

Mobile Programming and Multimedia

Mobile Programming Introduction

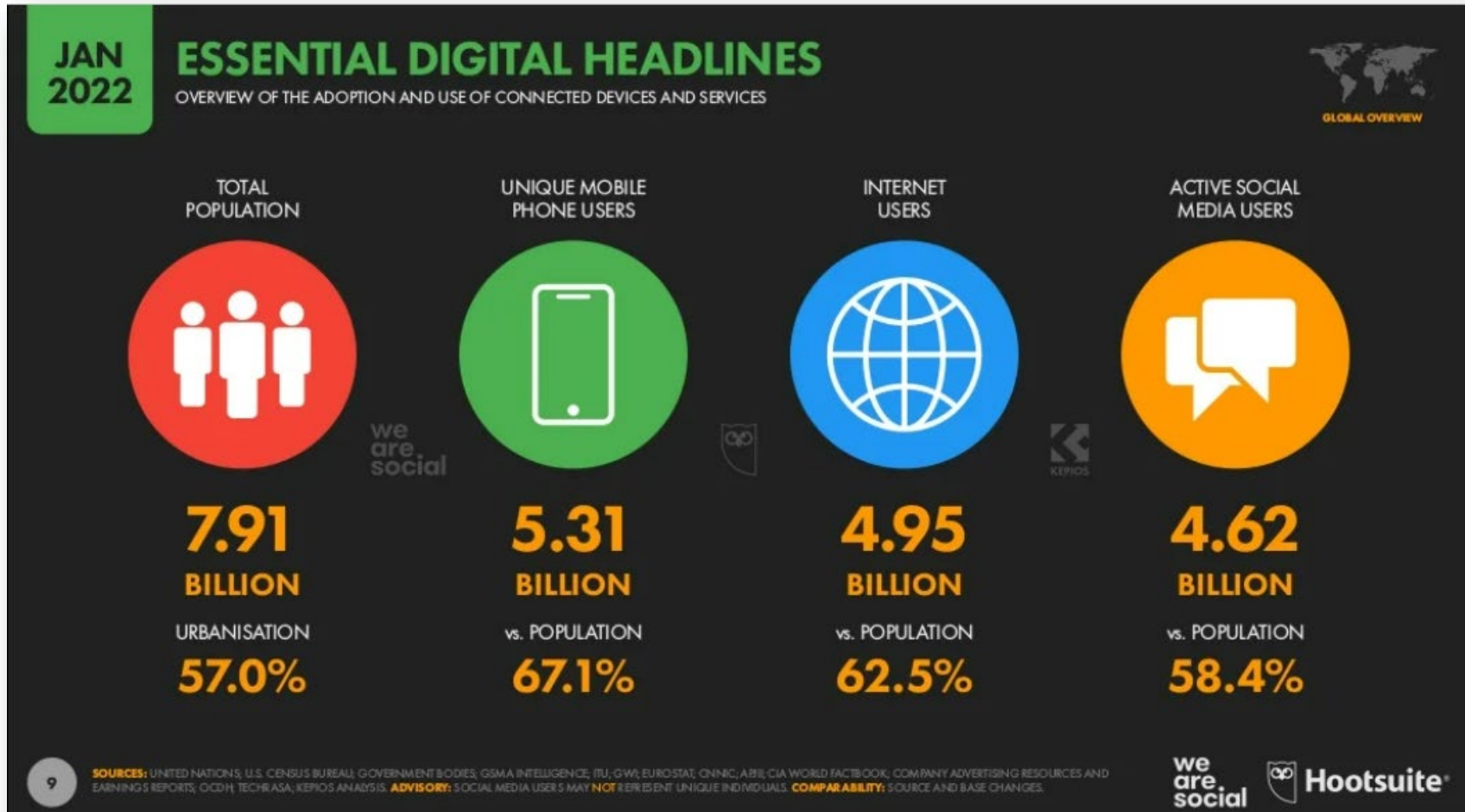
Prof. Ombretta Gaggi
University of Padua



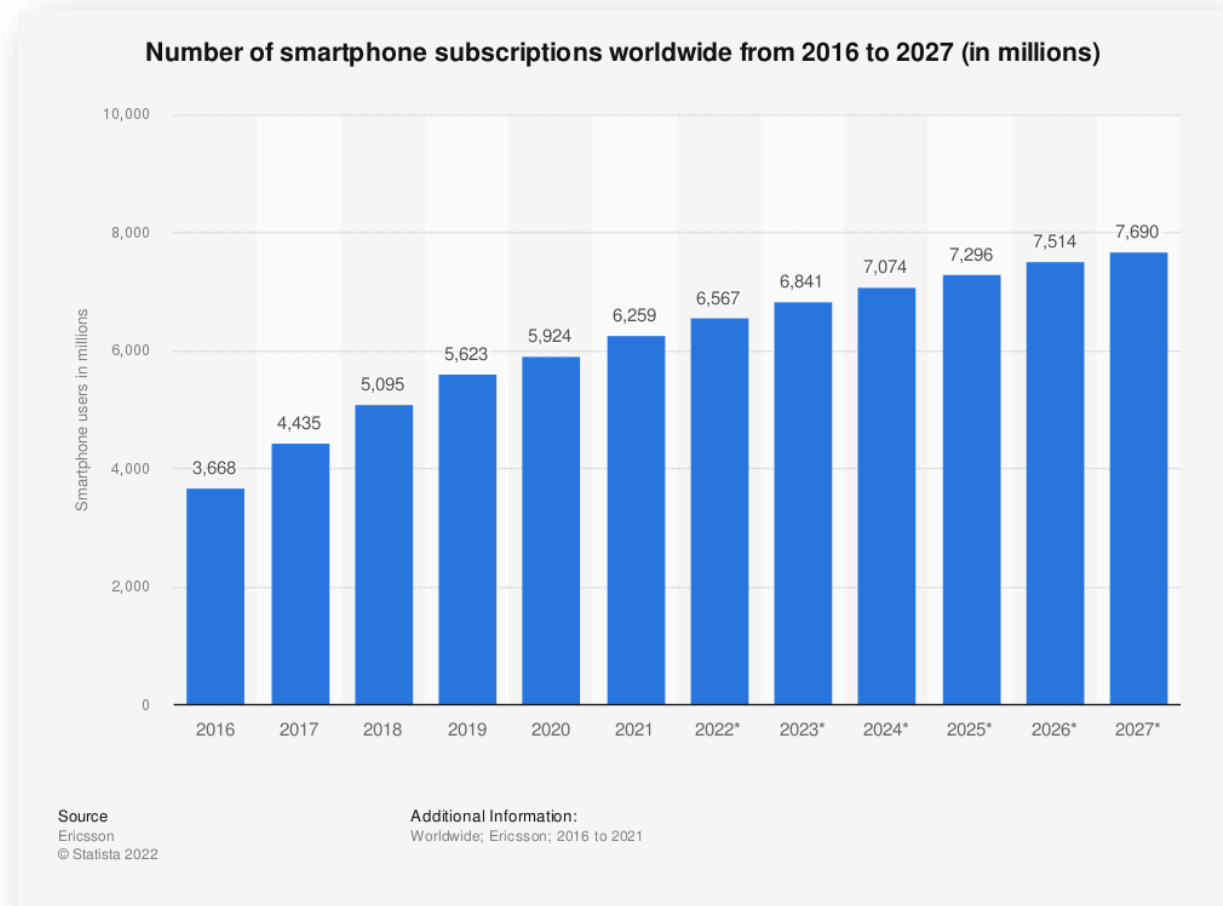
Mobile users vs population

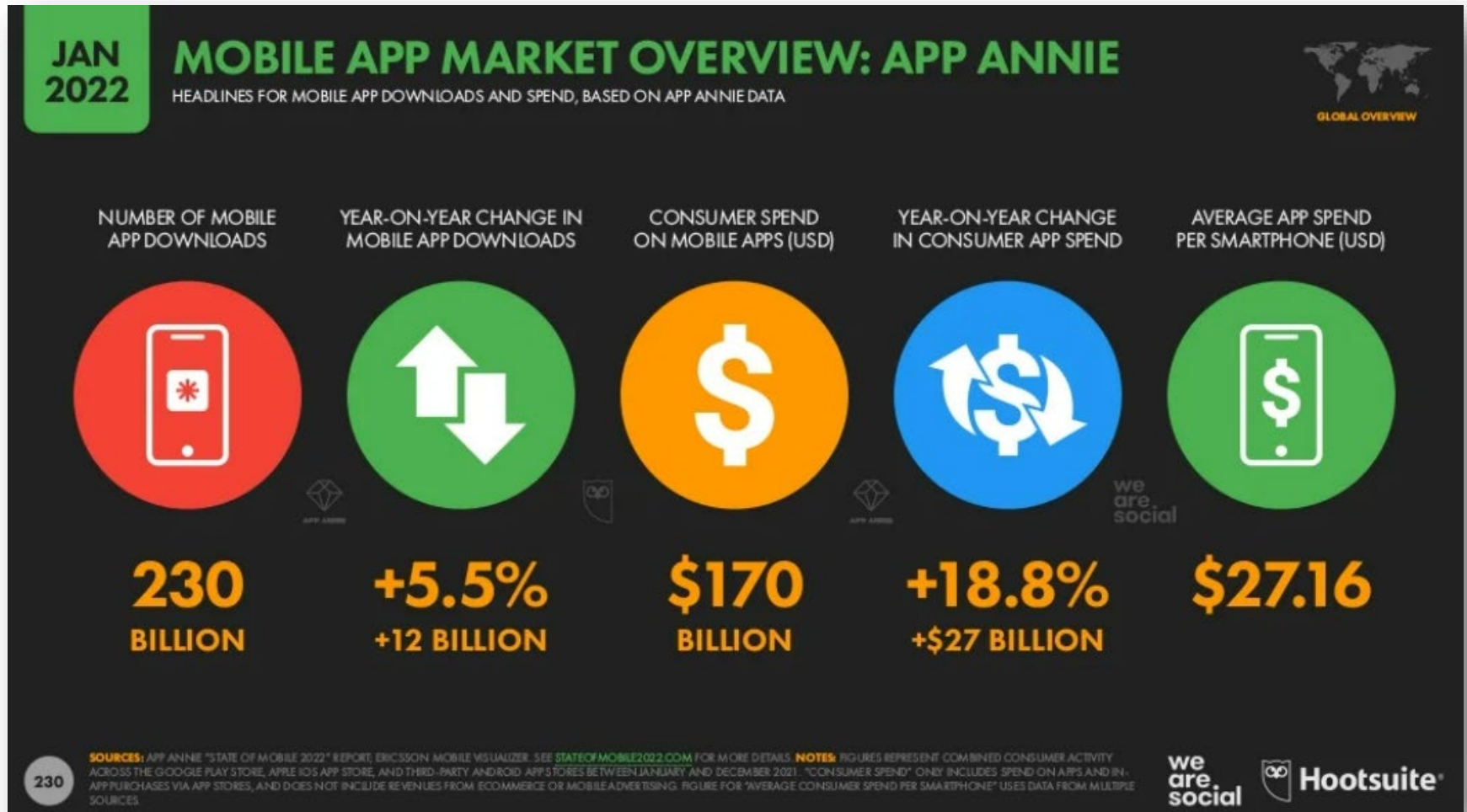


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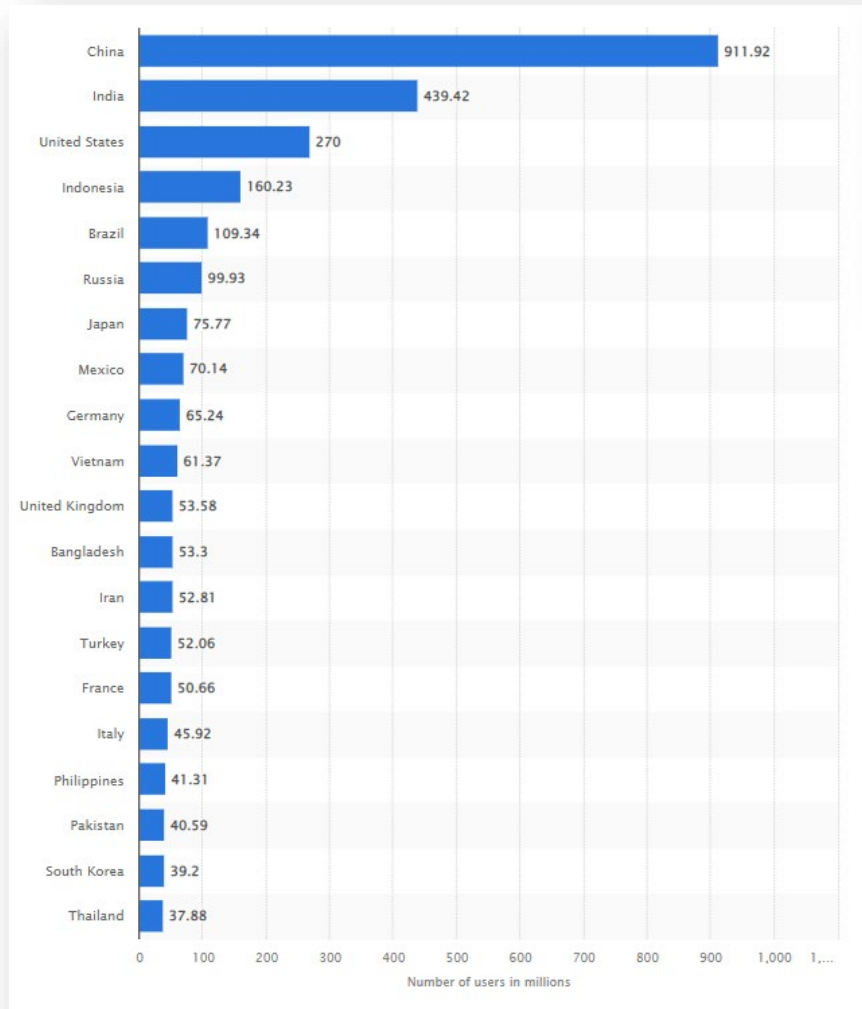


The
smartphone
market is
enormous





Number of smartphone users in May 2021

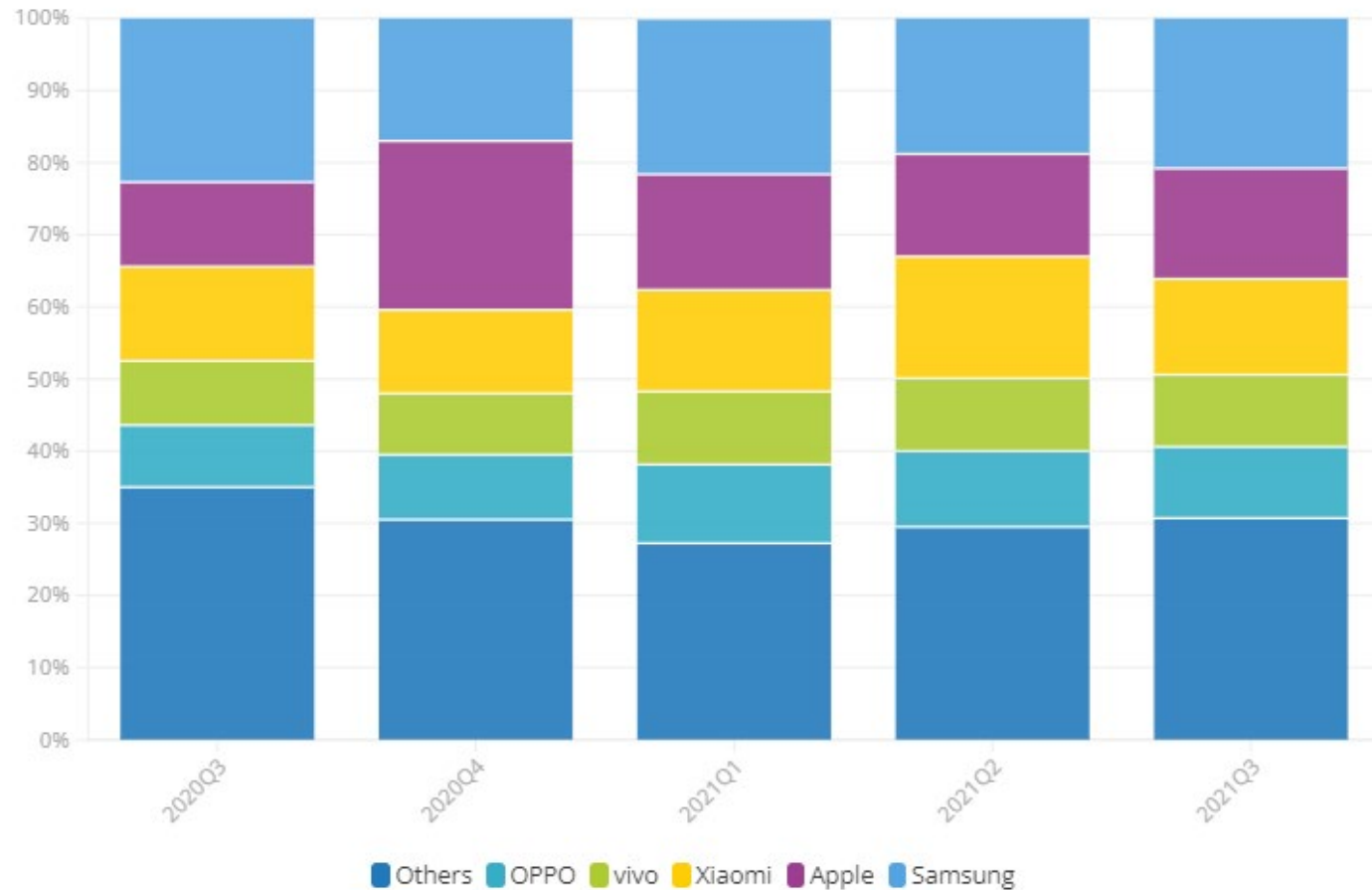


China, India, and the United States are the countries with the highest number of smartphone users.

Smartphone market



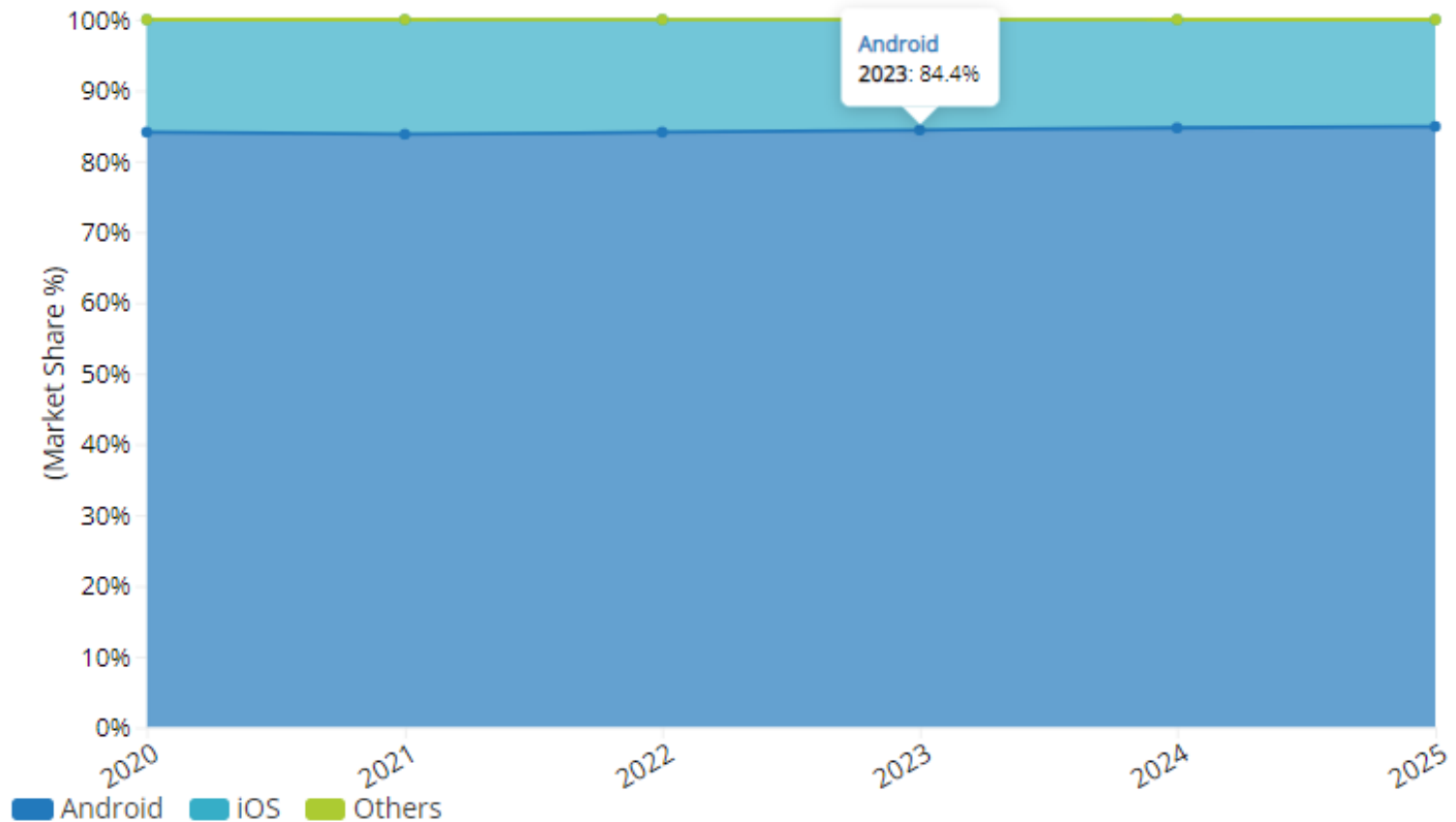
Top 5 Smartphone Companies, 2021Q3



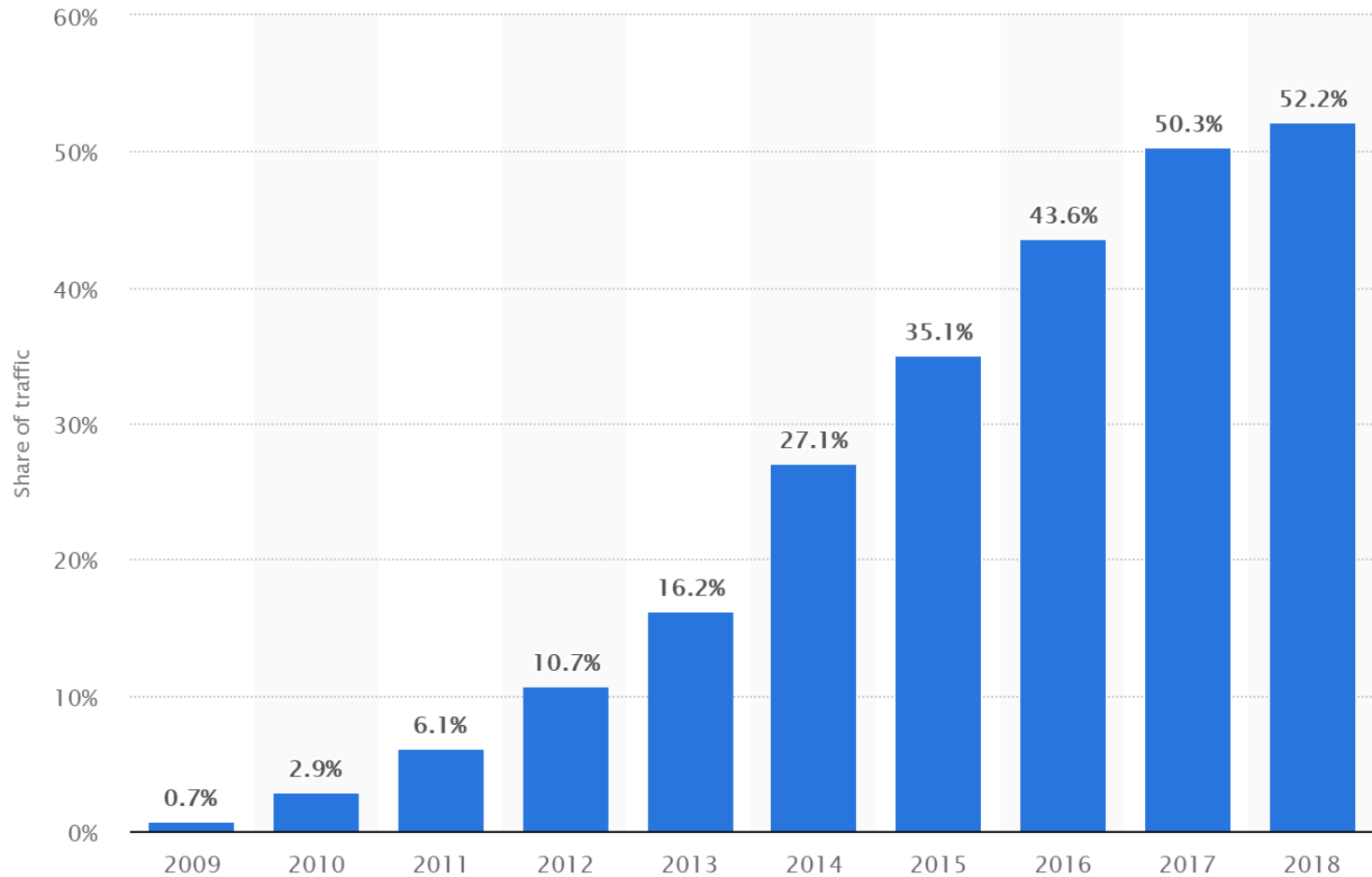
Operating Systems



Worldwide Smartphone Shipment OS Market Share Forecast

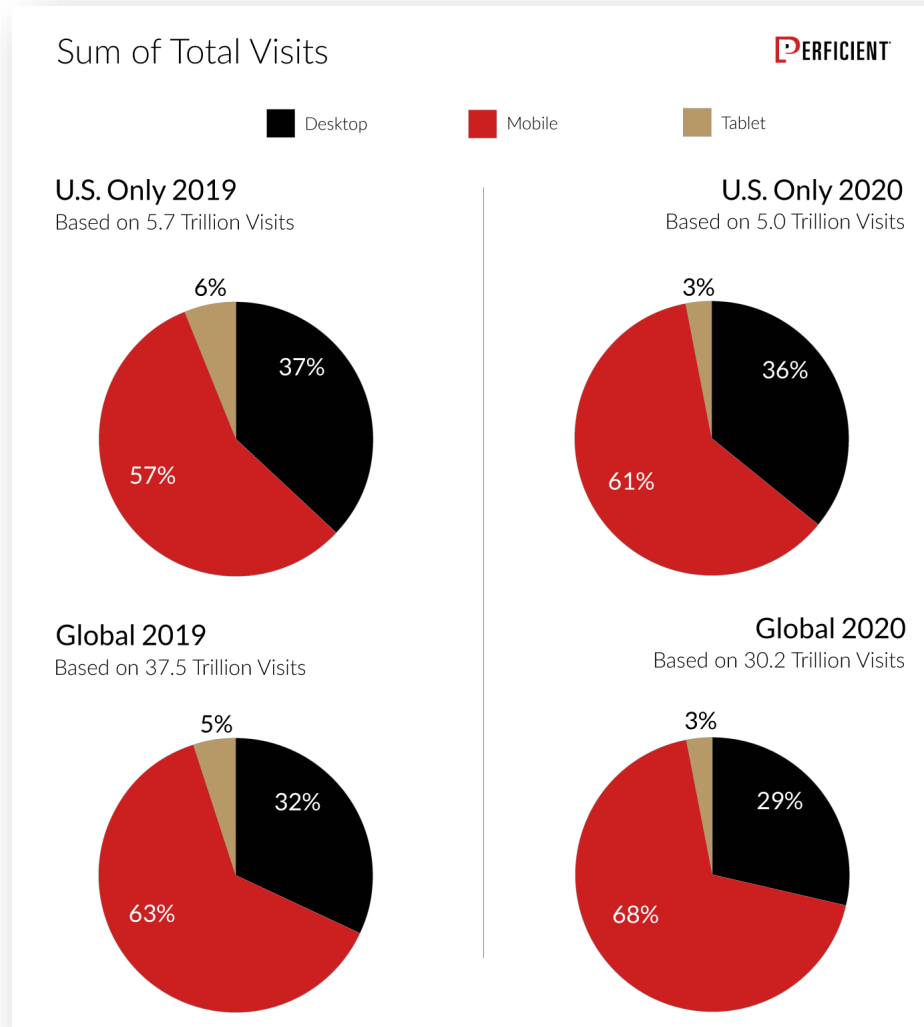


Site visited using smartphone - 1

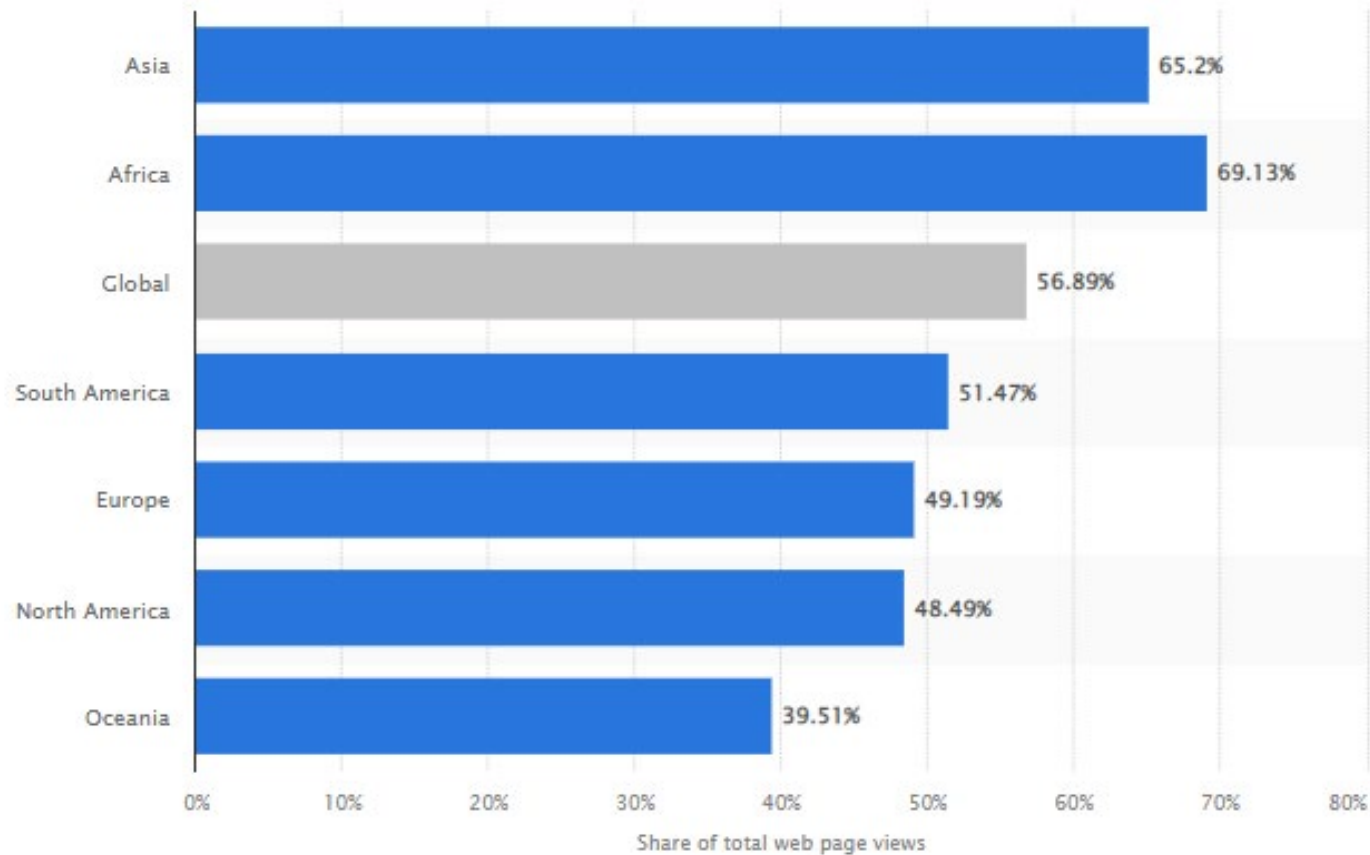


www.statista.com

Site visited using smartphone - 2



Site visited with smartphone/region



Details: Worldwide; StatCounter; August 2021; mobile only, excluding tablet traffic

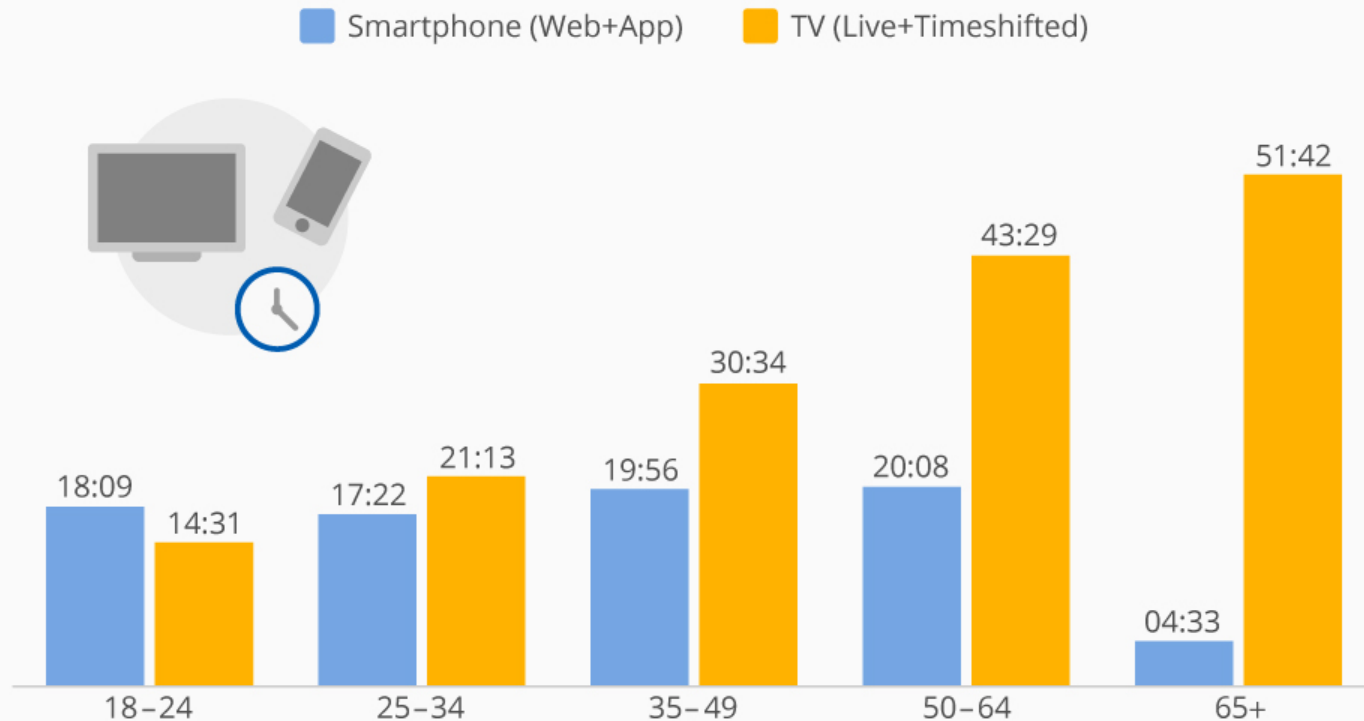
Smartphone vs TV



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Smartphones Beat TV for Young Adults in the U.S.

Average weekly smartphone and TV usage of adults in the United States in Q1 2017 (in hh:mm)



@StatistaCharts

Source: Nielsen Total Audience Report

statista

Relationship daytime-device



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% of each platform's average
daily impressions by hour



More than 4 billion people worldwide use smartphones, more than half of the worldwide population.

In 2018 Italy had the third place in the world, with 34 million people. Time spent on social networks every day, considering all the devices, is 1 hour and 53 minutes, and 2 hours and 20 minutes every day spent on the Internet using a smartphone

Not only smartphones...



Mobile phones are not considered anymore as a simple device to make calls, but incorporate a lot of different features:

- Messages, calls
- Internet navigation
- Sensor data collection and usage (app for training, biking, running, etc.)
- Agenda
- Entertainment (games, music, video, reading, etc.)

All these features are provided by apps

1. Mobile app development is not expensive
 - A bad app is worse than no app
2. Mobile app development is easy

On the contrary:

1. Mobile app development requires big teams
2. Mobile app development is **not** like winning at the lottery

Application or responsive website?

The first step to determine if it is better to develop a mobile layout of your own website or a mobile application is to understand the differences between the two:

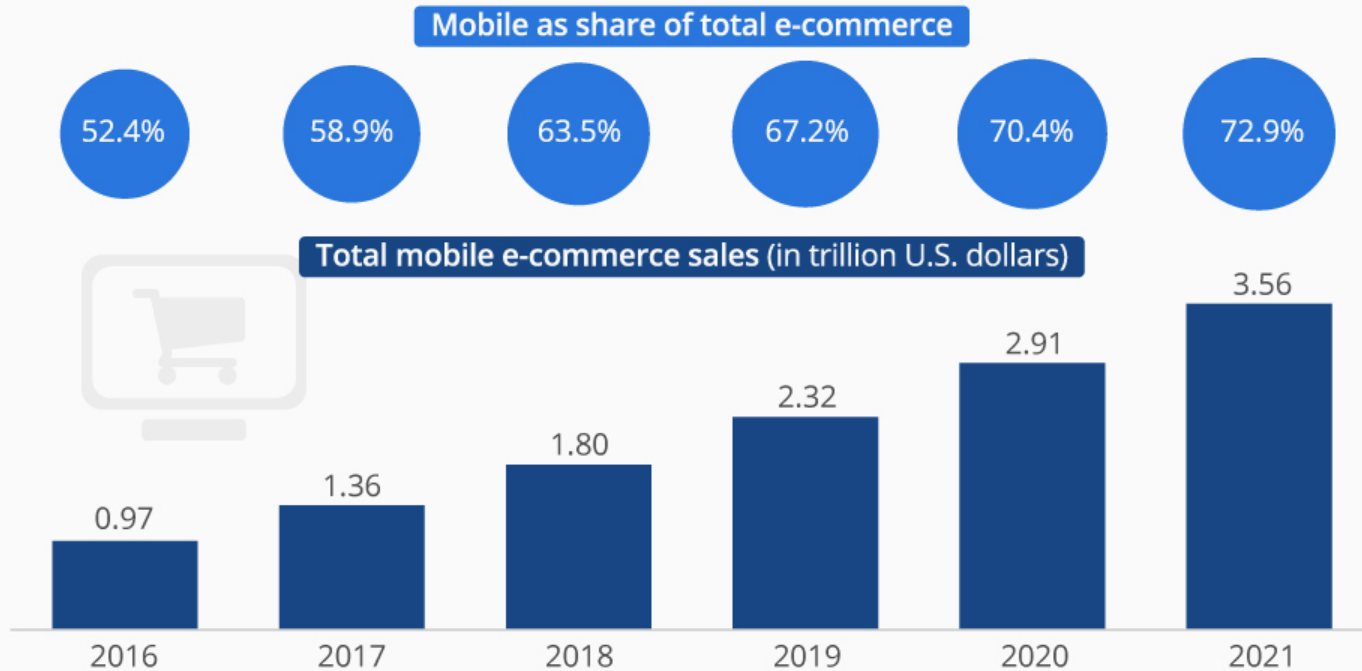
- Diversified content
- Native interface vs. Company brand
- Development time
- User interaction (ex: push notification)
- Access (icon)
- Target (loyalty vs. reach)

E-Commerce example - 1



Mobile E-Commerce is up and Poised for Further Growth

Estimated mobile e-commerce sales worldwide



Includes products or services purchased via mobile devices (including tablets) regardless of the method of payment or fulfillment; excludes travel and event tickets

As of January 2018

Source: eMarketer

E-commerce example - 2



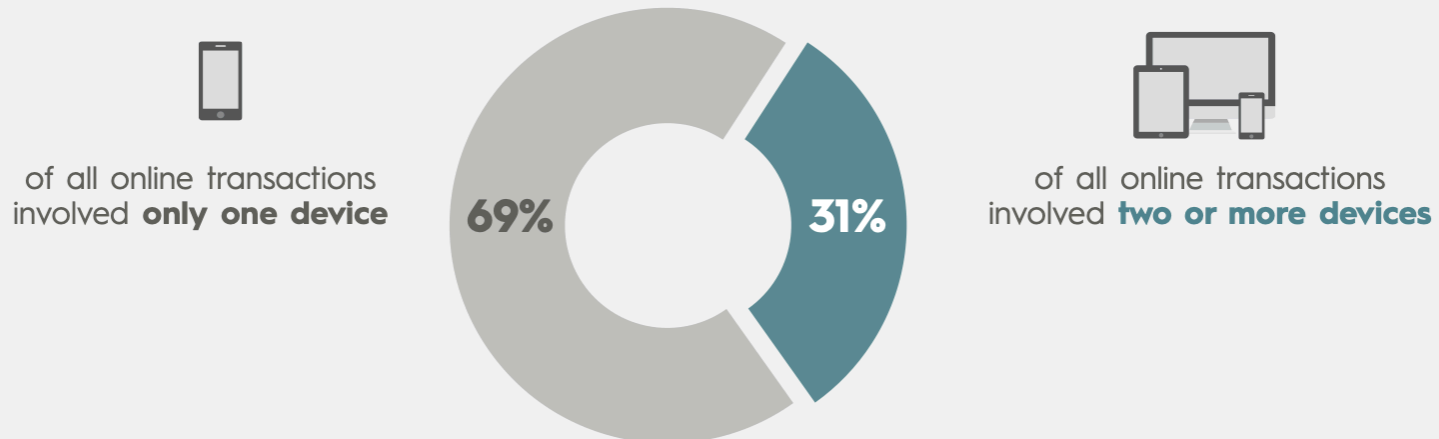
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You can't afford to
misunderstand 31% of
buyers

Nearly one-third of all transactions involved two or more devices from the first website visit to the point of purchase.* Without cross-device measurement, marketers risk miscalculating key metrics and ROI for one in three transactions.

US Share of Transactions by Number of Devices Used, Q4 2016

Number of devices used from first website visit to purchase*



E-commerce example - 3

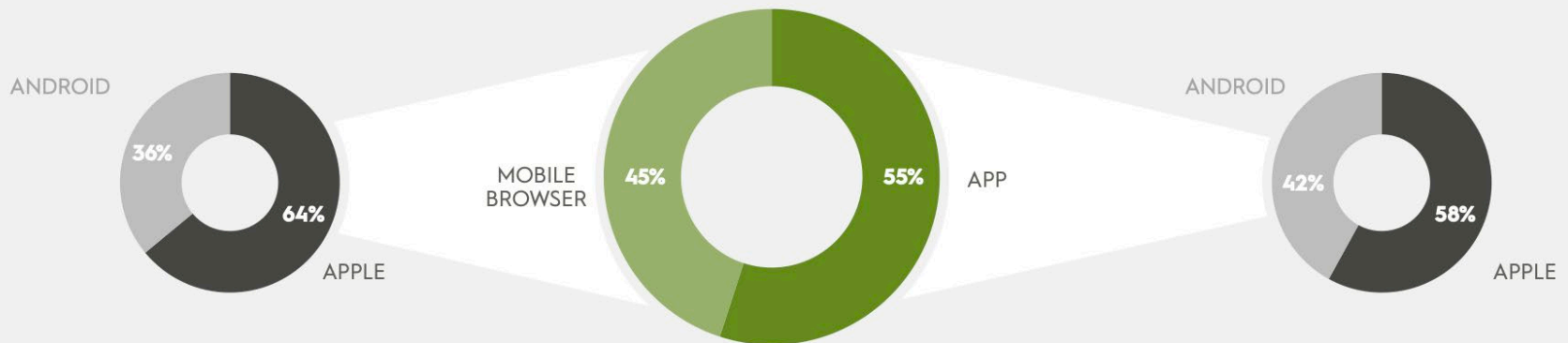


Apps outperform mobile browsers for retailers who invest*

Committed retailers capture more transactions on apps than on mobile browsers.

In both platforms, iOS devices capture the majority of these retailers' transactions.

Global App Share of Retail Mobile Transactions, Q4 2016



Source: Criteo dataset Q4 2016, all categories

*Includes retailers that have both a mobile website and app and over 25% of eCommerce transactions on mobile, 5% of which are from mobile apps.

Apps on the stores



There are millions of apps in the stores:

- 2,570,000 on the Google Play Store
- 1,840,000 on the Apple App Store
- 669,000 on the Windows Store
- 489,000 on the Amazon Appstore

25% of these apps are used only once

A user usually spend 90% of the smartphone time using apps

The 84% of the time is spent using 5 apps that change between users, which include, in this order, social apps, games, music, and video streaming

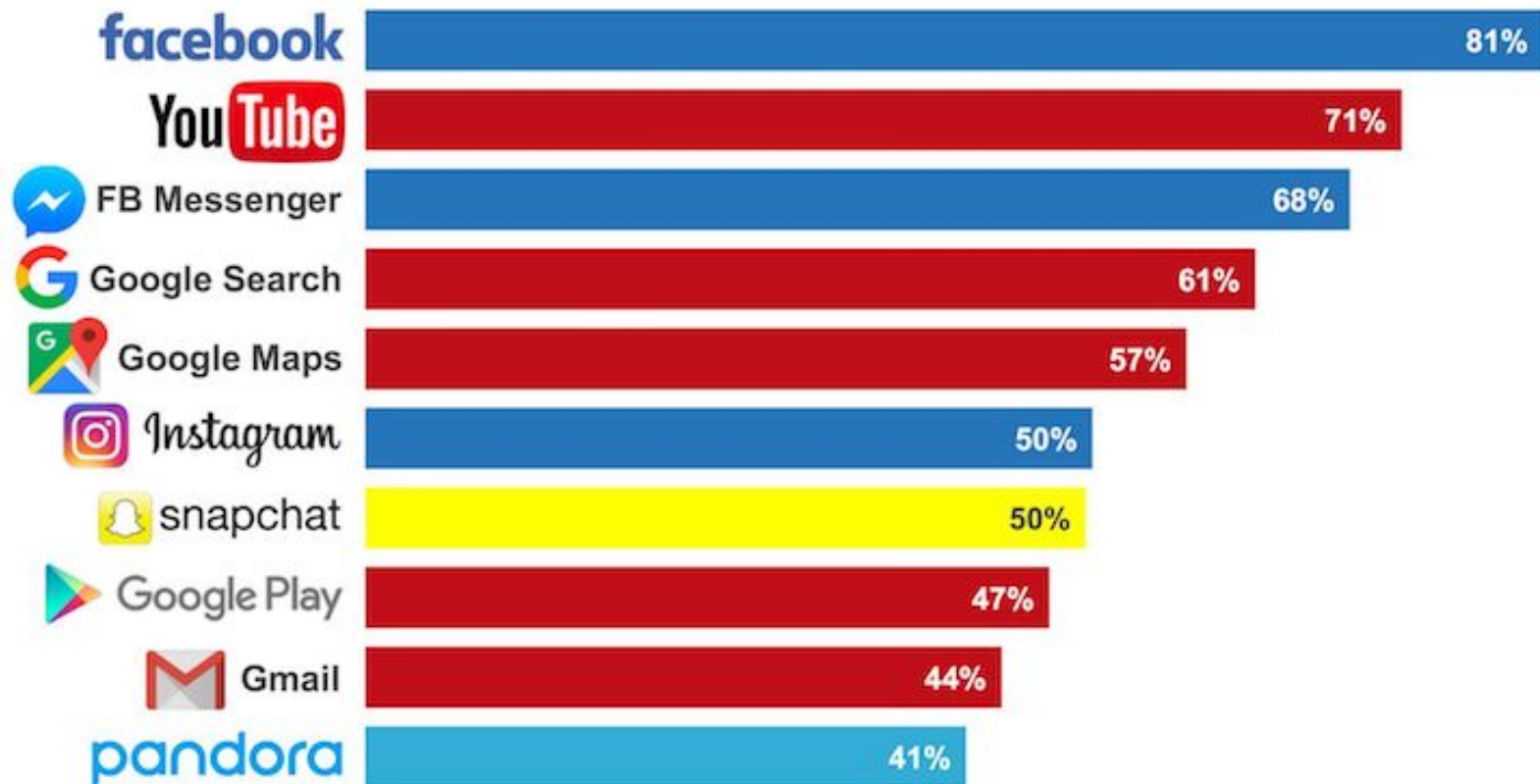
Fonte: <https://www.business.com/articles/mobile-apps-vs-mobile-web-do-you-have-to-choose>

Top Apps

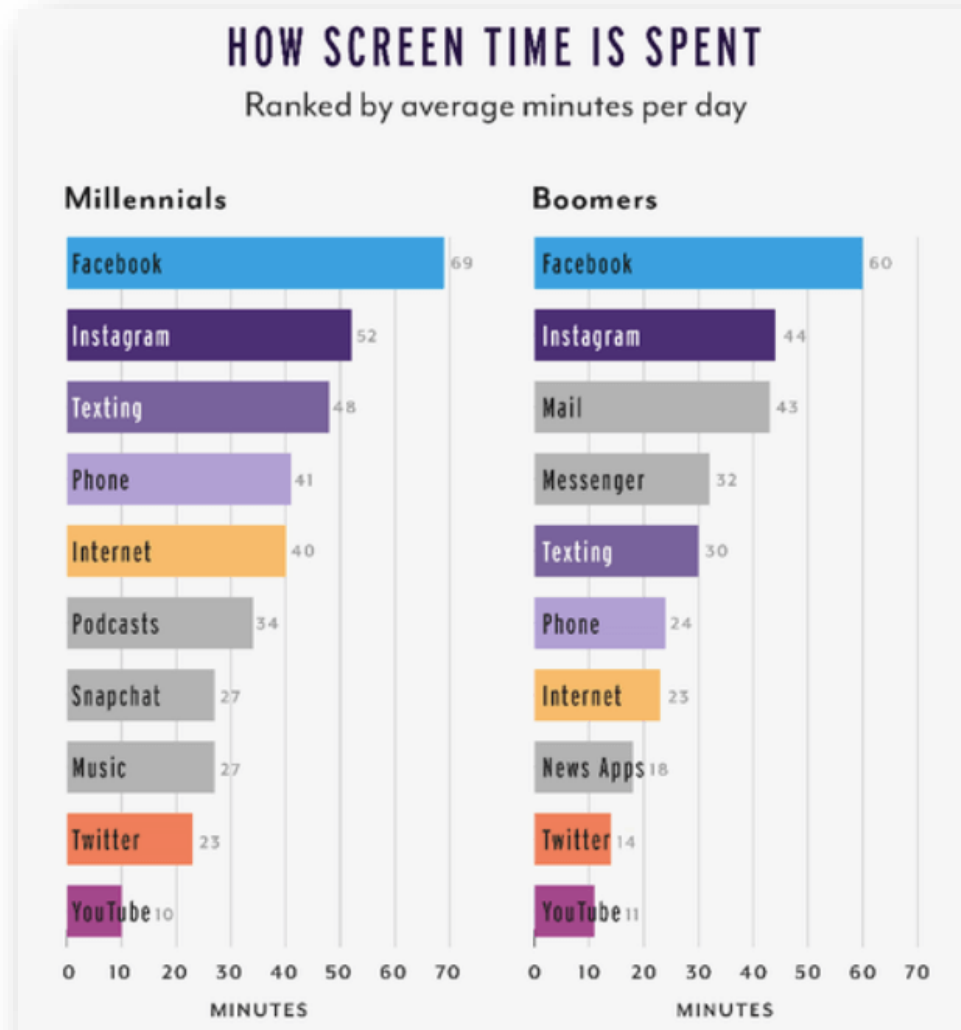


Top 10 Mobile Apps by Penetration of App Audience

Source: comScore Mobile Metrix, U.S., Age 18+, June 2017



Millennials vs Boomers



App vs. mobile web



A mobile application usually tends to encourage brand fidelity (icon on the desktop, notifications, etc.)

A website with a mobile layout allows reaching the user in every situation, immediately

When to create an app



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A lot of graphics or calculations

Camera, sensors, or microphone usage

Gallery or contacts' access

Push notifications or background service

~~For games~~

It is the only way to have access to the store

Fonte: J. McWherter, S. Gowell. Professional Mobile Application Development.

Ask the users!



The number of installed apps changes depending on the device (and its operating system)

According to Nielsen, the best approach is to interview the users to understand if they would accept to install the new app on their device

- Storage space
- Purpose
- Loyalty

The development of a mobile app requires several resources:

- Interface design
- Development
 - Which operating system?
- Maintenance

Web apps advantages



They require a very low knowledge base, HTML is popular

HTML5 now provides access to almost all smartphone features

More straightforward “conversion” to different operating systems

User does not have to worry about the update of the application

It is not necessary to wait for application approval:

- Apple can require more than 2 weeks!

Applications for mobile devices are different from desktop applications:

- Mobile operating systems are soft real-time operating systems:
 - An application can be suspended or terminated in every moment
 - The operating system manages context switch
- Only one application active
 - Not with iOS on iPad
- Limited space, it is not possible to open more than windows at the same time

Easy to install (or at least discourage less the use)

Incredibly high number!

- To design and create an exciting app is extremely challenging

Market fragmentation

Article discussing the choice between app or website

- <https://www.business.com/articles/mobile-apps-vs-mobile-web-do-you-have-to-choose/>

Number of used apps

- <https://techcrunch.com/2017/05/04/report-smartphone-owners-are-using-9-apps-per-day-30-per-month/>