



MOBILE APPLICATION DEVELOPMENT

ANDROID OVERVIEW



MOBILE BY THE NUMBERS

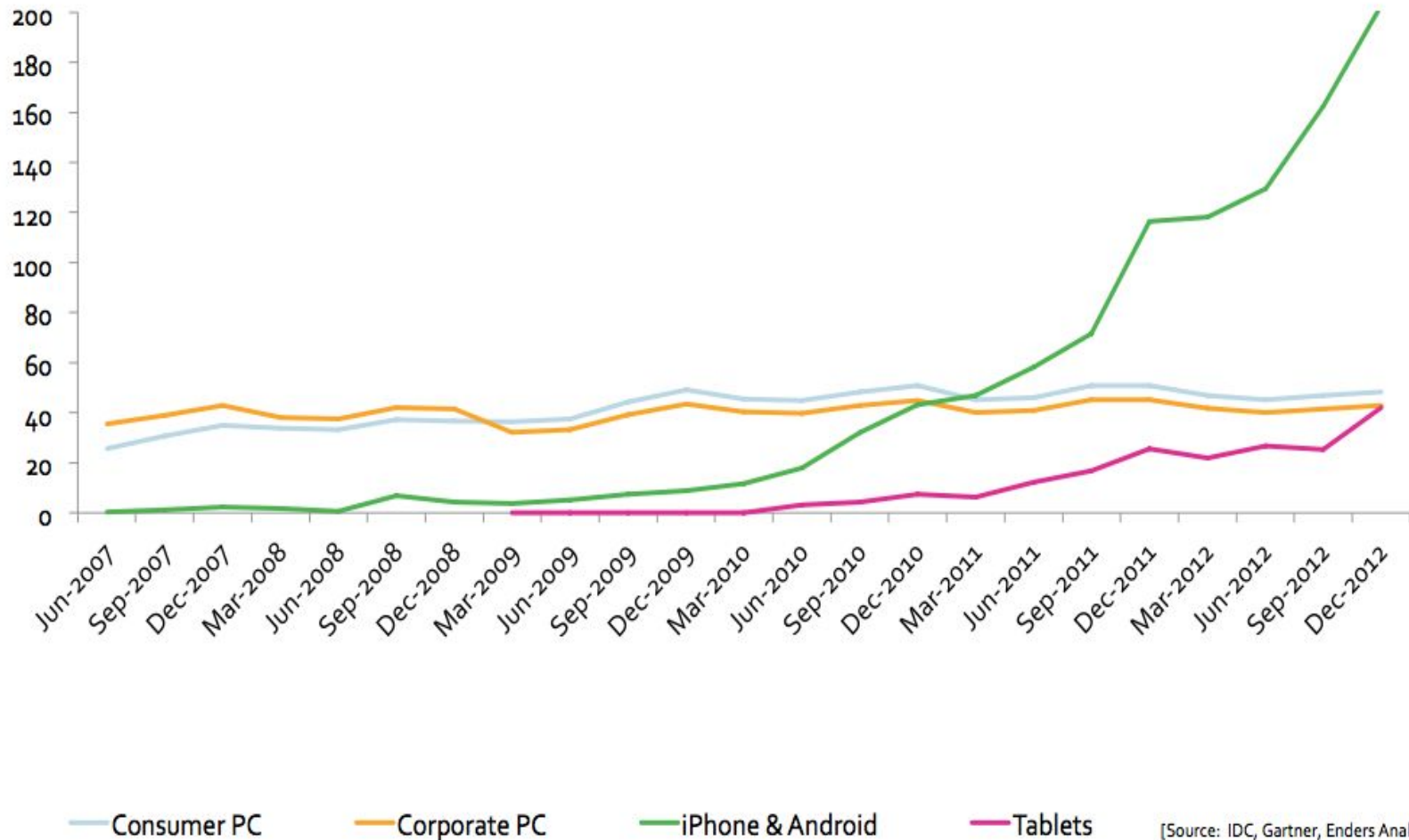
- 7.7 billion people on the planet
- 8.9 billion mobile connections
- 5 billion unique mobile phone users

Ref: <https://www.bankmycell.com/blog/how-many-phones-are-in-the-world>



MOBILE DEVICES VS PC SALES

Quarterly unit sales (m)



WHAT IS ANDROID?

- A software stack for mobile devices that includes
 - A free, open-source mobile OS (15 years)
 - An open-source development platform for creating apps (Android Studio)
 - Google owns Android
 - Android was developed using the core code of open-source Linux
- Uses Linux to provide core system services
 - Security
 - Memory management
 - Process management
 - Power management
 - Hardware drivers

ANDROID FOR DIFFERENT DEVICES



ANDROID WEAR



PHONES



TABLETS



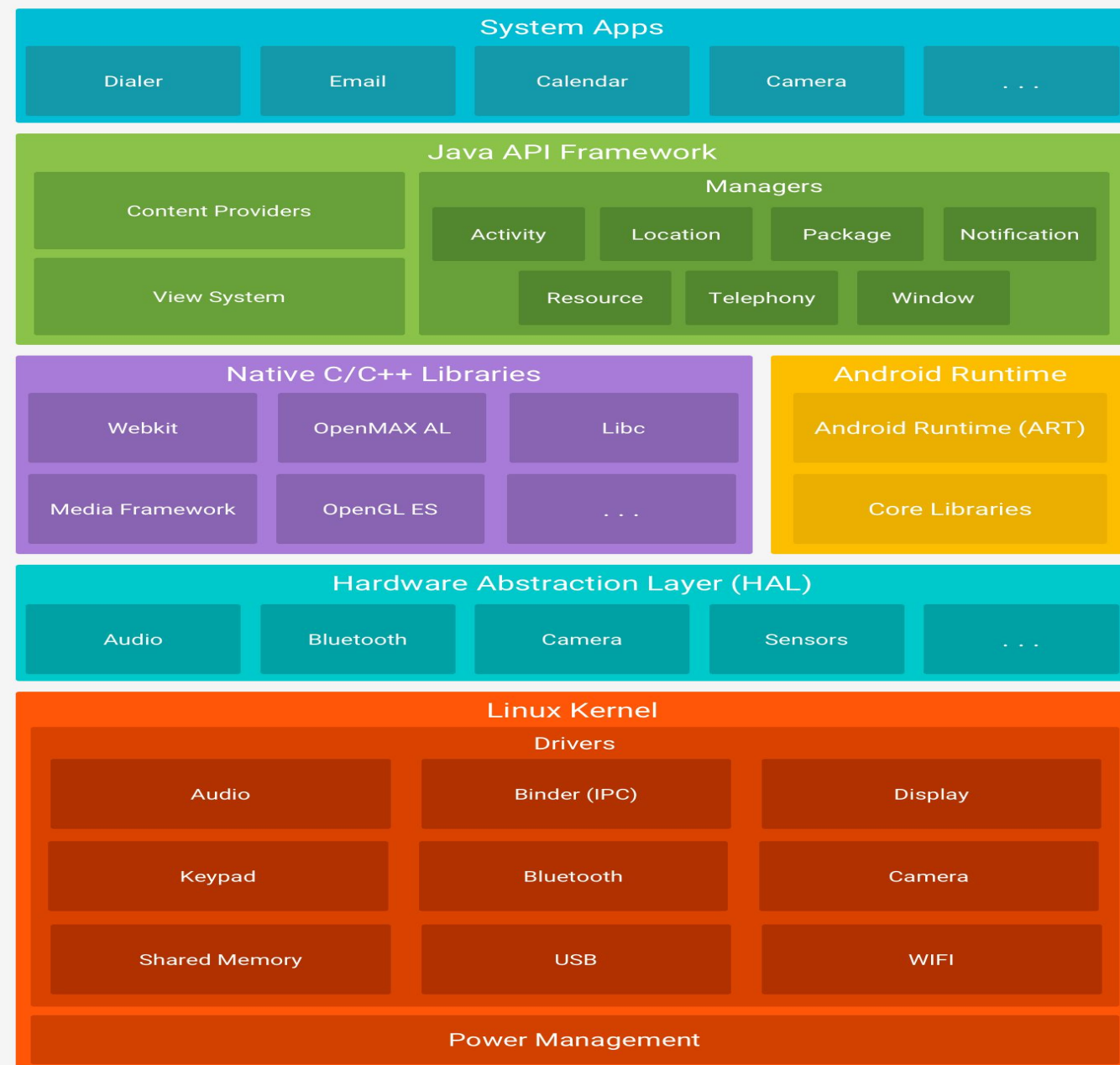
ANDROID TV



ANDROID AUTO

ANDROID PLATFORM ARCHITECTURE

See: An Overview of the Android Architecture
<https://developer.android.com/guide/platform/>



ANDROID FEATURES

- **Application framework** enabling reuse and replacement of components
- **Integrated browser** based on the open source WebKit engine
- **Optimized graphics** powered by a custom 2D graphics library; 3D graphics based on the OpenGL ES 1.0 specification (hardware acceleration optional)
- **SQLite** for structured data storage
- **Media support** for common audio, video, and still image formats (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF)
- **GSM Telephony** (hardware dependent)
- **Bluetooth, EDGE, 3G, and WiFi** (hardware dependent)
- **Camera, GPS, compass, and accelerometer** (hardware dependent)
- **Rich development environment** including a device emulator, tools for debugging, memory and performance profiling, and a plugin for the Eclipse IDE

A SHORT HISTORY OF ANDROID

- 2001 Palm Kyocera 6035, combining PDA and phone
 - PDA = personal data assistant, PalmPilot
- 2003 - Blackberry smartphone released
- 2005
 - Google acquires startup Android Inc. to start Android platform.
 - Work on Dalvik VM begins
- 2007
 - Open Handset Alliance announced
 - Early look at SDK
 - June, iPhone released
- 2008
 - Google sponsors 1st Android Developer Challenge
 - T-Mobile G1 announced, released fall
 - SDK 1.0 released
 - Android released open source (Apache License)
 - Android Dev Phone 1 released



SHORT HISTORY CONT.

■ 2009

- SDK 1.5 (Cupcake) after Alpha and Beta
 - New soft keyboard with “autocomplete” feature
- SDK 1.6 (Donut)
 - Support Wide VGA
- SDK 2.0/2.0.1/2.1 (Eclair)
 - Revamped UI, browser

■ 2010

- Nexus One released to the public
- SDK 2.2 (Froyo)
 - Flash support, tethering
- SDK 2.3 (Gingerbread)
 - UI update, system-wide copy-paste



https://en.wikipedia.org/wiki/Android_version_history

SHORT HISTORY CONT.

- 2011
 - SDK 3.0 (Honeycomb) for tablets only
 - New UI for tablets, support multi-core processors, fragments
 - SDK 3.1 and 3.2
 - Hardware support and UI improvements
 - SDK 4.0 (Ice Cream Sandwich)
 - For Q4, combination of Gingerbread and Honeycomb



SHORT HISTORY CONT.

- 2012
 - Android 4.1, "Jelly Bean" released in July
- 2013
 - Android 4.4, KitKat released October 31, 2013



Top Smartphone Platforms
3 Month Avg. Ending May 2012 vs. 3 Month Avg.
Ending Feb. 2012
Total U.S. Smartphone Subscribers Ages 13+
Source: comScore MobiLens

| | Share (%) of Smartphone Subscribers | | |
|-------------------------------------|-------------------------------------|--------|--------------|
| | Feb-12 | May-12 | Point Change |
| <i>Total Smartphone Subscribers</i> | 100.0% | 100.0% | N/A |
| Google | 50.1% | 50.9% | 0.8 |
| Apple | 30.2% | 31.9% | 1.7 |
| RIM | 13.4% | 11.4% | -2.0 |
| Microsoft | 3.9% | 4.0% | 0.1 |
| Symbian | 1.5% | 1.1% | -0.4 |

SHORT HISTORY (GETTING LONGER)

- November, 2014
Android 5.0 Lollipop
released.
API level 21
"Material Design"
- October, 2015
Android 6.0
Marshmallow
API level 23

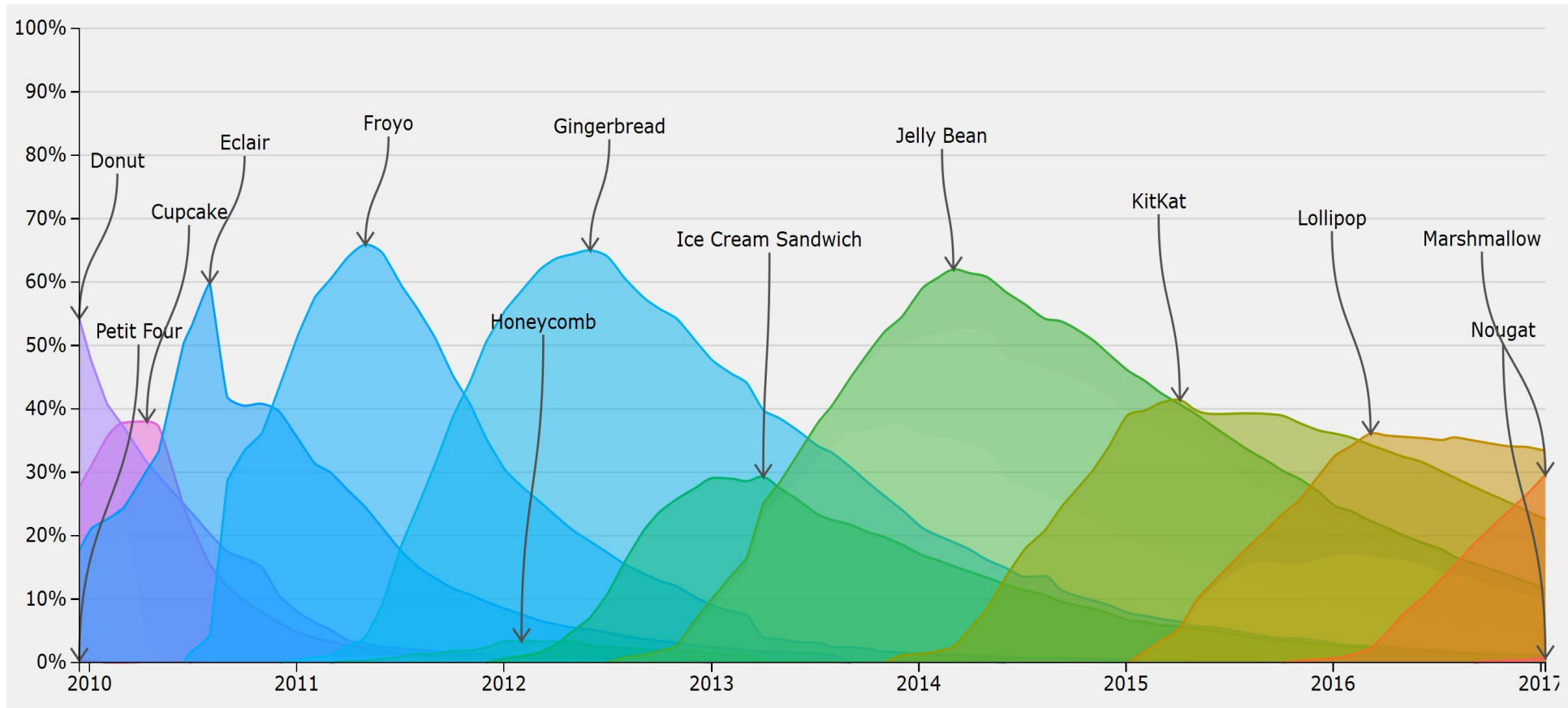


STILL MORE

- August 2016
 - Nougat
 - Daydream Virtual Reality Interface
 - Doze functionality to improve battery life
- August 2017
 - Oreo
 - Jetpack, tools for building apps, common libraries and frameworks



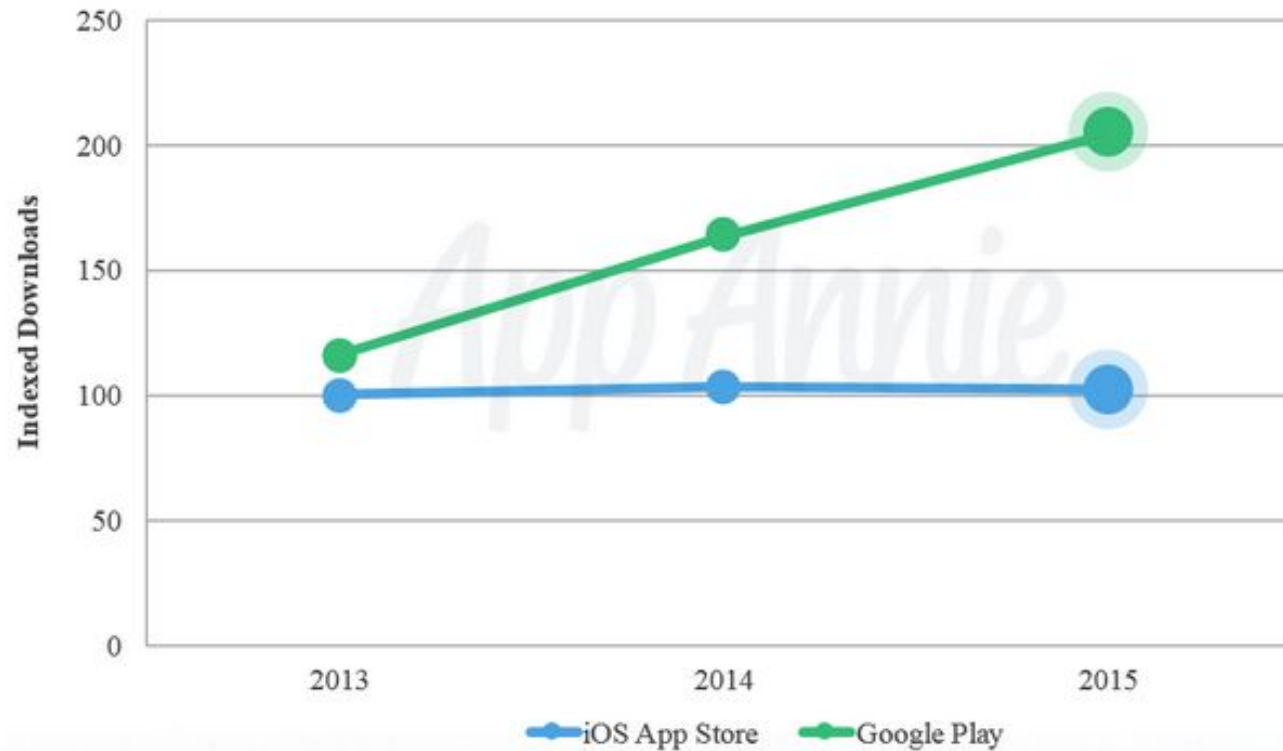
DOMINANT VERSION



IPHONE VS. ANDROID

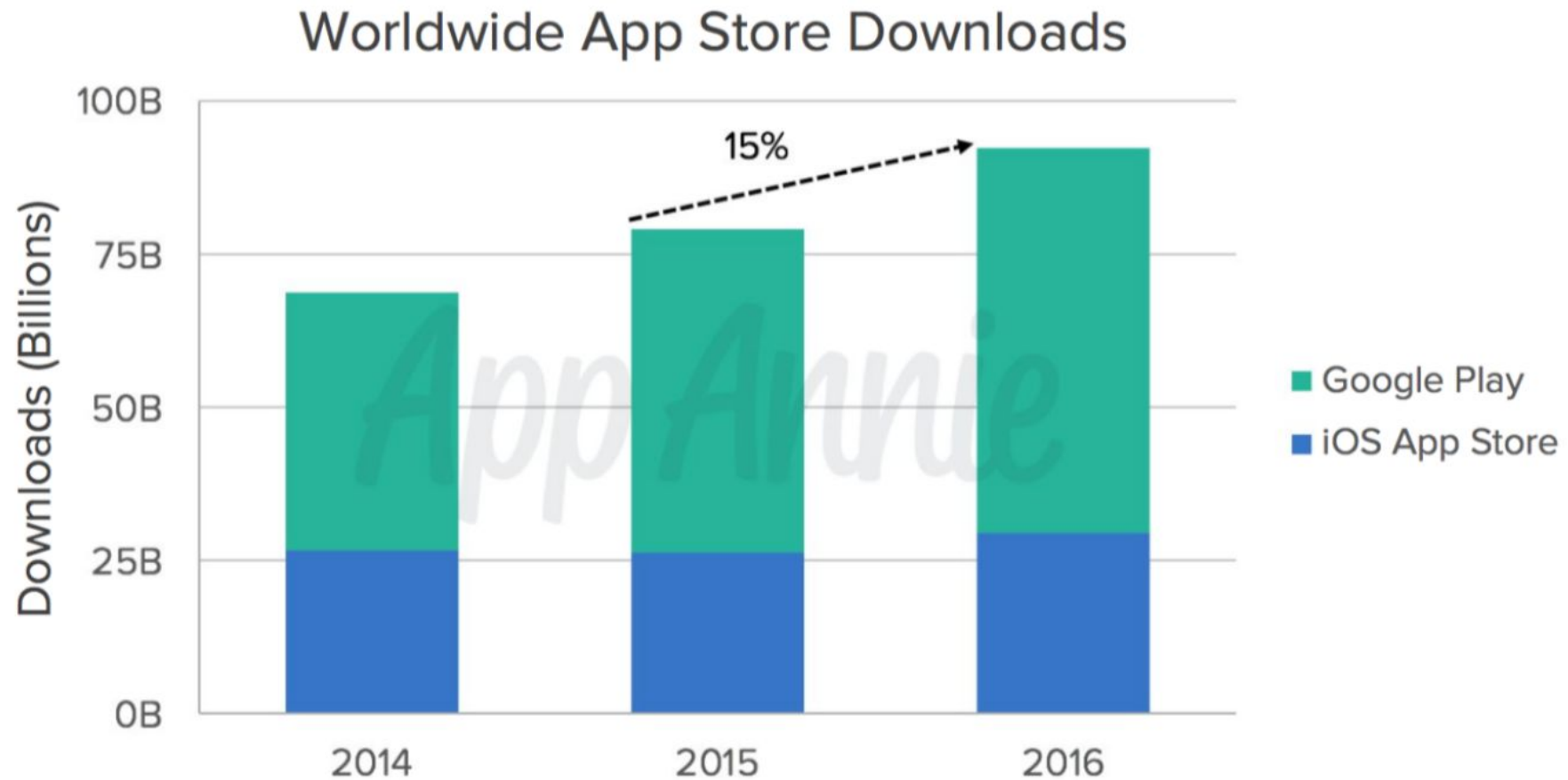


2015 APP DOWNLOADS

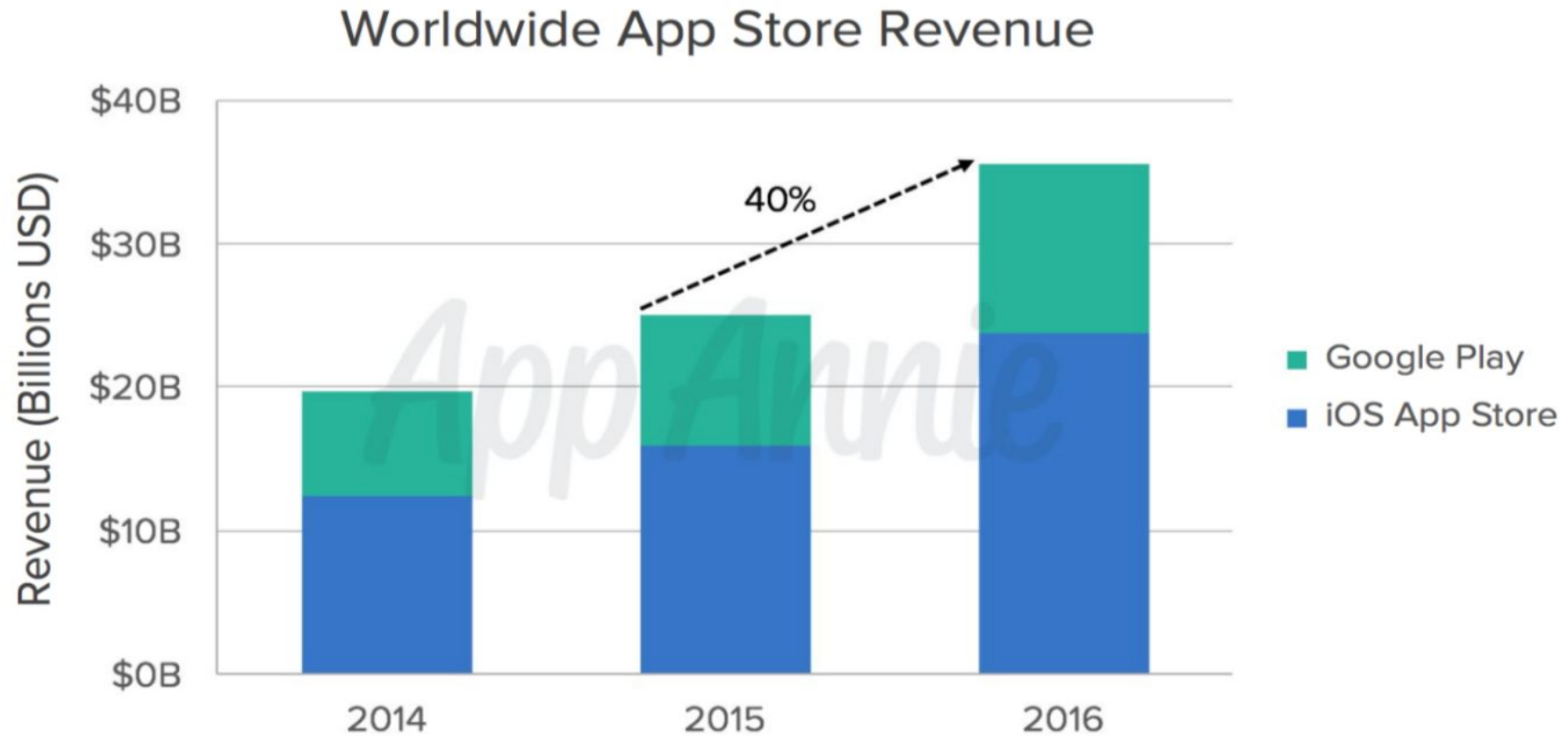


<https://www.appannie.com/>

ANDROID VS IOS



REVENUE



WHY ANDROID?

- Powerful and open SDK
- No licensing fees
- Thriving developer community
- Low barrier to entry
- Huge potential market of users