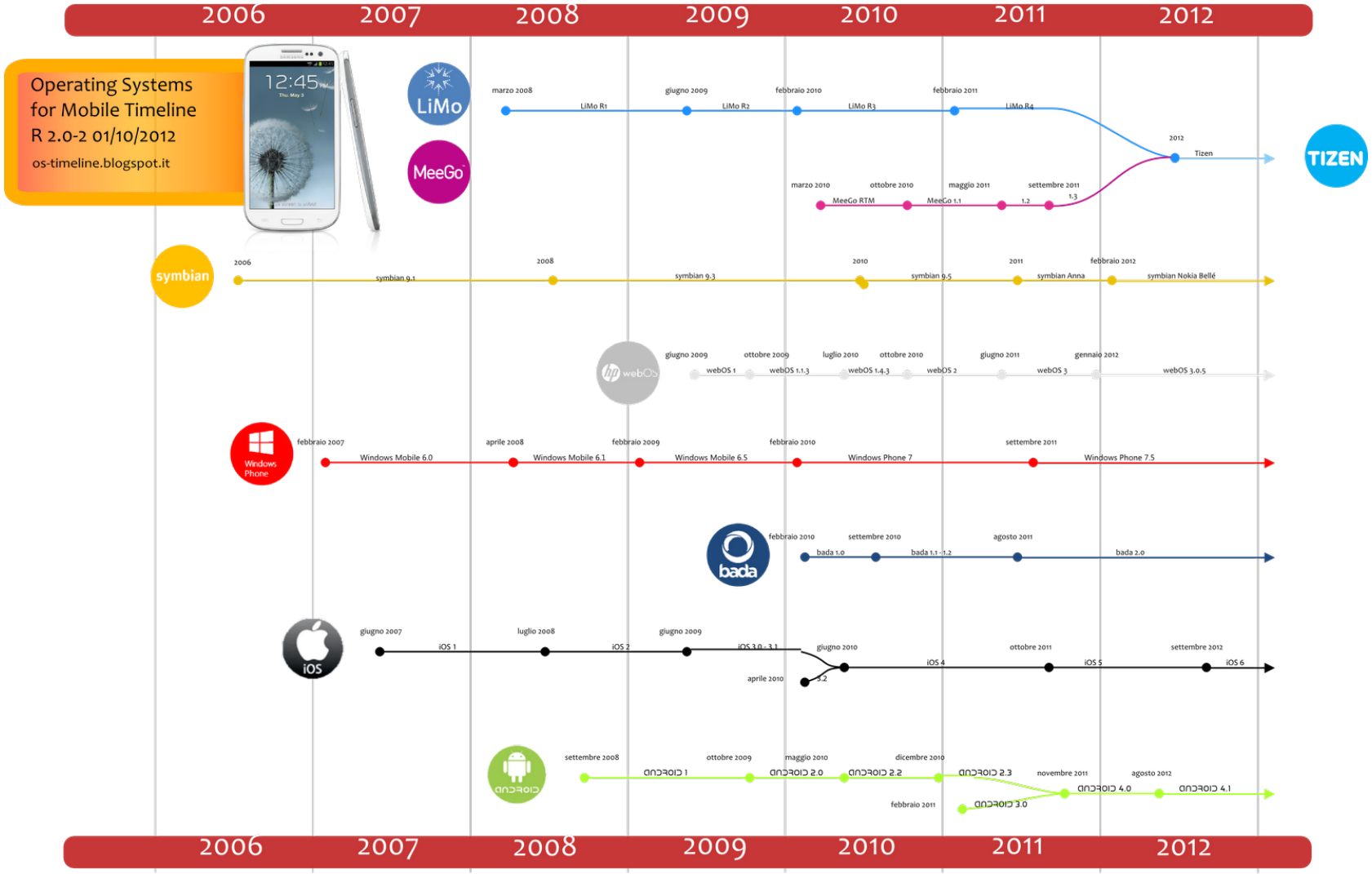
DISADVANTAGES OF MOBILE COMPUTING

- Expensive
- Short battery life
- Small screen display
- Slow internet speed
- Communication depends upon network
- Risky to carry
- Security

Mobile Operating Systems

- A mobile operating system (or mobile OS) is an operating system for smartphones, tablets, PDAs, or other mobile devices.
  - a touchscreen,
  - cellular,
  - Bluetooth,
  - Wi-Fi,
  - GPS mobile navigation,
  - camera,
  - video camera,
  - speech recognition,
  - voice recorder,
  - music player,
  - near field communication
  - infrared blaster.

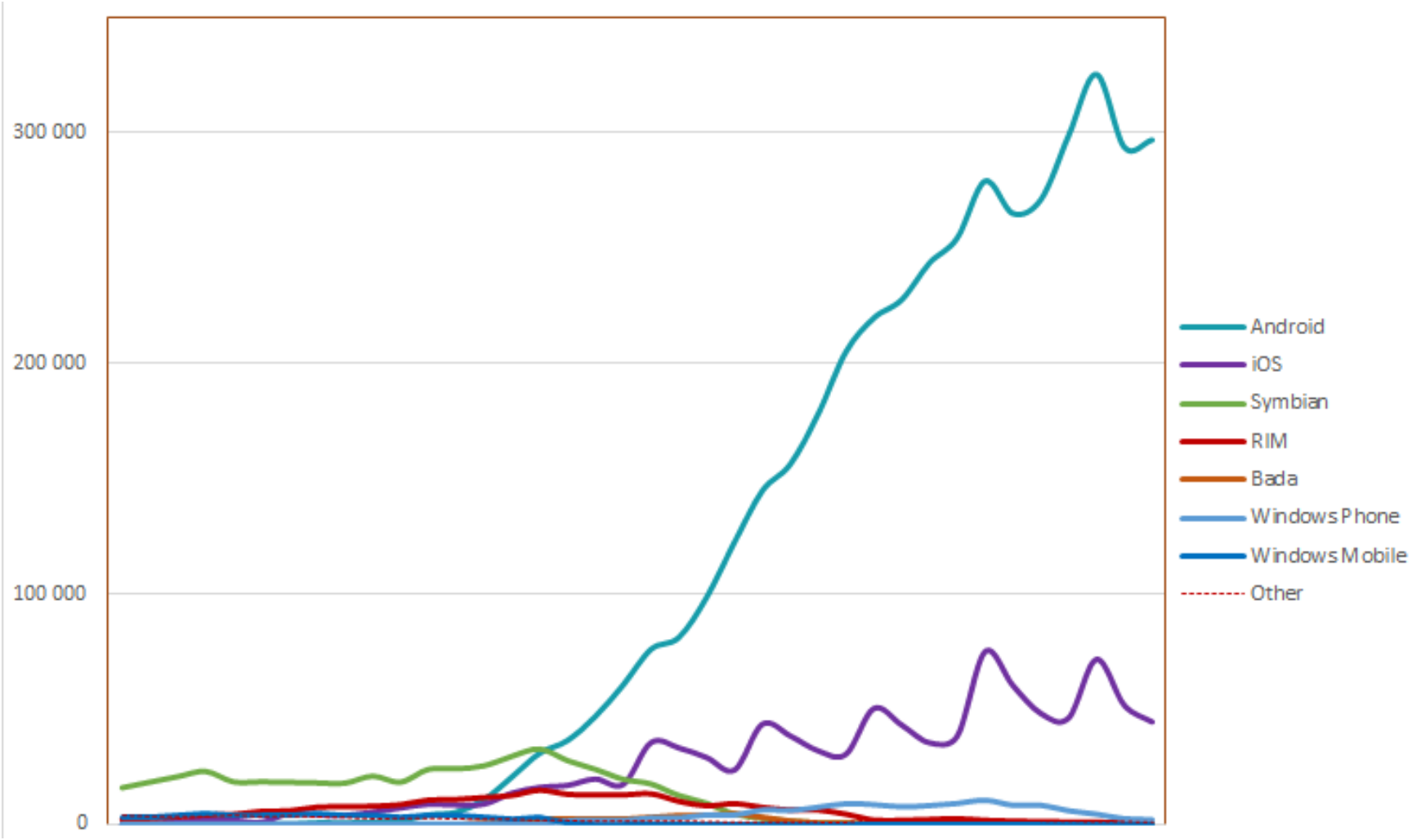
Timeline for Mobile OS



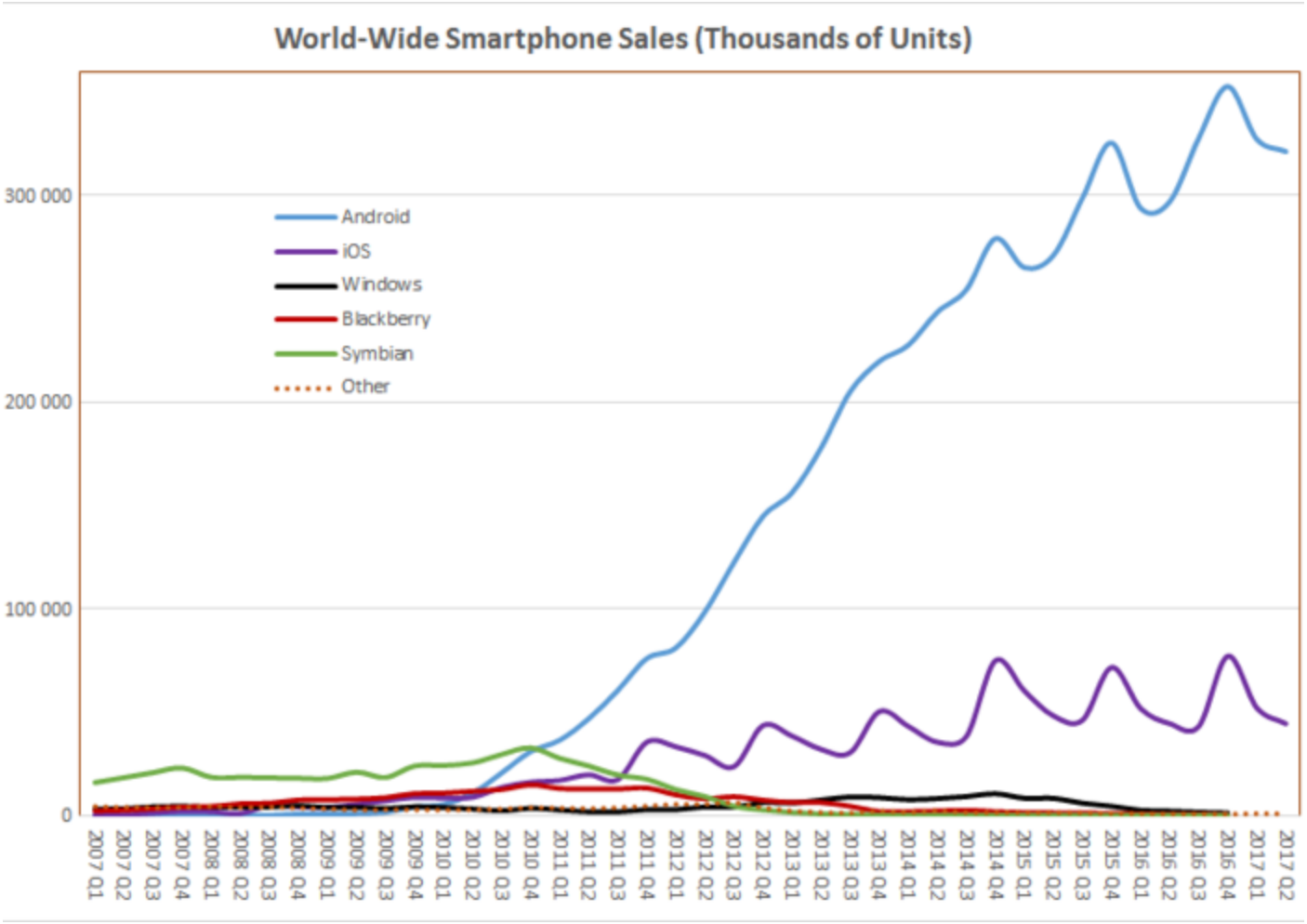
Up-to-date Mobile Operating Systems

- Android
- EMUI (Emotion User Interface)
  - Based on Android Open Source Project
- HTC Sense
- MIUI (Xiaomi)
- Nokia X Platform (removed Google Services)
  - Based AOSP
- LGUX
- Oxygen OS
- TouchWiz (Samsung)
- ZenUI(Asus)
- iOS
- Windows 10 Mobile
- Blackberry 10
  - Based QNX OS
- Firefox OS (does not have Java-like code)
- Tizen
  - Based on Linux
- Ubuntu OS (does not have Java-like code)

Market Share



Trends


World-Wide Smartphone Sales (Thousands of Units)
300 000
200 000
100 000
0
Android
iOS
Windows
Blackberry
Symbian
Other
2007 Q1
2007 Q2
2007 Q3
2007 Q4
2008 Q1
2008 Q2
2008 Q3
2008 Q4
2009 Q1
2009 Q2
2009 Q3
2009 Q4
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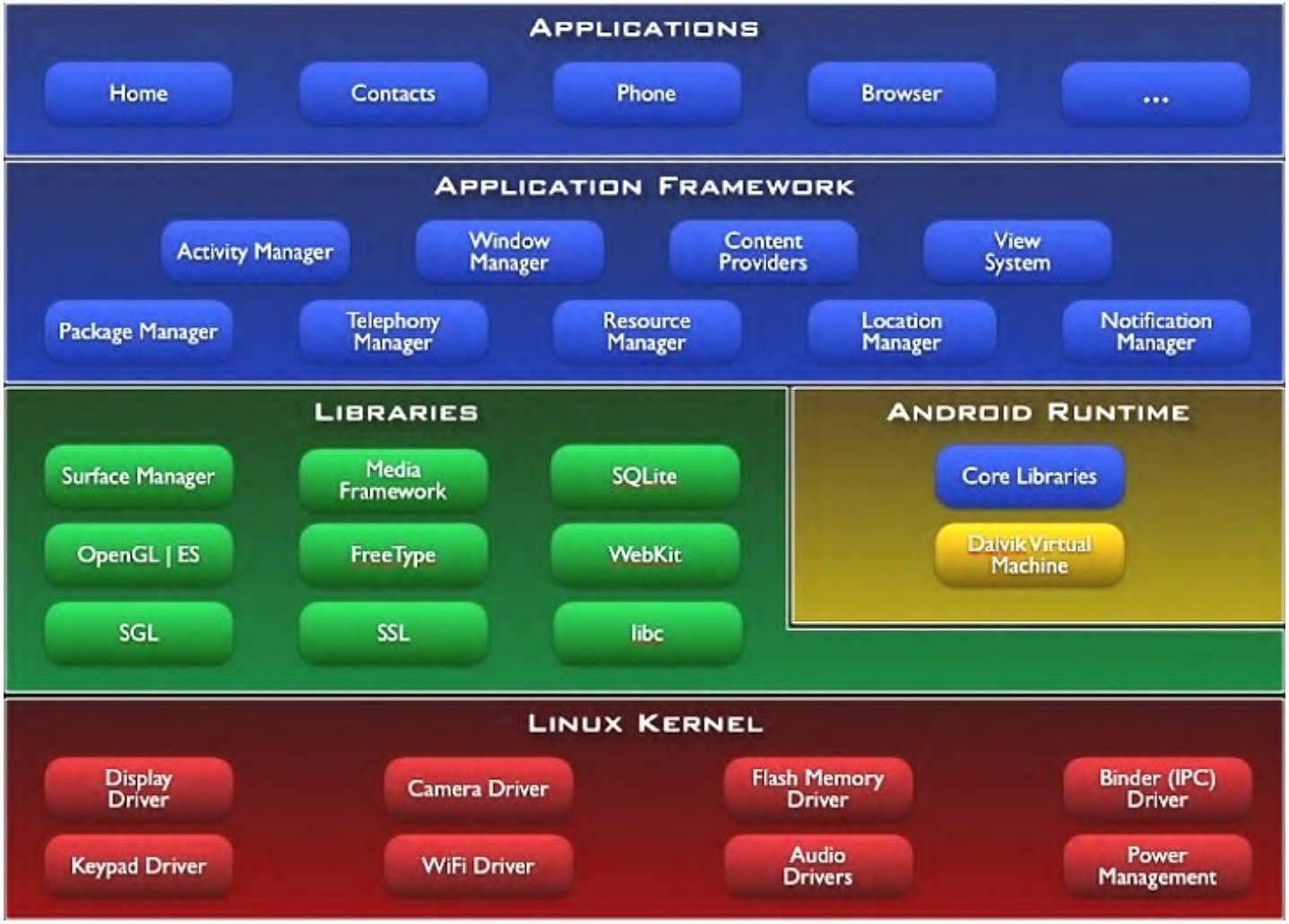
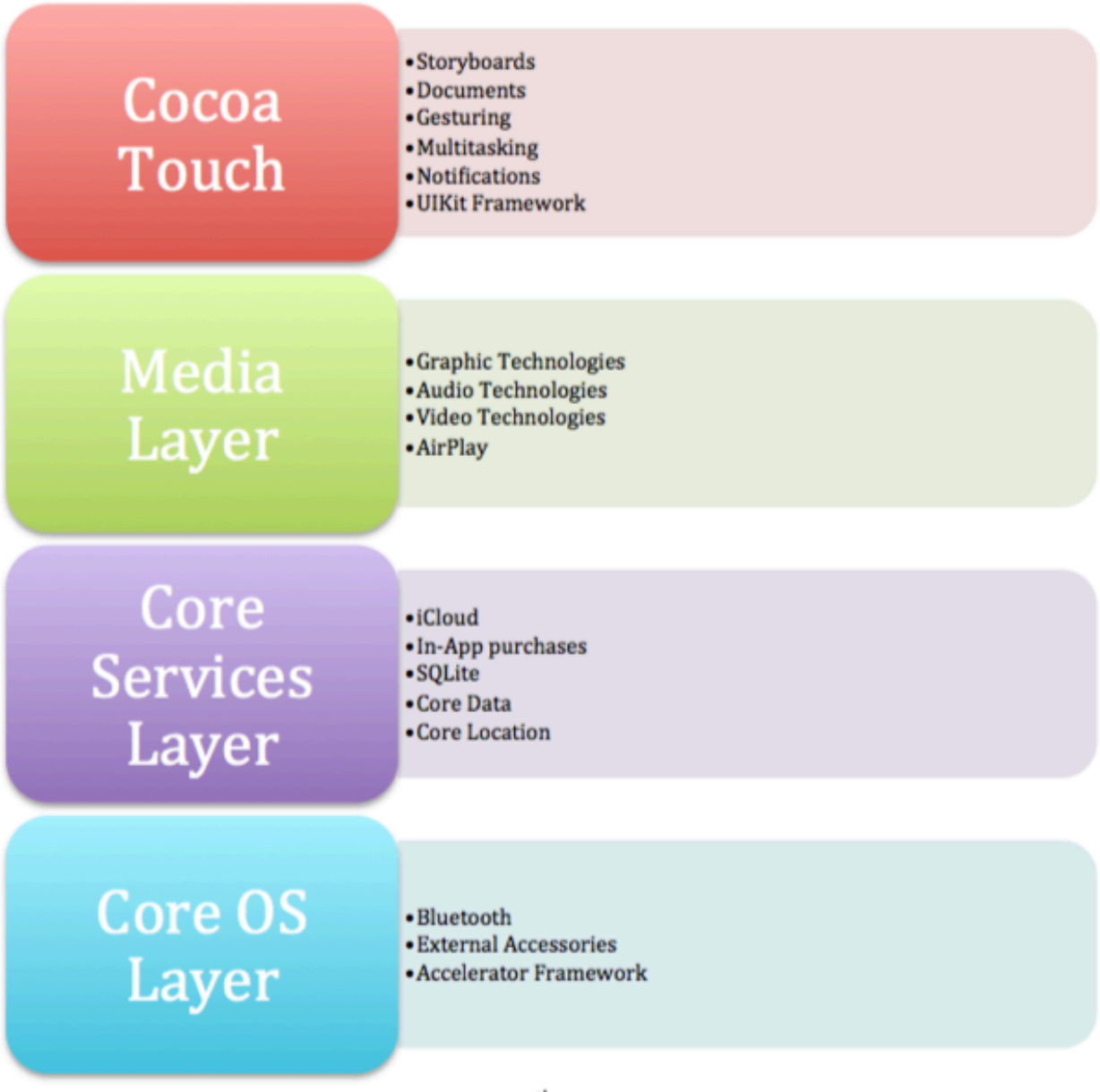
2015 Q4
2016 Q1
2016 Q2
2016 Q3
2016 Q4
2017 Q1
2017 Q2

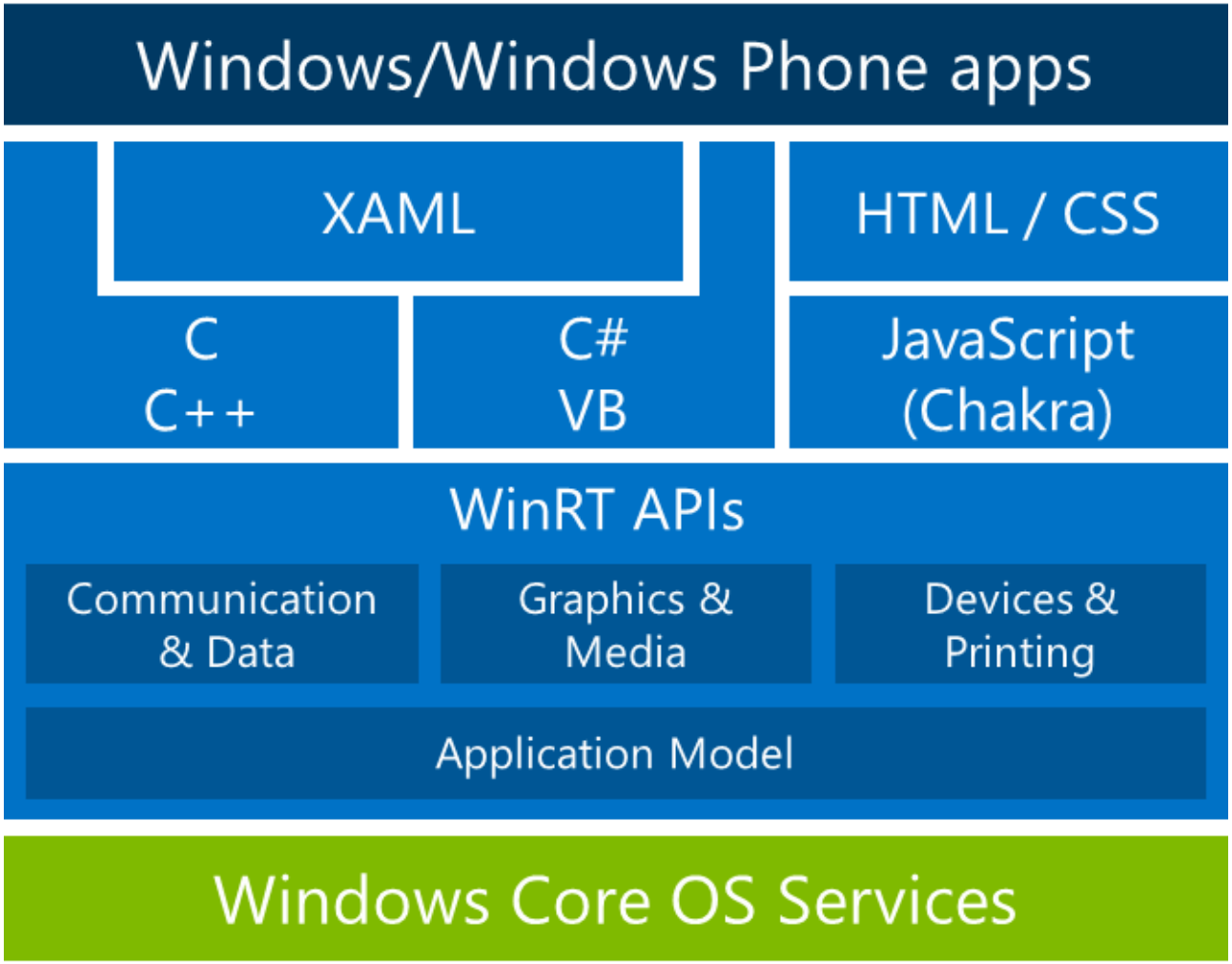
Android Operating System



iOS


Cocoa Touch
•Storyboards
•Documents
•Gesturing
•Multitasking
•Notifications
•UIKit Framework
Media Layer
•Graphic Technologies
•Audio Technologies
•Video Technologies
•AirPlay
Core Services Layer
•iCloud
•In-App purchases
•SQLite
•Core Data
•Core Location
Core OS Layer
•Bluetooth
•External Accessories
•Accelerator Framework

Windows Phone OS



Difference between Mobile OS and PC OS

- **1. Power:** In Android, by default processor and display shuts down. If any process wants to keep processor/display running, it should exclusively lock them using "wake-locks".

- **2. Interface:** Touchscreen is the main input method, supported by keypad, voice etc. Traditional windows method is heavy, so it uses layers and views.

- **3. Memory:** Android is optimized to use less memory, each applications are structured such way to load into minimum RAM. "Out of memory ”support is already there in Linux kernel, but Android adds "Low memory killer" on top of that to kill unused applications. All libraries used in framework are optimized, for ex, For C library, bionic replaces glibc

- **4. Communication processor:** Android communicates with another proprietary OS which runs on communication processor, GPRS/EDGE/3G/LTE are supported, which are not needed in desktop systems.

- **5. Portability:** x86 was built for desktops, Mobiles OSes runs mainly on ARM , which was built for embedded systems. Even though most OSes are ported to all hardware architectures, they are not optimized.

Difference between Mobile OS and PC OS

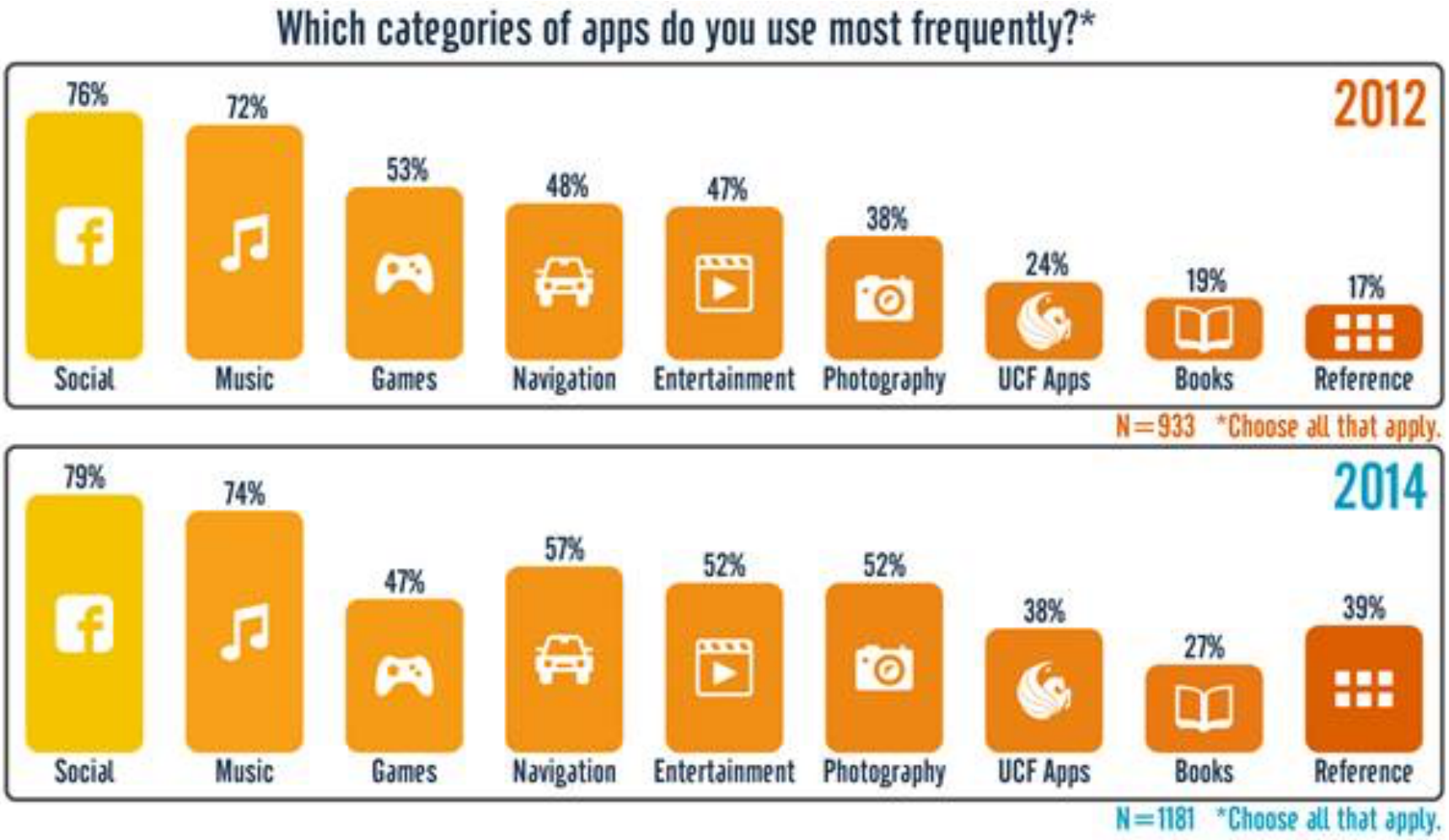
- Limitation to available APIs
- Mobile OS is much more restricted than desktop

Mobile OS Design Criteria

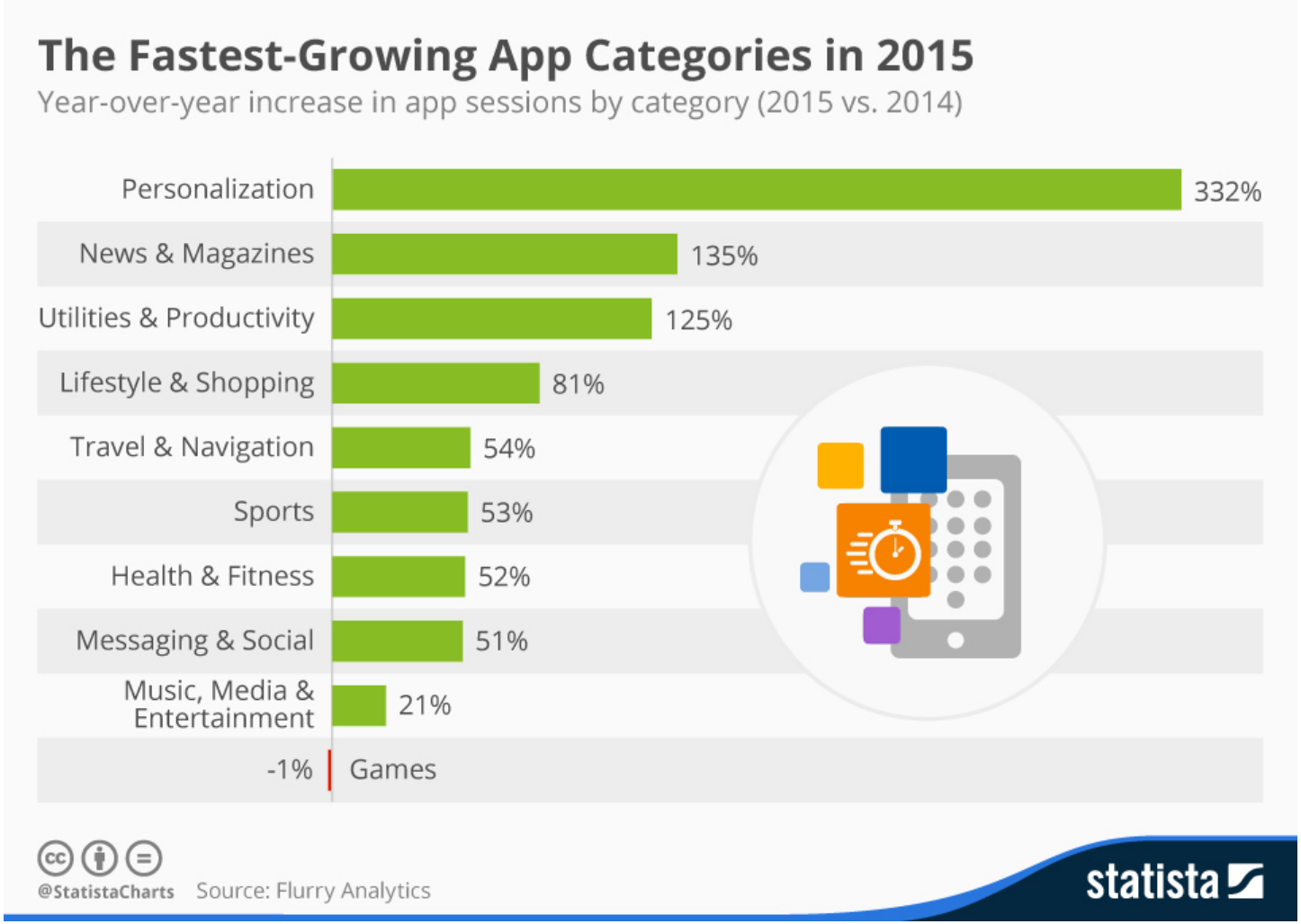
Mobile Application Development

- Constraints
  - Limited Battery
  - Less Resources
    - CPU
    - Memory
    - Storage
    - Battery
  - Range x Bandwidth
  - Security Standartds
  - Potential Hazards

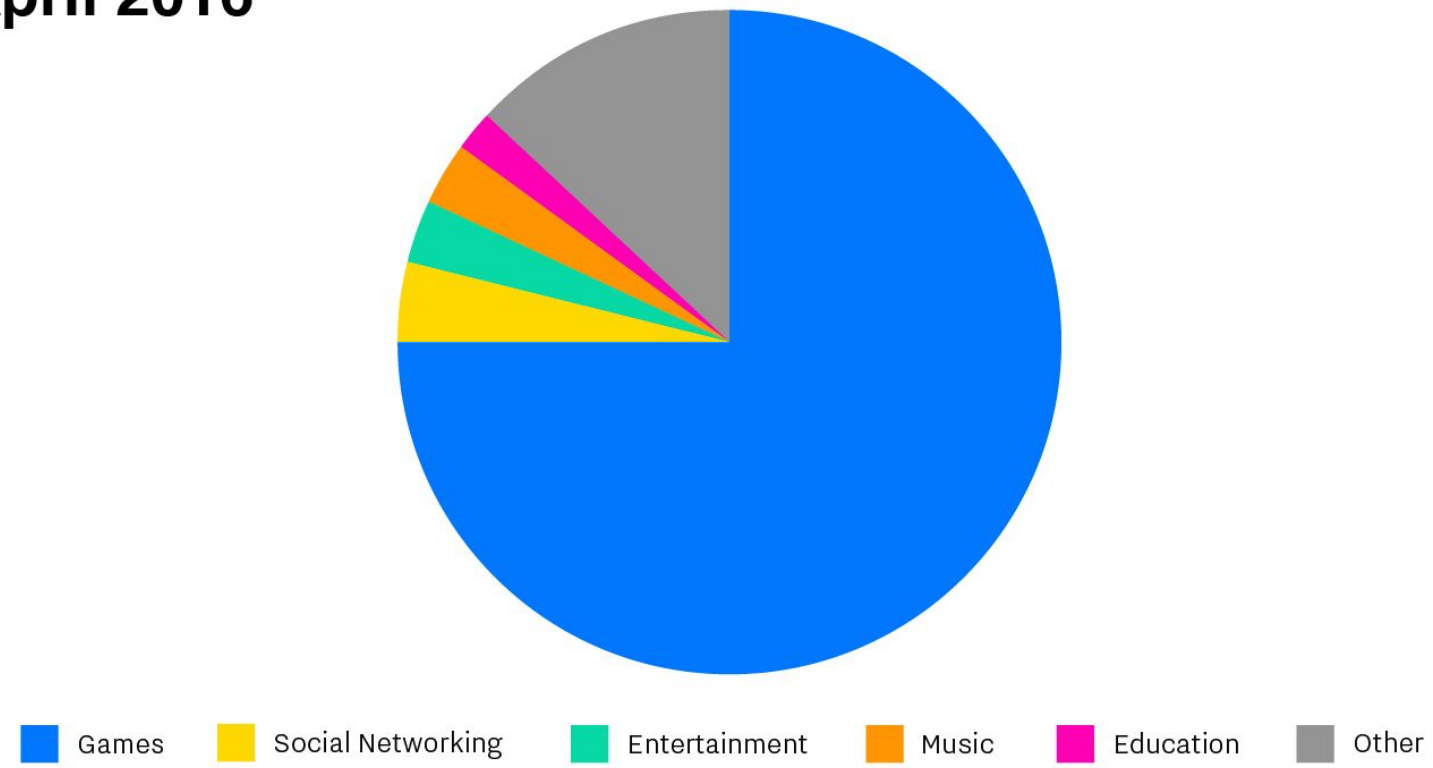
Mobile App Categories



Mobile App Categories



Top categories by worldwide revenue in April 2016

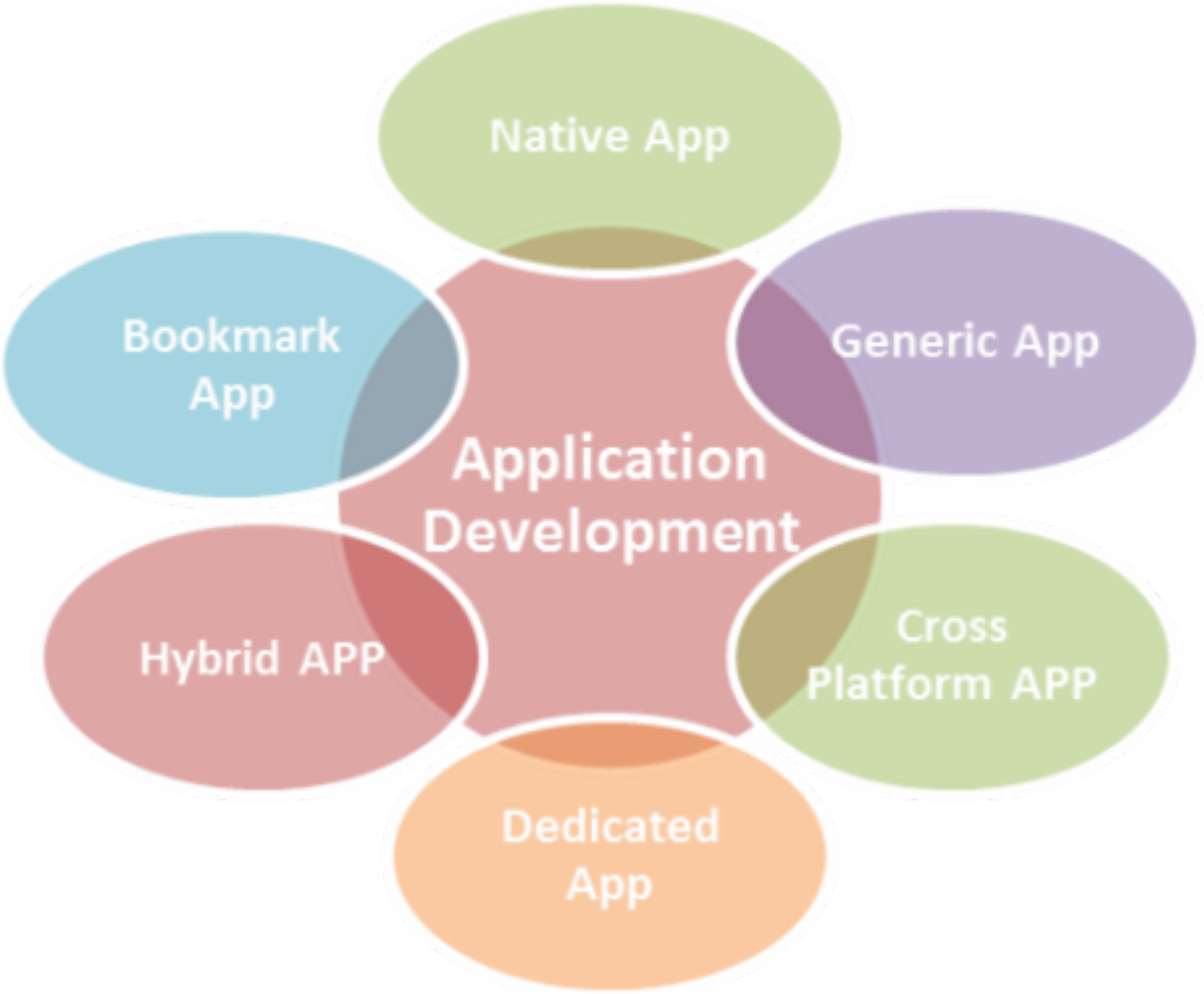


Credit: App Annie

Prominent Challenges

- Device Fragmentation
- Operating System Fragmentation

Mobile Application Development



Mobile App Development Techniques

- Native Applications
  - C, C#, C++, Java
- Web-based Approaches
  - HTML5,CSS3,Javascript
- Hybrid Apps
  - In a native container

Cross-Platform Tools

- Reduction of required skills for developers to develop applications due to the use of common programming languages;
- Reduction of coding, because the source code is written once and it is compiled for each supported OS
- Reduction of development time and long term maintenance costs;
- Decrement of API knowledge, because with these tools is not needed to know the API's of each OS, but only the API's provided by the selected tool;
- Greater ease of development compared to building native applications for each OS
- Increment of market share for the corresponding business model with the advantage to raise the Return On Investment (ROI).

Cross-Platform Selection Criteria

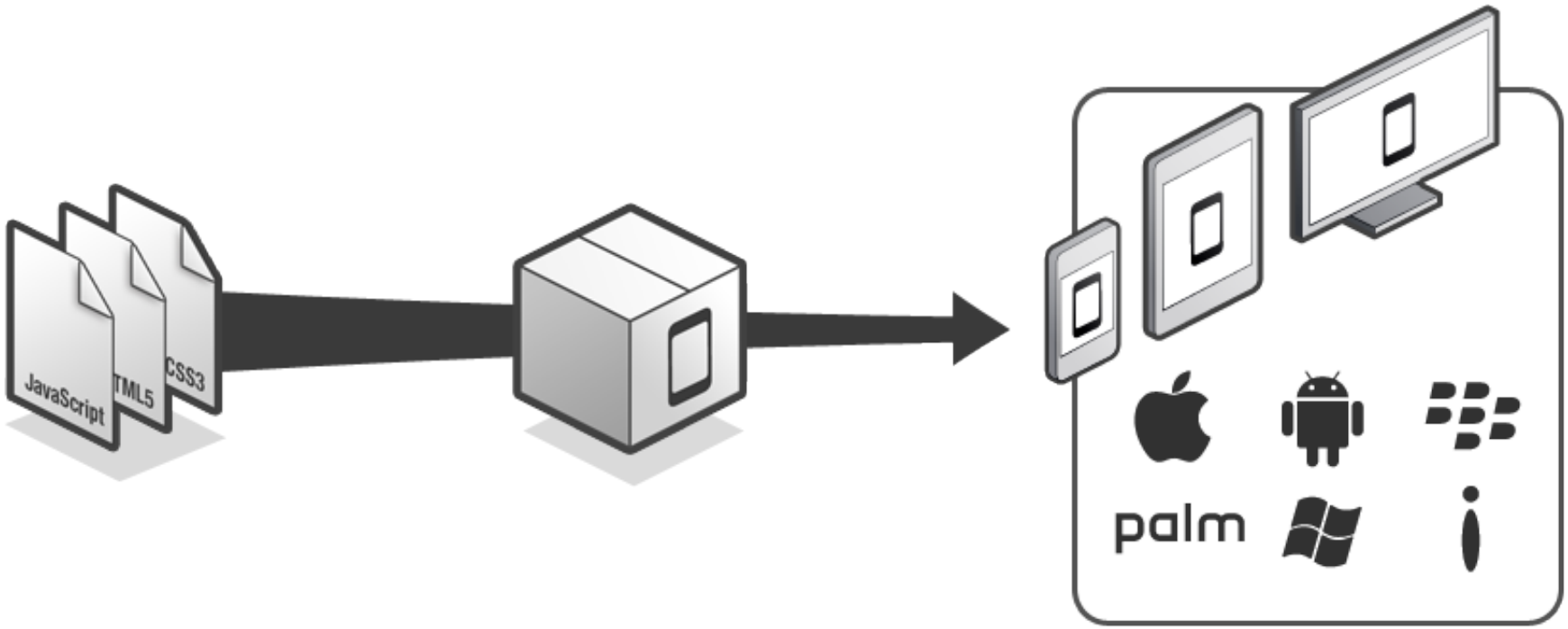
- Mobile Operating Systems supported to understand possible effects on respective business models
- Tool licences offered to evaluate the terms and conditions of use
- Programming languages offered to developers for building applications;
- Availability of API's provided with the aim to get an idea of different hardware parts accessible in the OS;
- Accessibility to native API's to compare how it is possible to access them from each tool;
- Architecture provided for the development process of the application
- Integrated Development Environments available for developing applications.

Cross-Platforms

API Name	**Rhodes** JavaScript	**PhoneGap** JavaScript	**MoSync** JavaScript	**MoSync** C, C++	**DragonRad**
Accelerometer		√	√		
Barcode	√	√			√
Bluetooth	√	√		√	
Calender	√	√	√	√	√
Camera	√	√		√	
Capture		√	√	√	√
Compass		√	√		
Connection		√	√	√	
Contacts	√	√			√
Device	√	√	√	√	√
File	√	√	√	√	
Geolocation	√	√	√	√	√
Menu	√				√
NFC	√	√	√	√	√
Notification	√	√	√	√	
Screen Rotation	√	√		√	
Storage	√	√	√	√	√

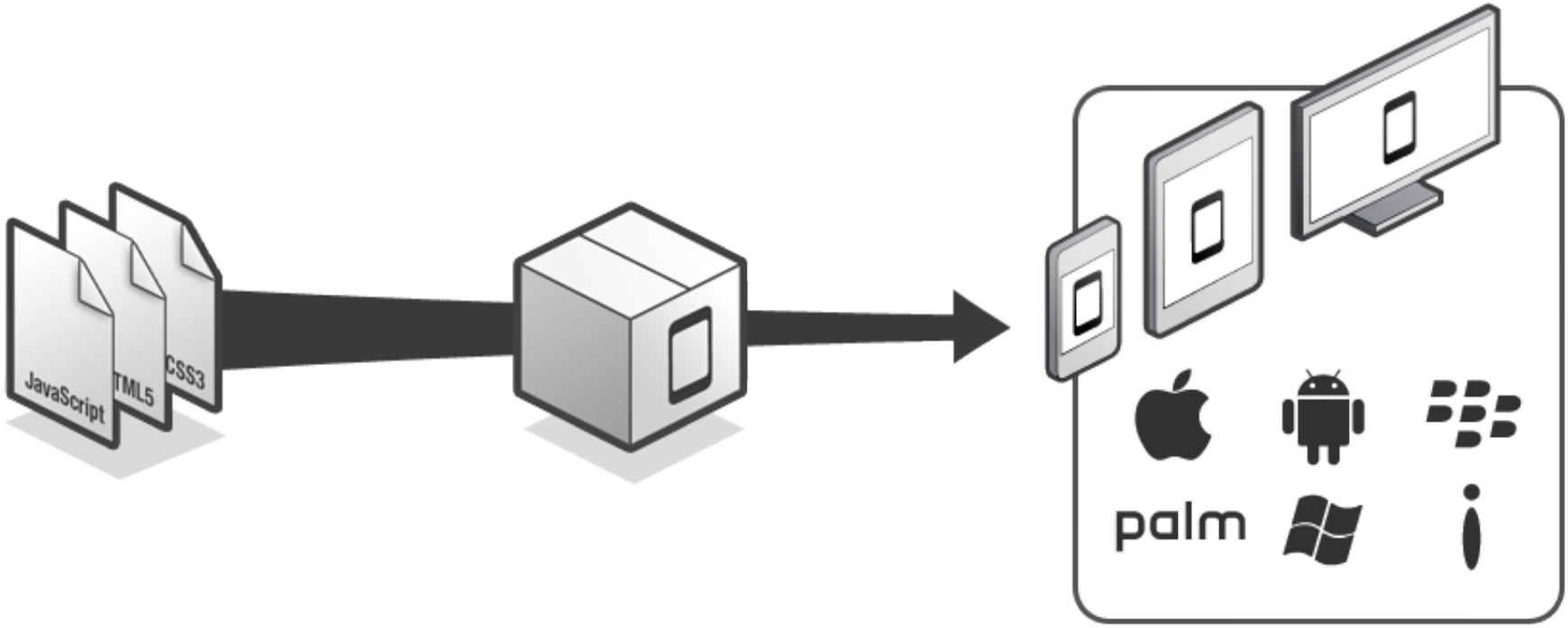
Sencha

- Sencha is a tool that lets you develop your apps in HTML5.



PhoneGap

- Owned by Adobe, PhoneGap is a free resource that first-time app developers can use to translate code from HTML5, CSS, and JavaScript.



Cross-Platform Tools

- Appcelerator Titanium
- Cocos2d
- Unity 3D
- Corona
- Qt
- Xamarin
- Alpha Anywhere
- 5App

Security in Mobile World