

Mobile Programming and Multimedia

Mobile Programming

Introduction

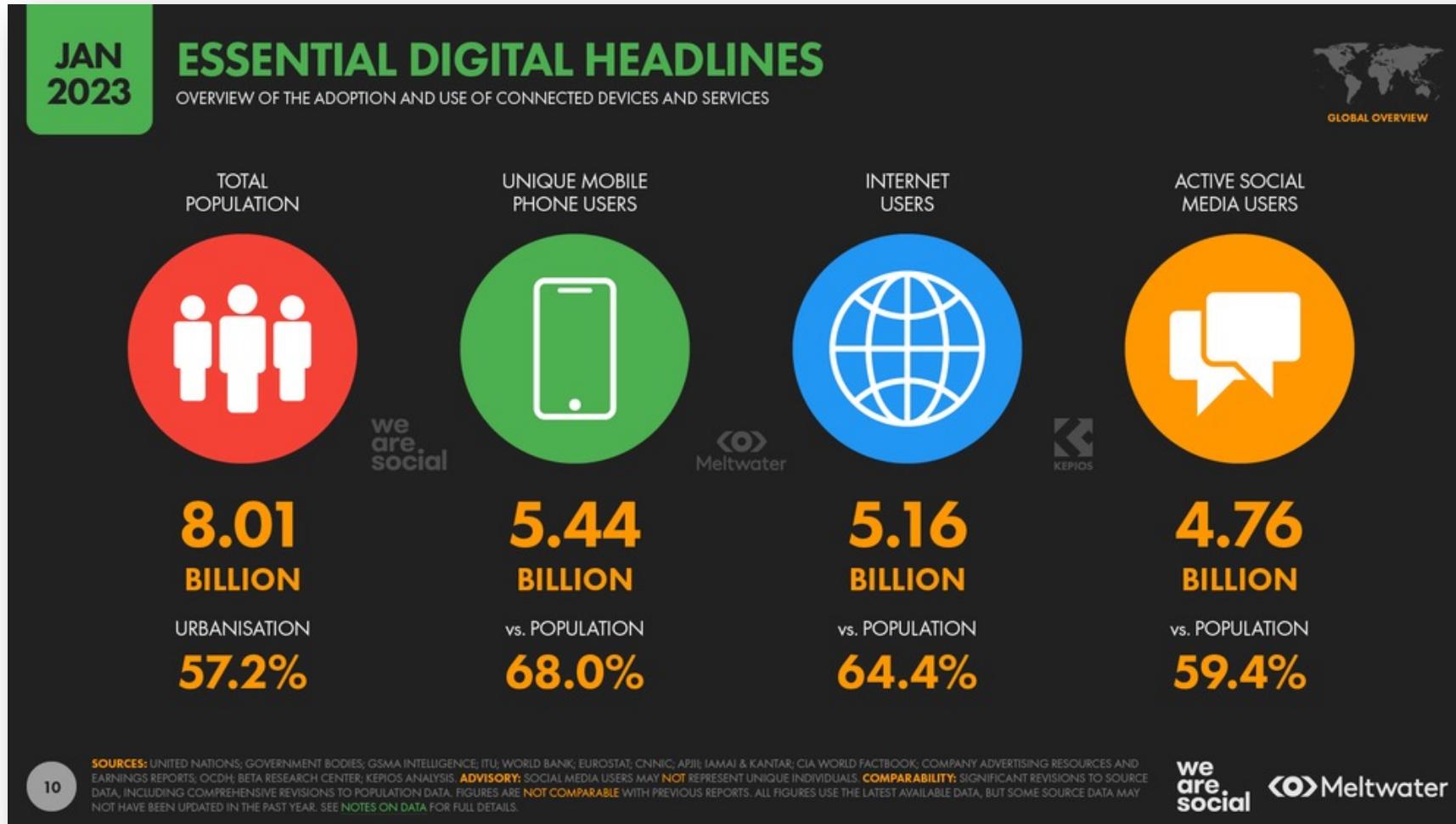
Prof. Ombretta Gaggi
University of Padua



Mobile users vs population



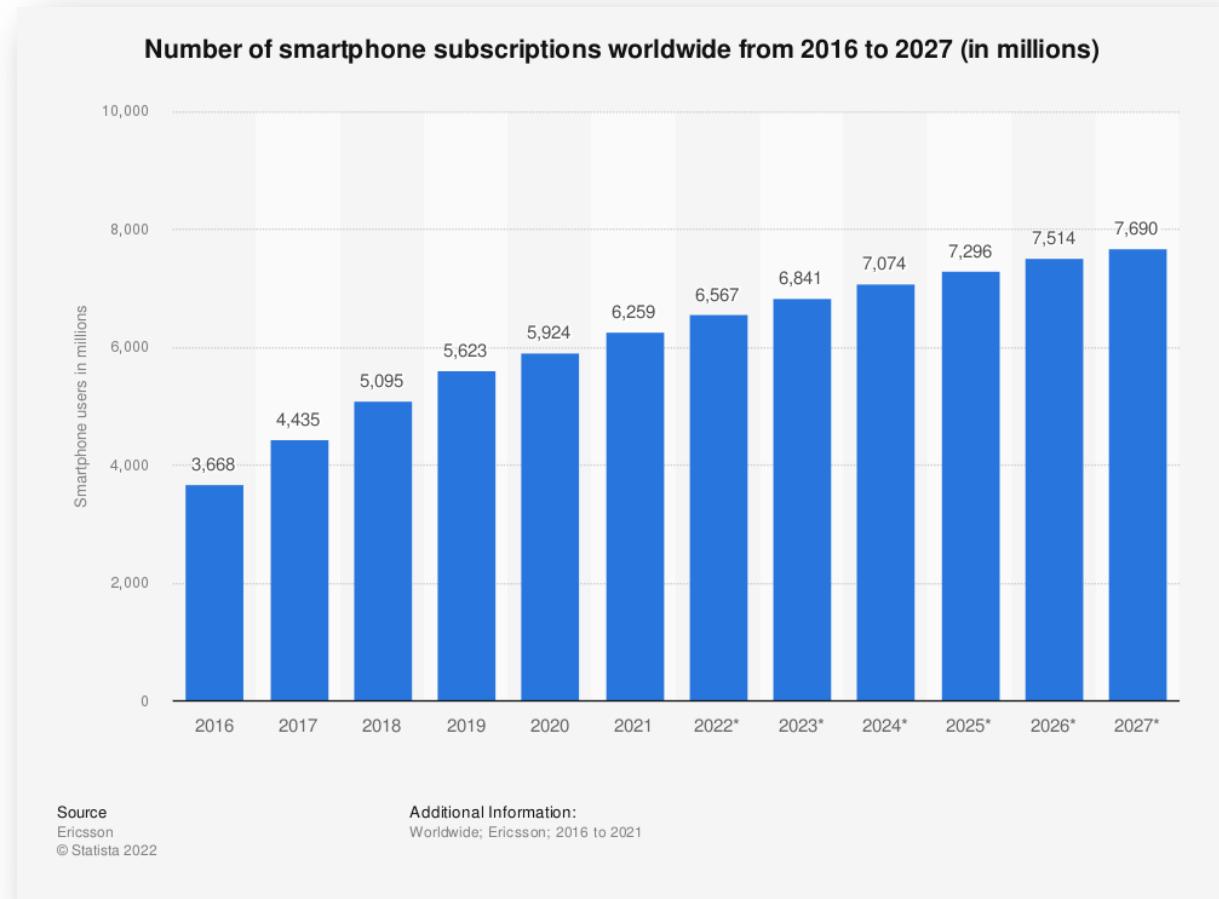
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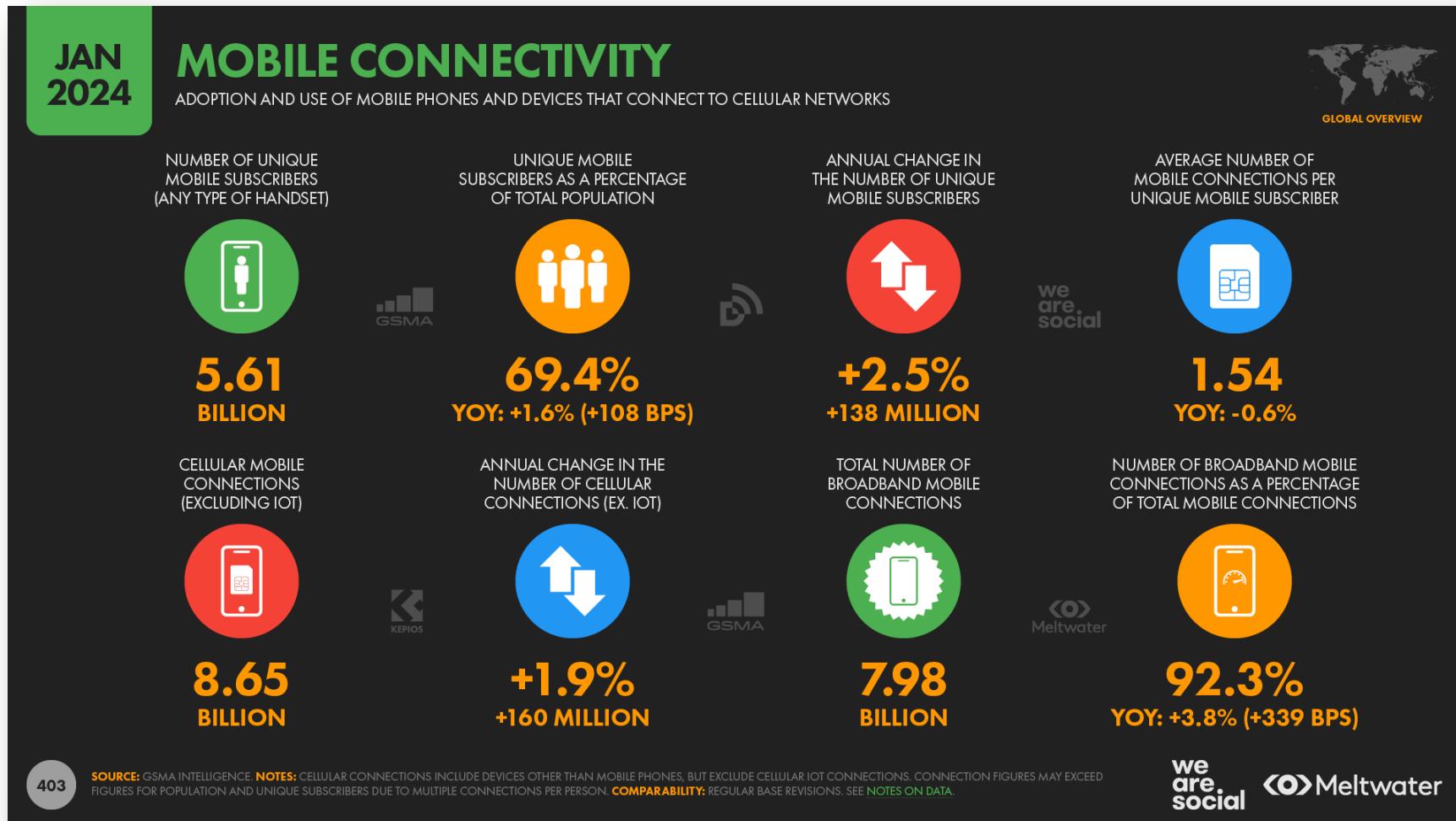


Diffusion



The smartphone market is enormous

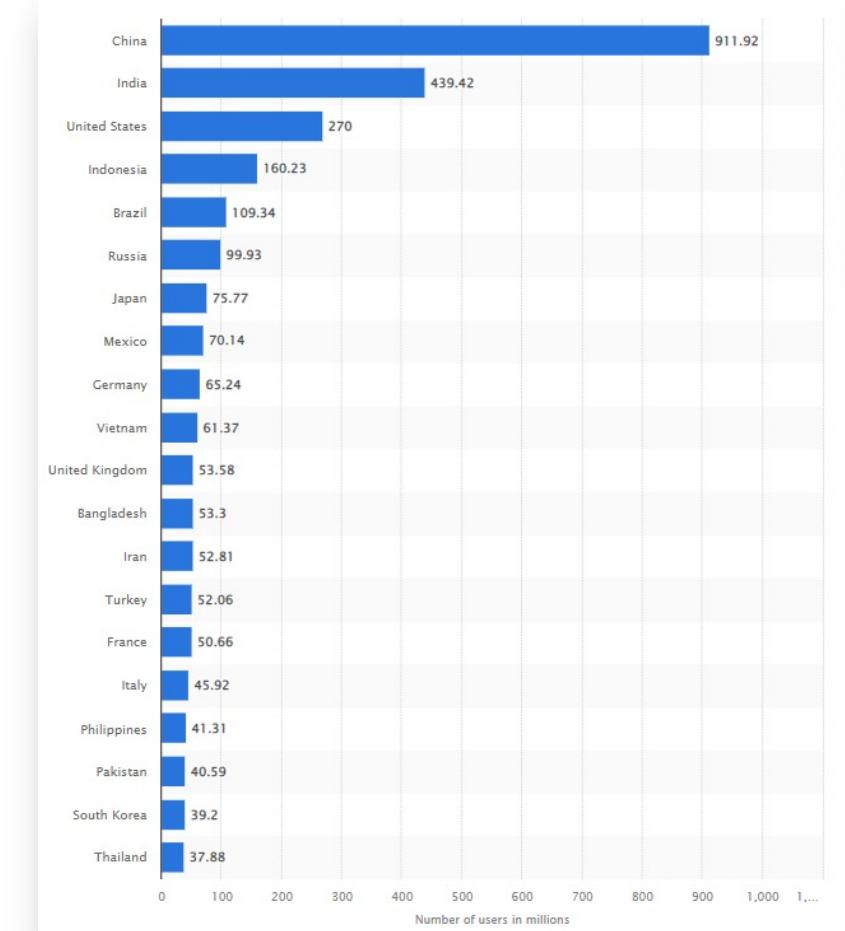




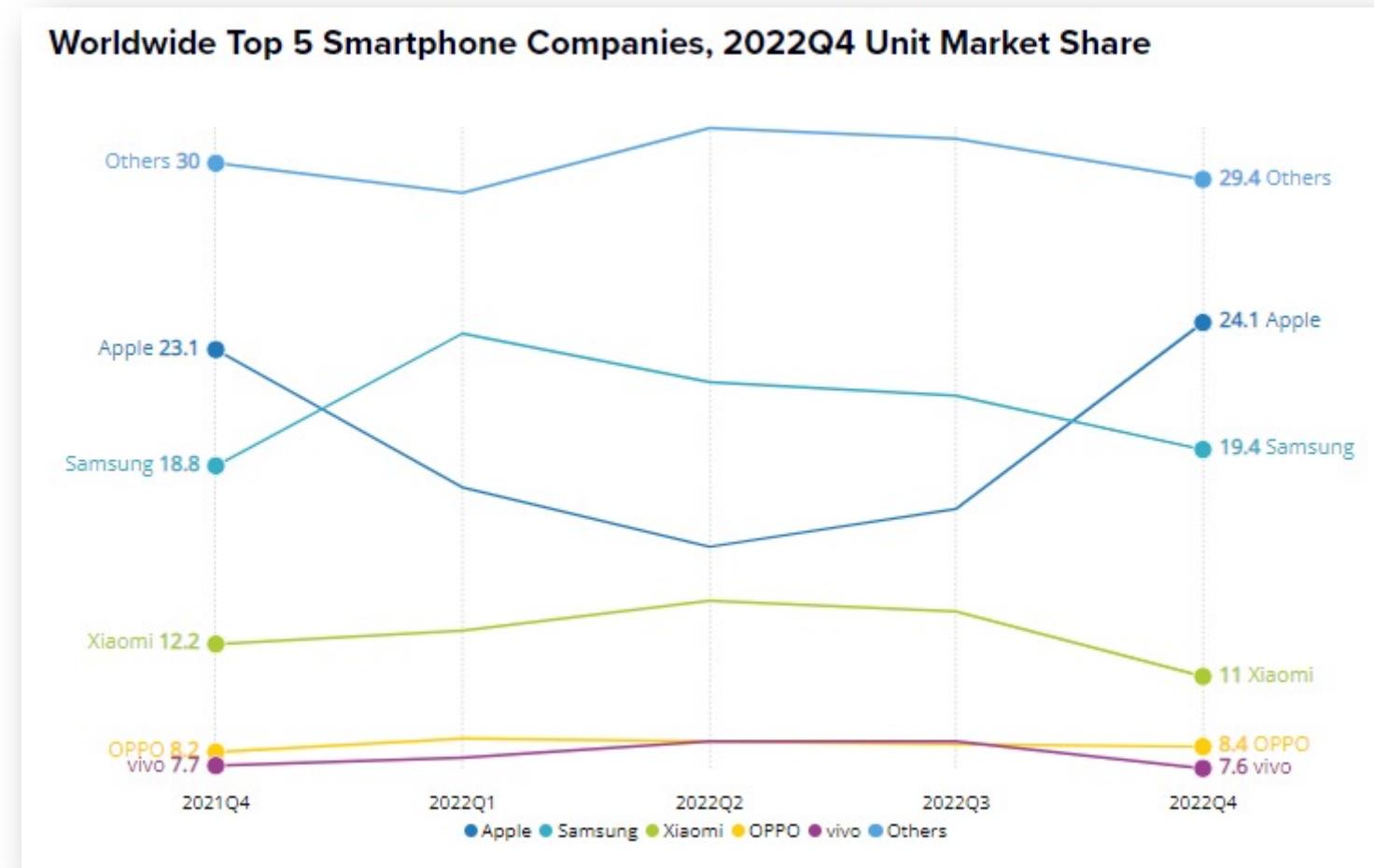
Number of smartphone users in May 2021



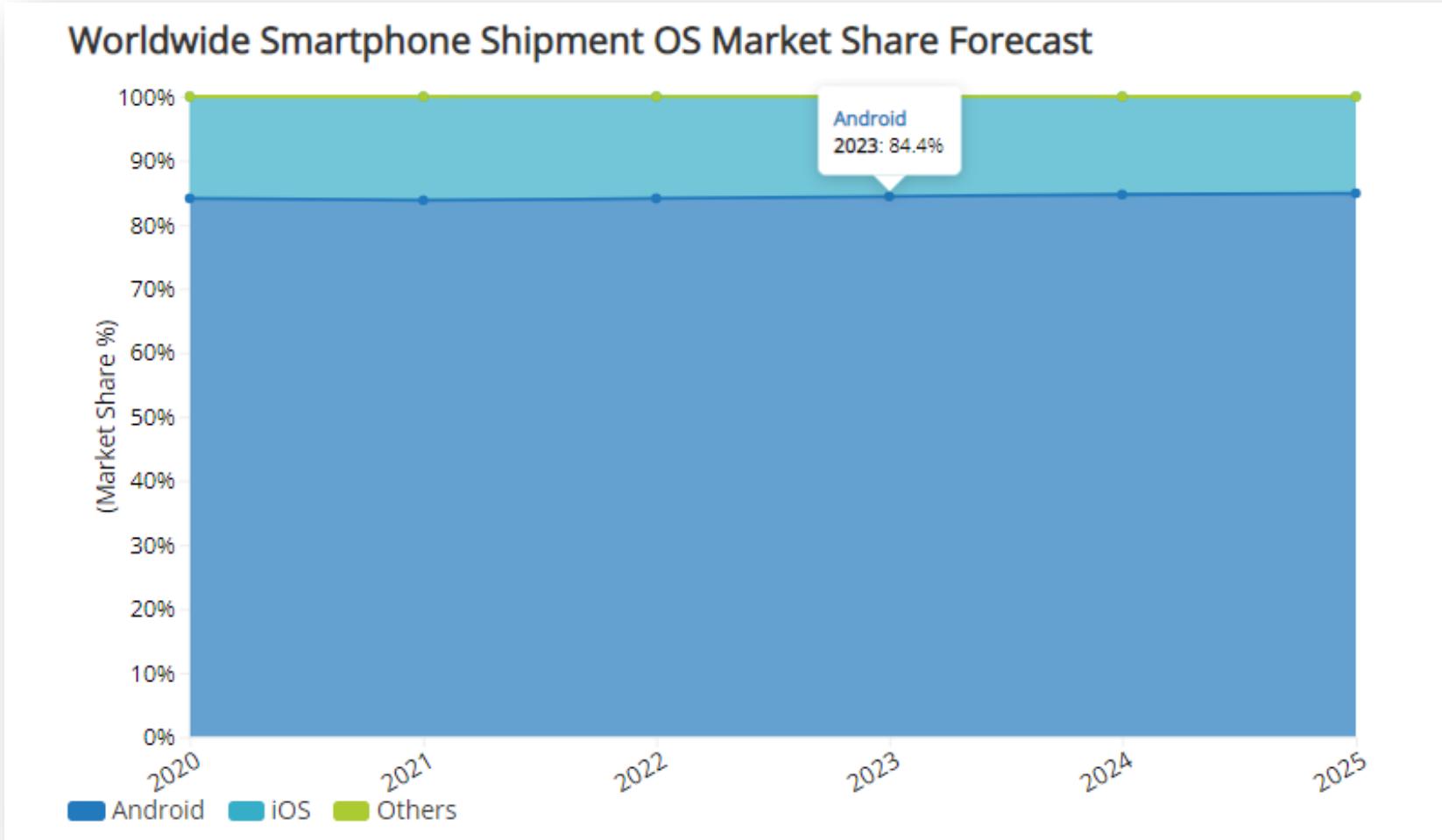
China, India, and the United States
are the countries with the highest
number of smartphone users.



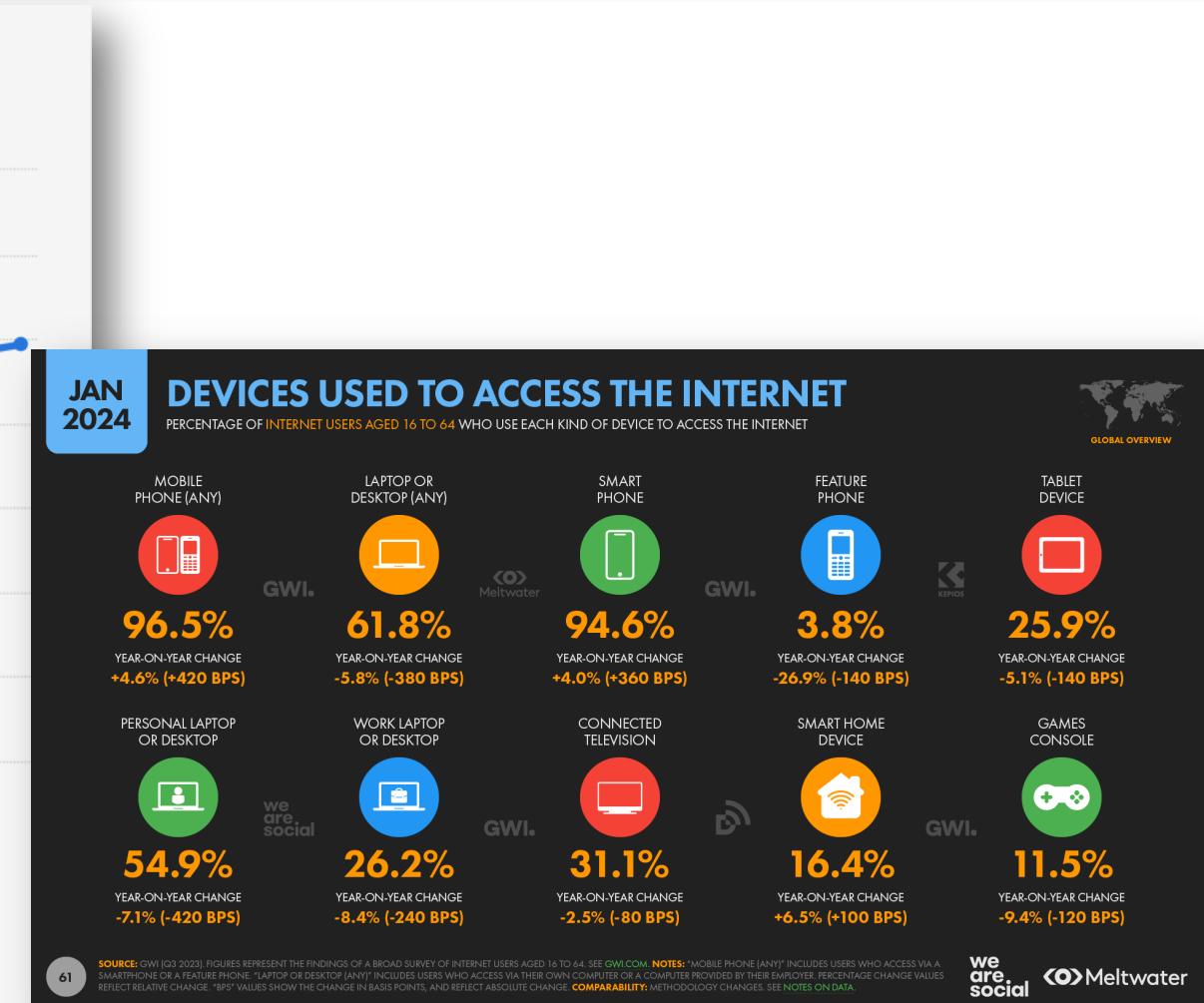
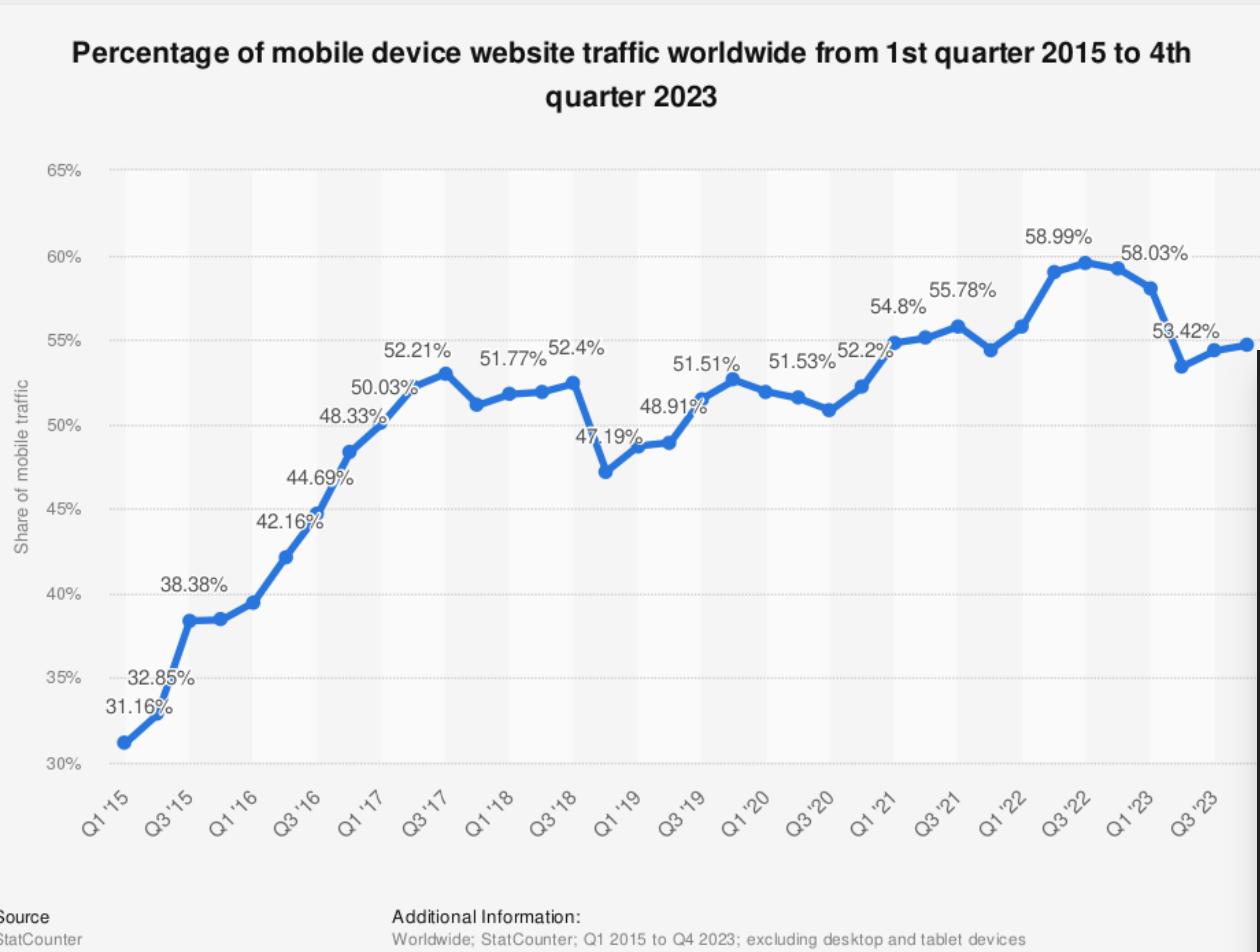
Smartphone market



Operating Systems



Site visited using smartphone

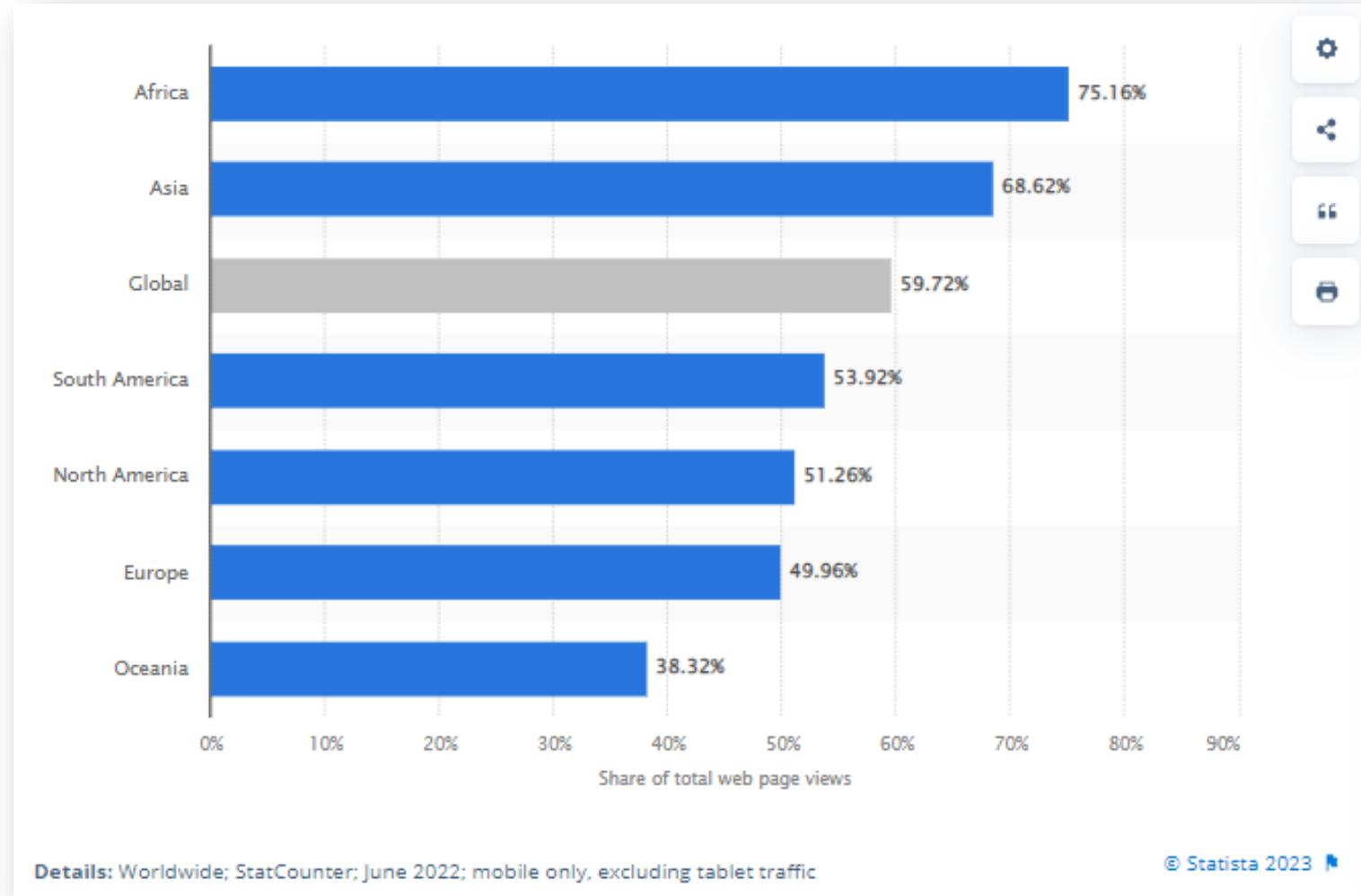


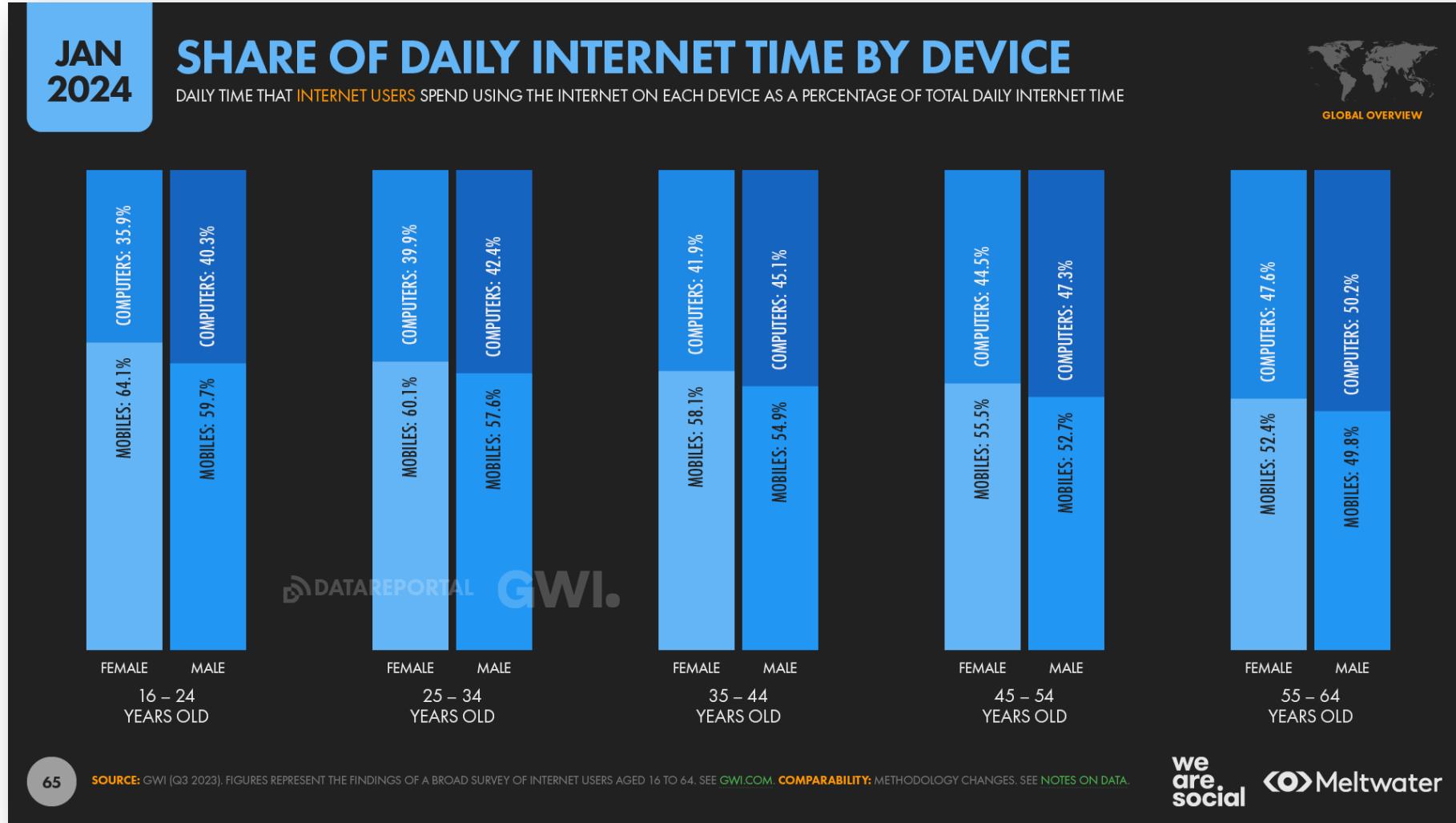
Region-specific insights



- In North America, 64.47% of users use desktop to access to websites
- In South America and Ocenia, 52.27% of users use desktop to access to websites
- In Europe, 51.89% of users use mobile devices to access to websites
- In Asia, 64% of users use mobile devices to access to websites
- In Africa, 79.8% of users use mobile devices to access to websites

Site visited with smartphone/region





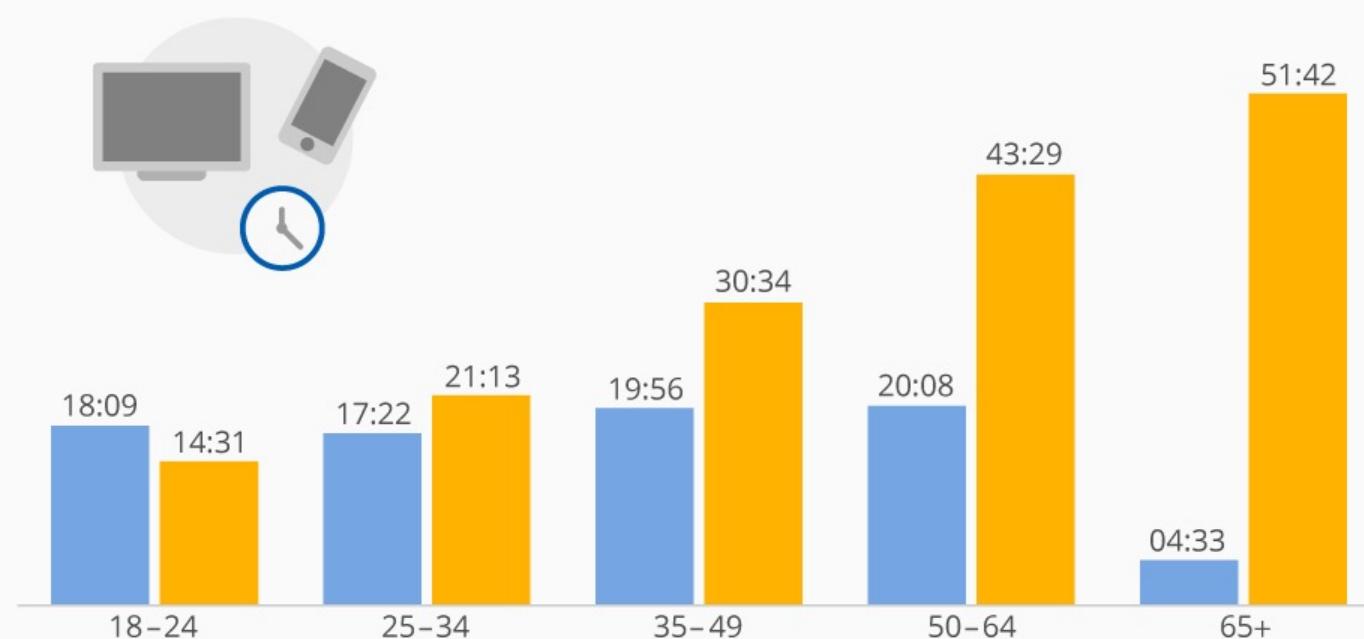
Smartphone vs TV



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)

Smartphone (Web+App) TV (Live+Timeshifted)

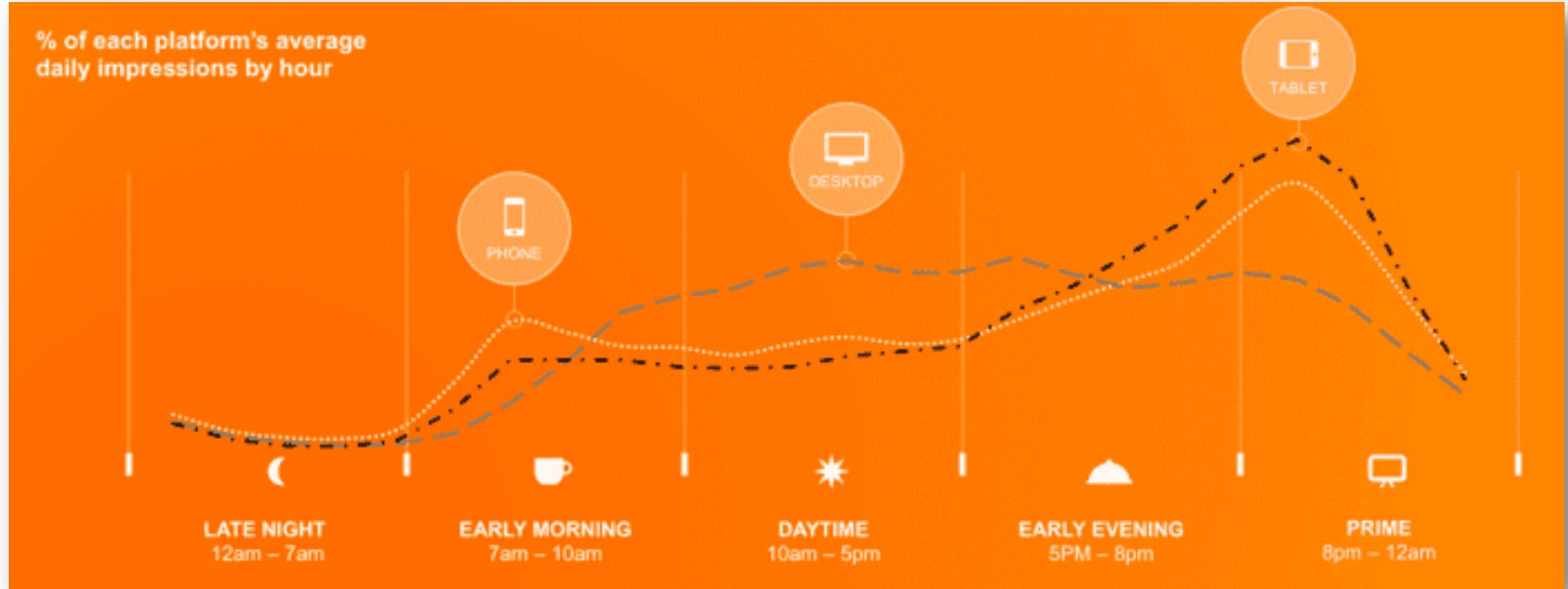


@StatistaCharts

Source: Nielsen Total Audience Report

statista

Relationship daytime-device





More than 5 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

False myths



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?

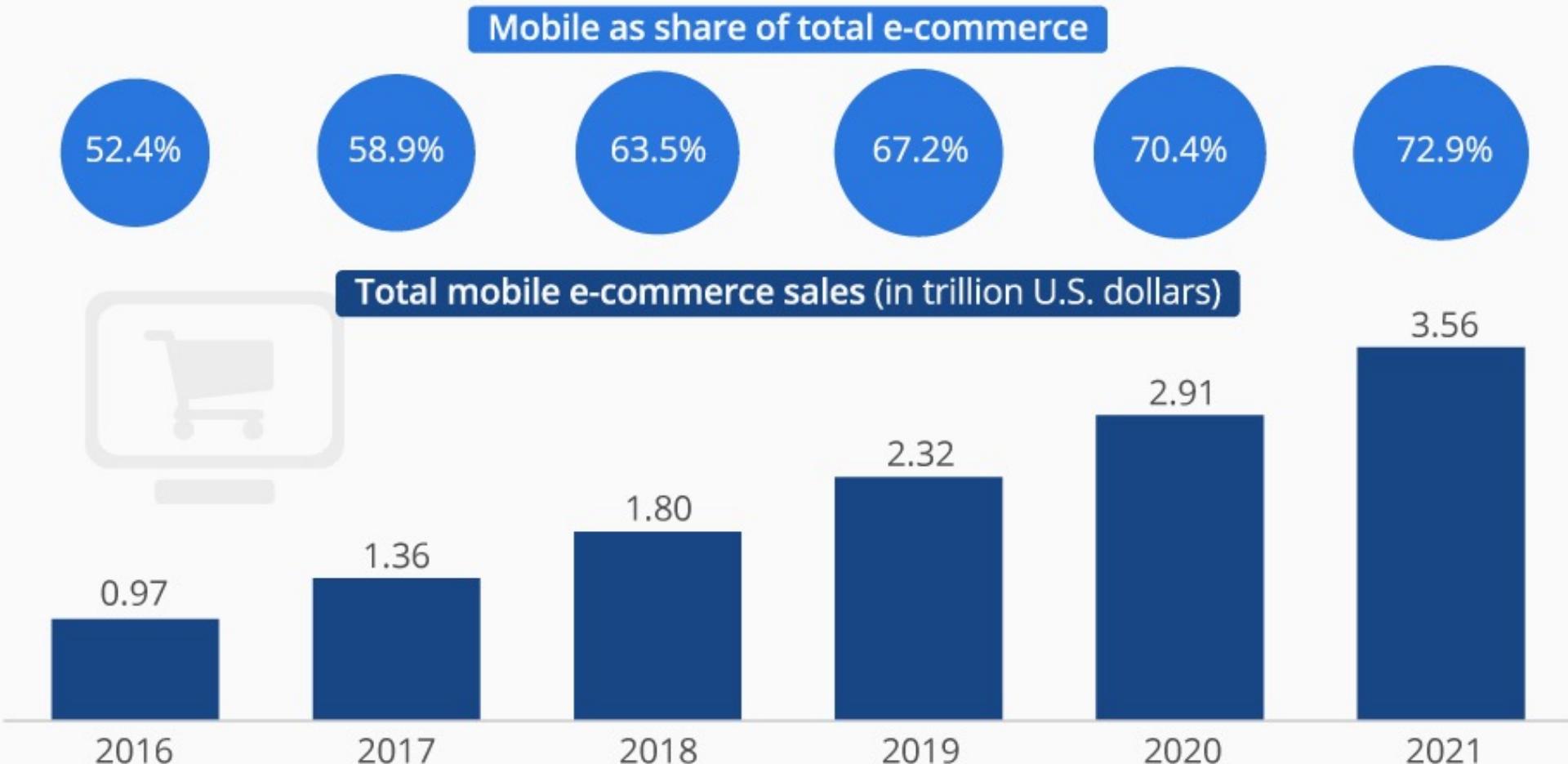
The first step to determine if it is better to develop a mobile layout of your own website or a mobile application is to understand the differences between the two:

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

E-Commerce example

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 fulfilment;
excludes travel and event tickets

As of January 2018

Source: eMarketer



E-commerce example - 2

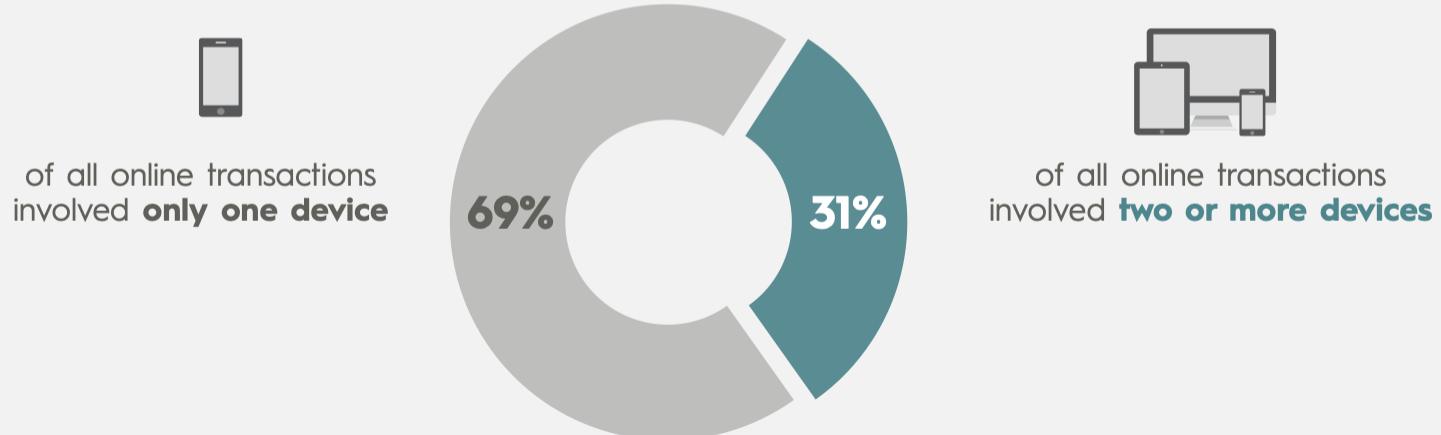


You can't afford to
misunderstand 31% of
buyers

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*



7 | STATE OF CROSS-DEVICE COMMERCE H2 2016

Source: Criteo dataset Q4 2016, US, all categories, excluding apps *Given a 30-day period

E-commerce example - 3

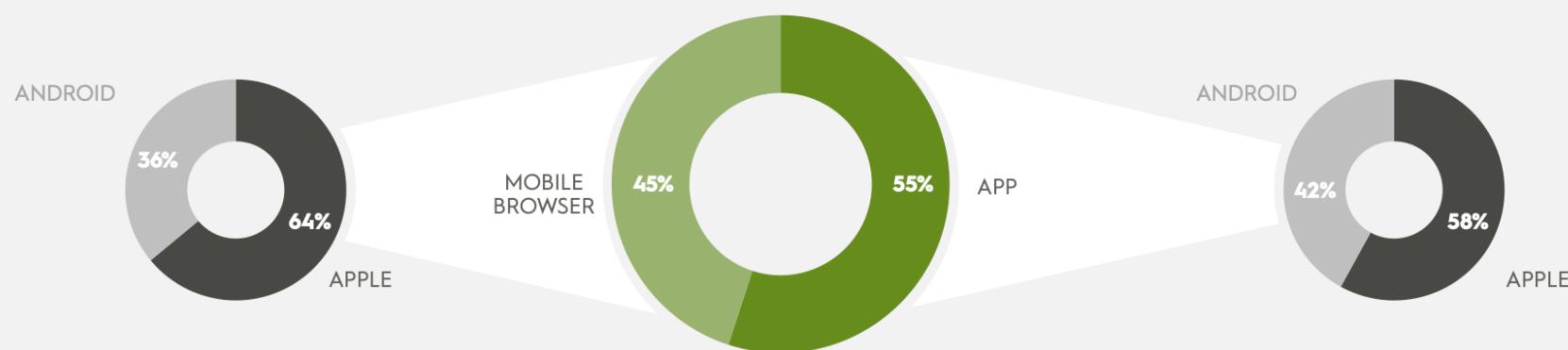


Apps outperform mobile
browsers for retailers
who invest*

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:

- 3,553,050 on the Google Play Store
- 1,643,000 on the Apple App Store
- [669,000 on the Windows Store]
- 483,000 on the Amazon Appstore

25% of these apps are used only once

Some statistics

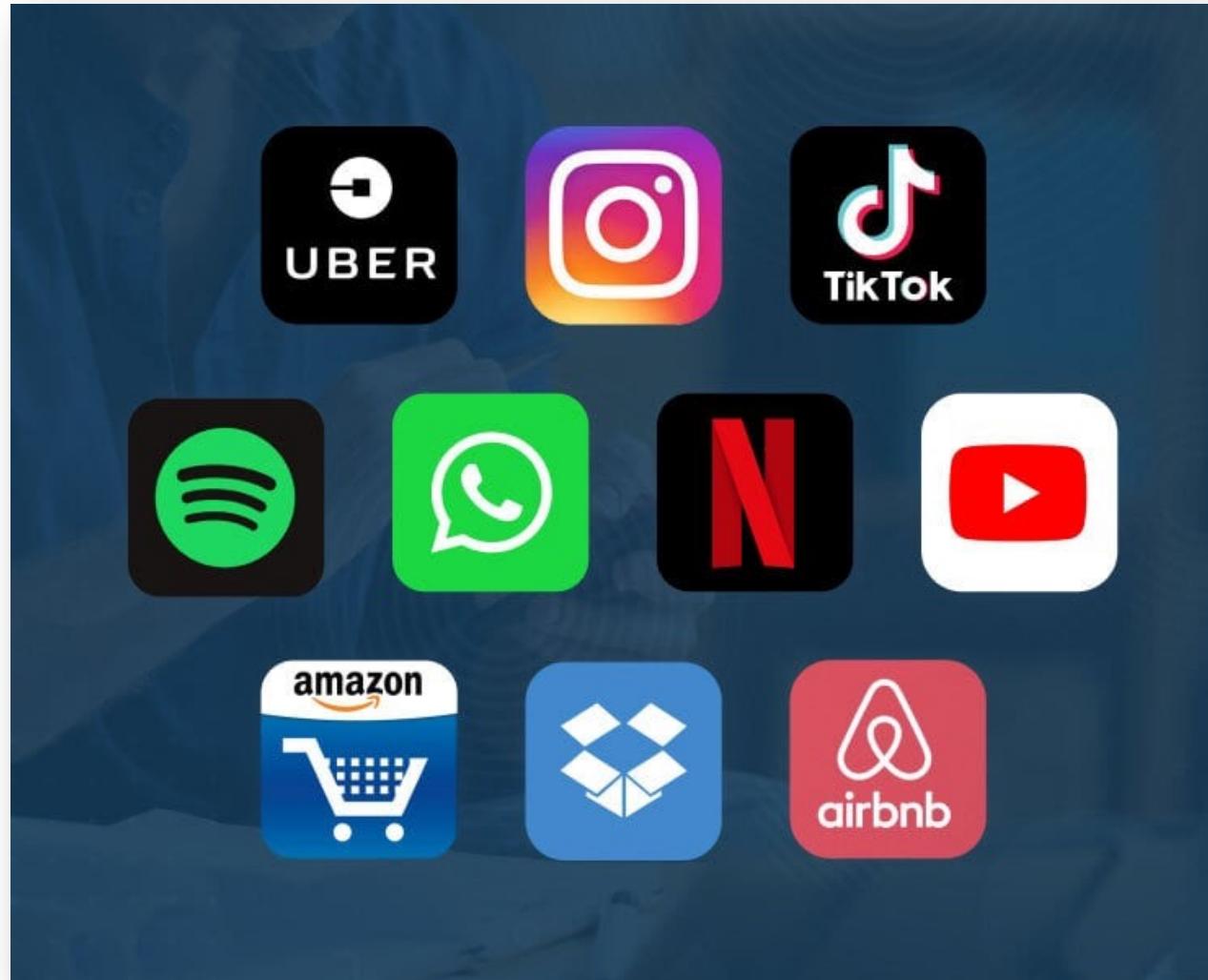


A user usually spend 89.2% of the smartphone time using apps

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 most downloaded app 2023



Top Apps



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The Most Downloaded Apps · December 2023

Worldwide

		iOS App Store	Google Play	Combined Total
1		TikTok *	19M	1
2		CapCut *	17M	2
3		Temu	14M	3
4		Threads	12M	4
5		YouTube	11M	5
6		Instagram	11M	6
7		Google Maps	11M	7
8		Google	10M	8
9		WhatsApp	10M	9
10		Gmail	9M	10
				10

* Includes downloads of lite and regional versions where applicable.

App Intelligence & Analytics by [appfigures](#)

The Highest Earning Apps · December 2023

Worldwide

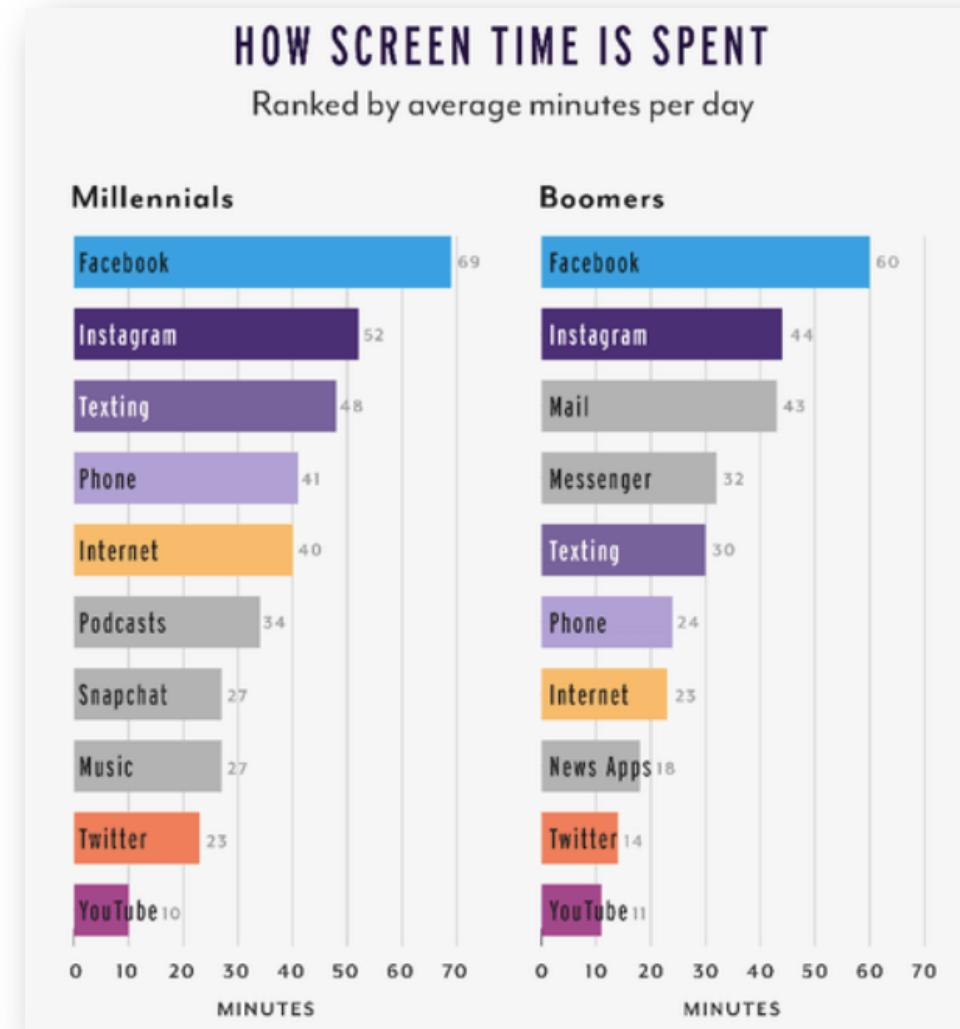
		iOS App Store	Google Play	Combined Total
1		TikTok *	\$194M	1
2		YouTube	\$123M	2
3		Disney+	\$84M	3
4		Tinder	\$79M	4
5		Max	\$48M	5
6		腾讯视频 (Tencent Video)	\$42M	6
7		爱奇艺 (iQIYI)	\$33M	7
8		Hulu	\$31M	8
9		Bumble	\$28M	9
10		Duolingo	\$27M	10
				10

All Revenue is after store commission.

* Includes downloads of lite and regional versions where applicable.

App Intelligence & Analytics by [appfigures](#)

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



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!

App vs Desktop applications - 1



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 windows at the same time

App vs Desktop applications - 2



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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

Bibliography



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/>