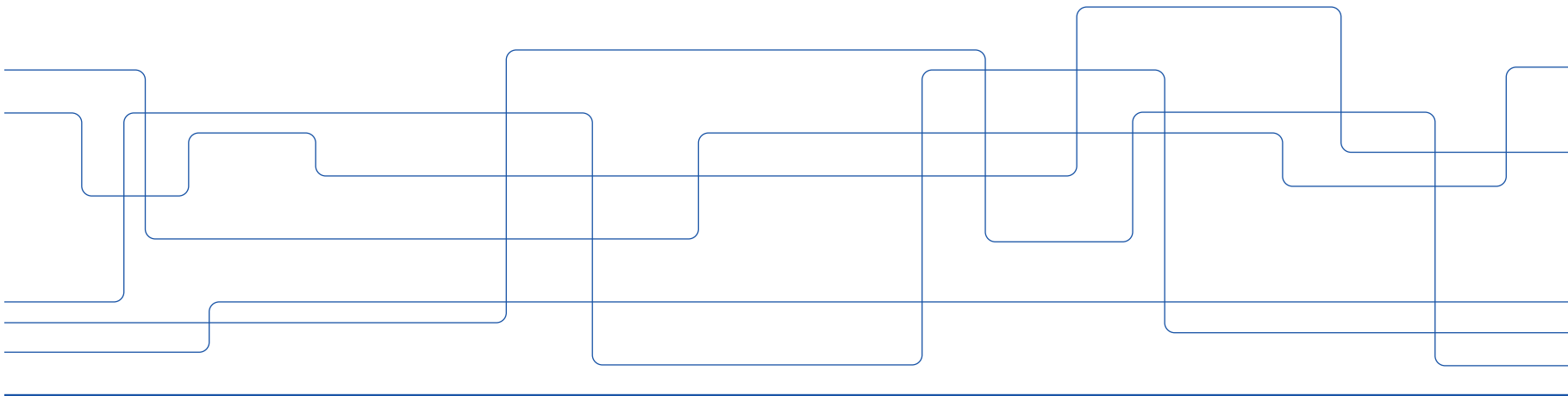




Introduction to Developing Mobile Applications

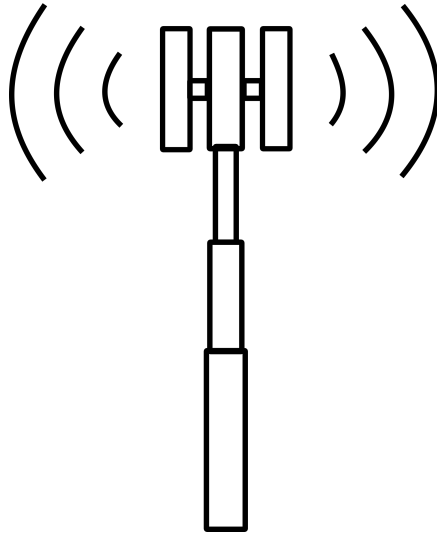
Anders Västberg <vastberg@kth.se>



Three requirements



Mobile Device



Mobile Internet Access



Application

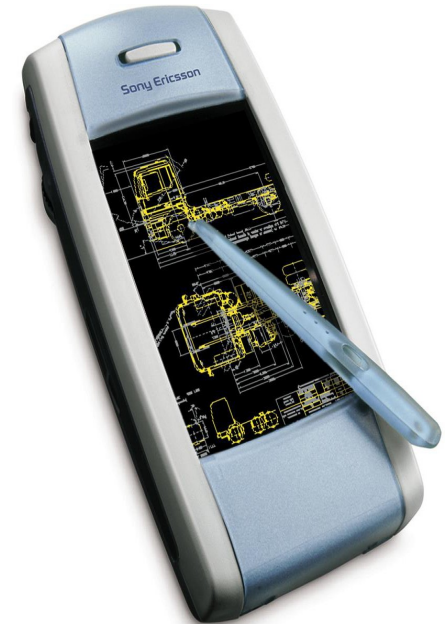
Mobile Device: The Smartphone [1]

- 2007 Steve Jobs introduces the iPhone combining:
 - A Touchscreen iPod
 - A Mobile Phone
 - And an Internet Communicator into one device
- 2008 First Android Smartphone
 - HTC Dream
- 2018 there had been produced 24000 different Android devices
- At the same time a total of 18 different iPhone models had been presented

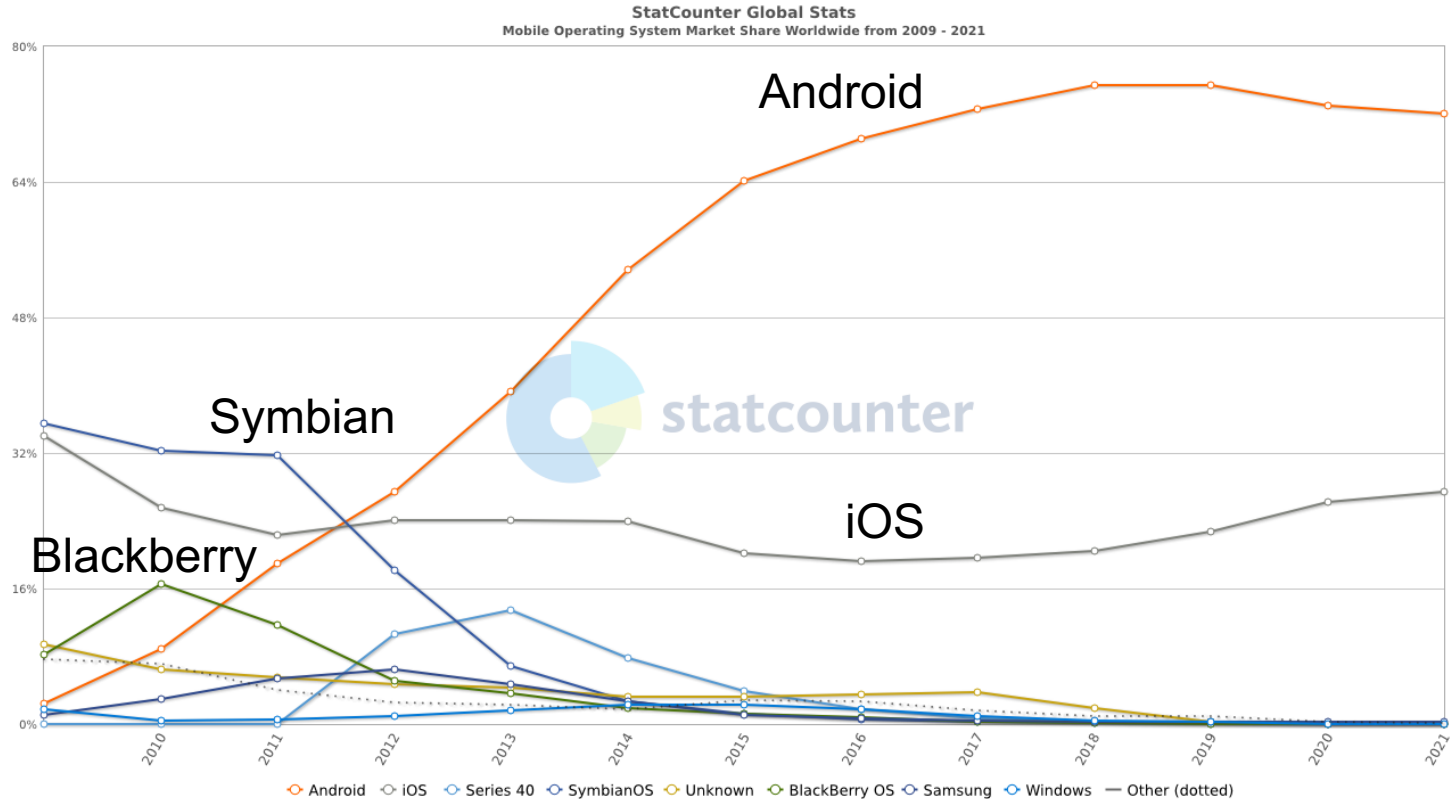


Earlier Smartphones

- iPhone was not the first Smartphone
- Earlier examples:
 - Simon Personal Communicator (IBM 1994)
 - Nokia 9000 Communicator (Nokia, 1996)
 - Ericsson R380 (Ericsson Mobile Communications, 2000)
 - Blackberry (Research in Motion, 2002)



Mobile Operating Systems Market Share [2]



Mobile Networks Development

- 1G NMT (Anlog)
- 2G GSM (Digital)
 - Voice
 - Limited data (10 – 236,8 kbit/s)
- 3G UTMS
 - 384 kbit/s
 - HSPA: 7.2 Mbit/s
 - HSPA+ 42 Mbit/s (3.5G)
- 4G LTE
 - 150 Mbit/s
 - LTE Advanced 300 Mbit/s
- 5G: 10 Gbit/s+

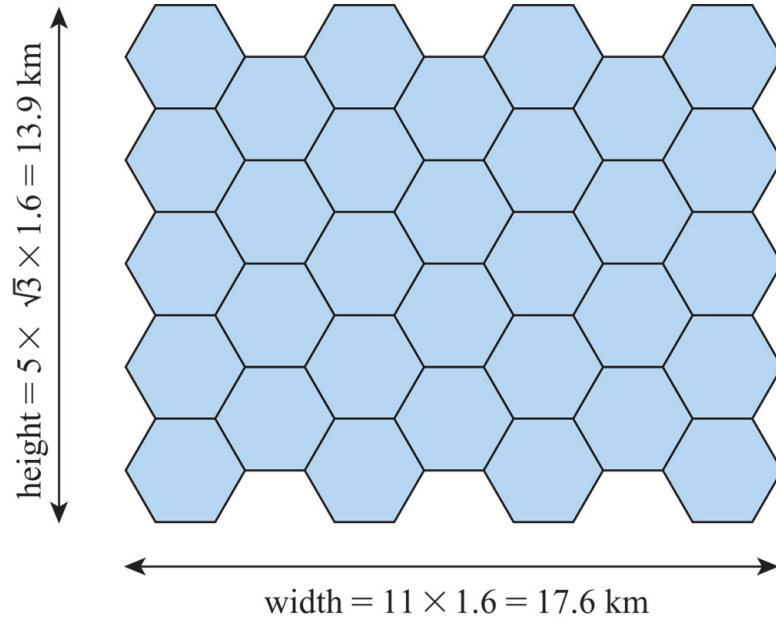




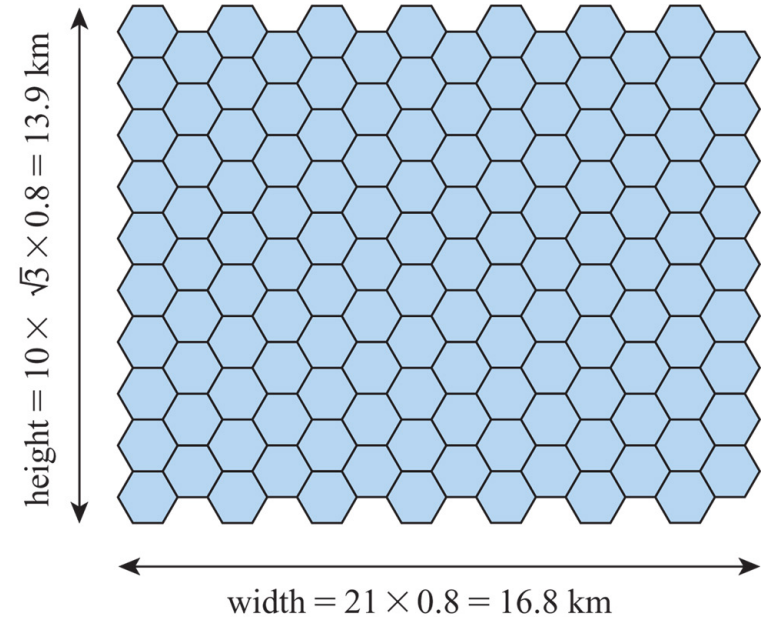
Mobile Access Networks

- Data rate dependent on
 - Range from base station
 - Interference from other users
 - Number of users within the cell
- Capacity (#users served per area unit) dependent on
 - Spectrum Allocated
 - Size of the Cell
 - Technology used

Mobile Access Networks [3]

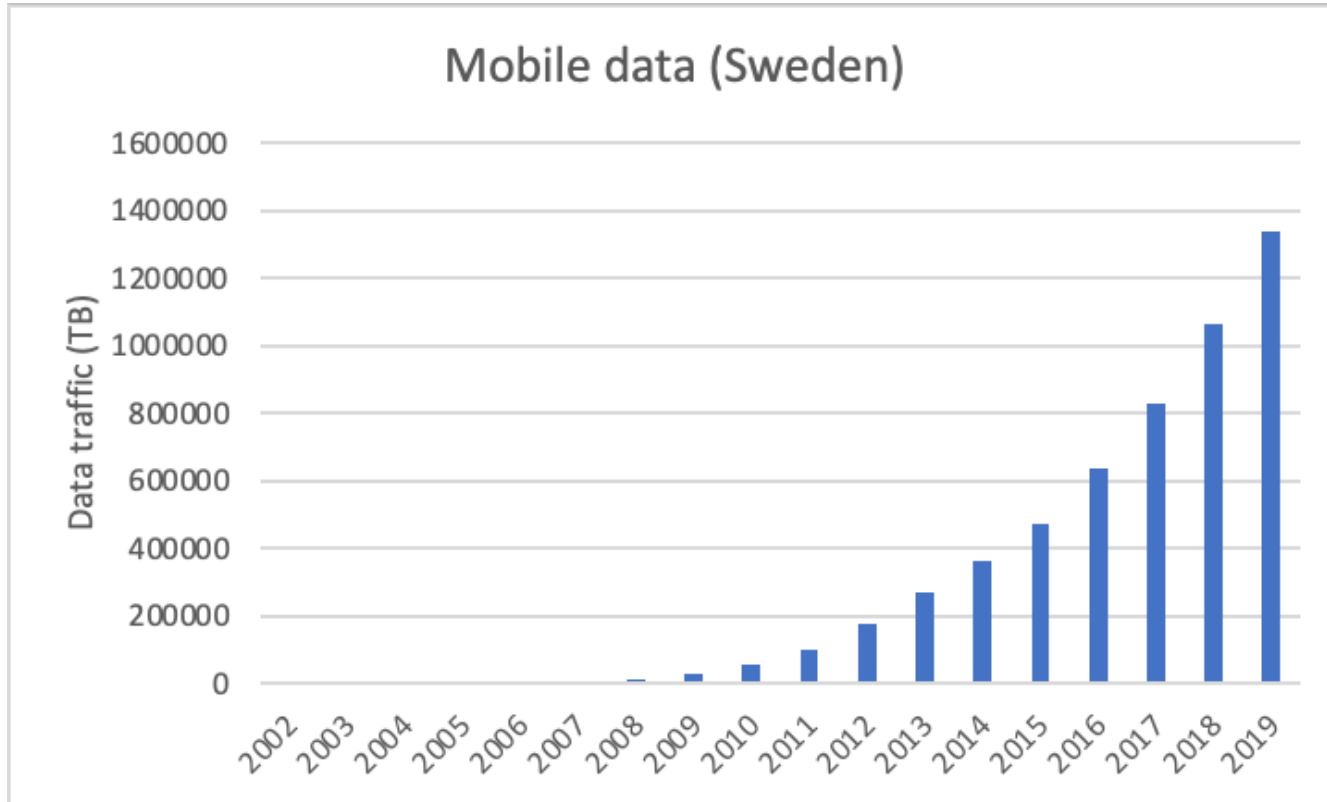


(a) Cell radius = 1.6 km

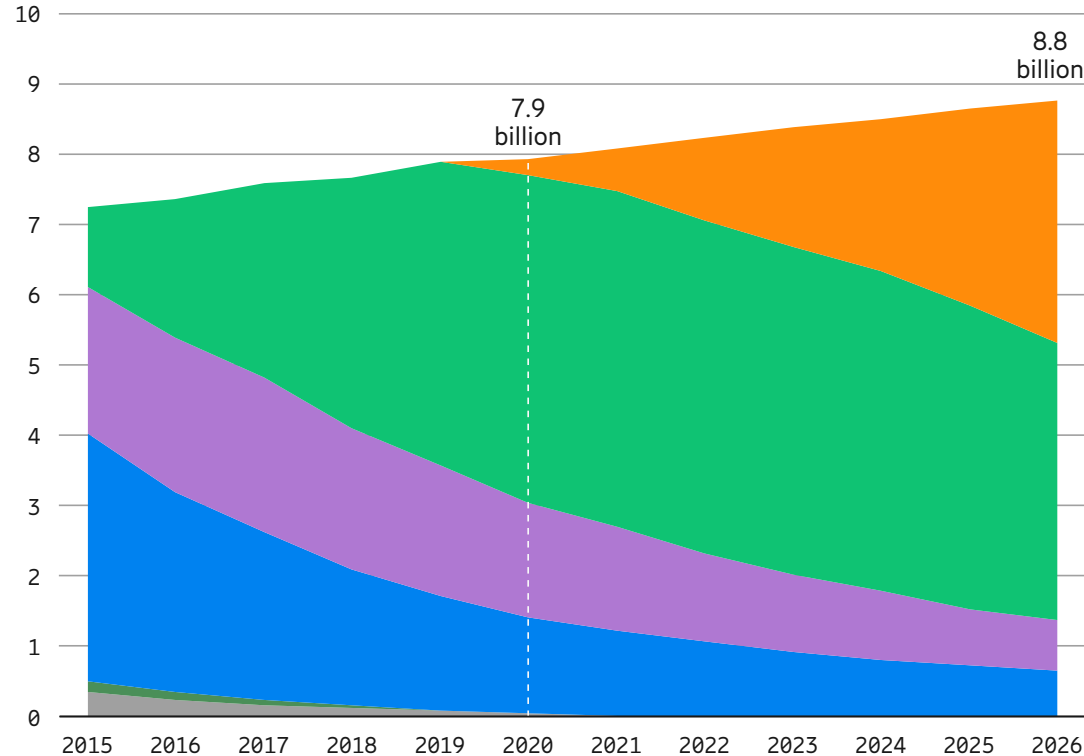


(b) Cell radius = 0.8 km

Mobile Data Traffic – Exponential Growth [4]



Mobile Subscriptions [5]



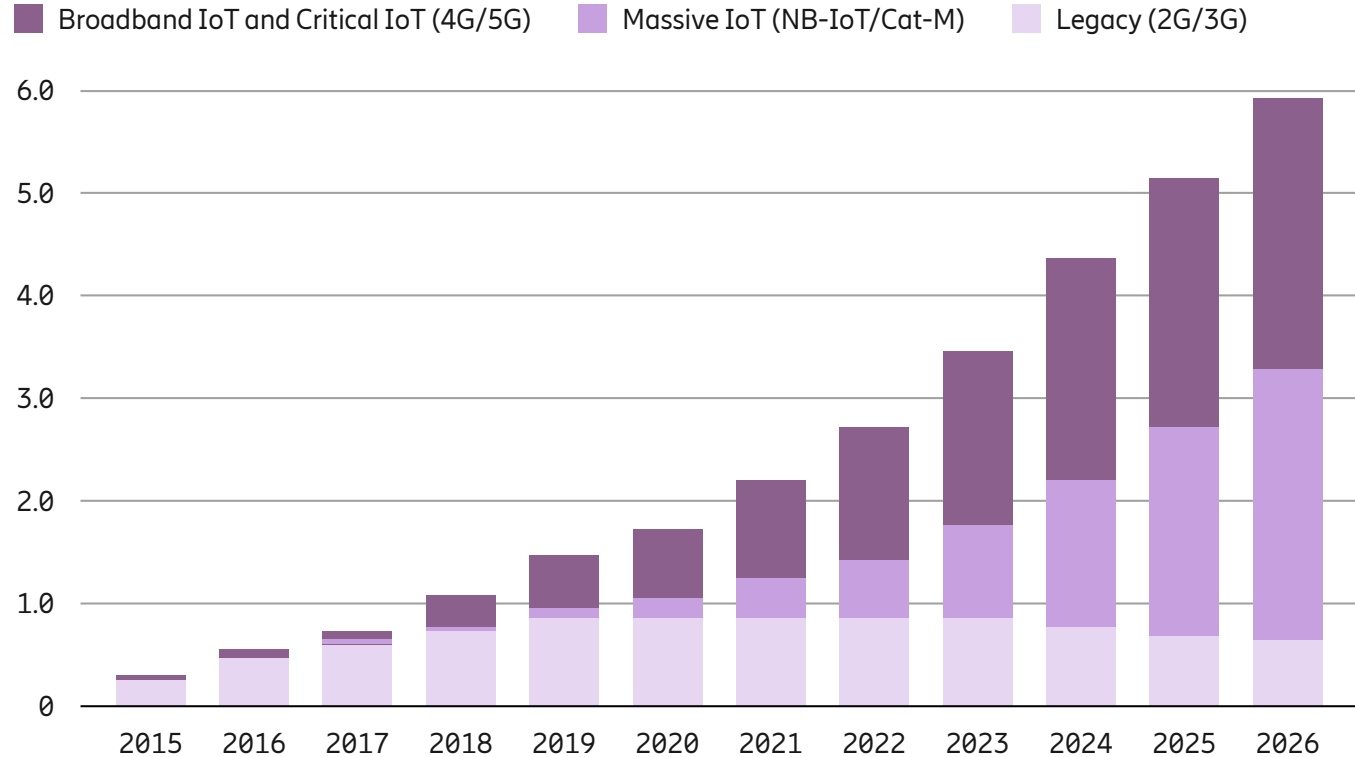
3.5bn

In 2026, 3.5 billion 5G subscriptions are forecast.

Note: IoT connections are not included in this graph. Fixed wireless access (FWA) connections are included.



IoT Connections [5]



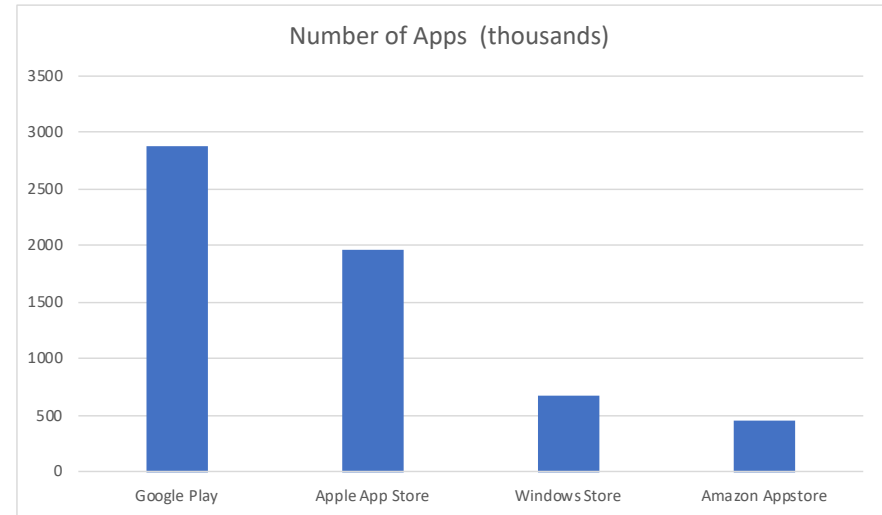


Discussion

- Join Break-out room (3 persons)
- What (new) mobile application do you want to have in two years time?
- Categorize your applications:
- Enterprise, Media, Education, Games...

Mobile Apps [6]

- Large industry
- Total revenue of the market 2020 Q4: \$31.9 billion
 - Apple App Store: \$20.4 billion
 - Google Play: \$10.4 billion
- A large share of the market are games: \$21.4 billion
- Millions of apps available



Native Applications, Mobile Web Apps, and Cross Platform Frameworks

NATIVE APPS



VS

HTML
APPS





Mobile Applications Characteristics [7]

- Shorter life span
- Complex functionalities
 - camera, accelerometers, GPS
- Fewer physical interfaces
- More number of screens for interaction
- Battery usage by applications
- Cross platform development

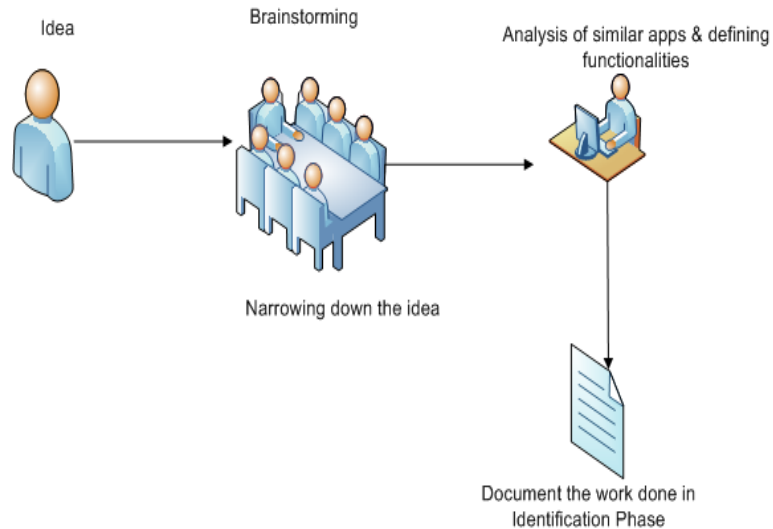


Mobile Application Development Life Cycle [7]

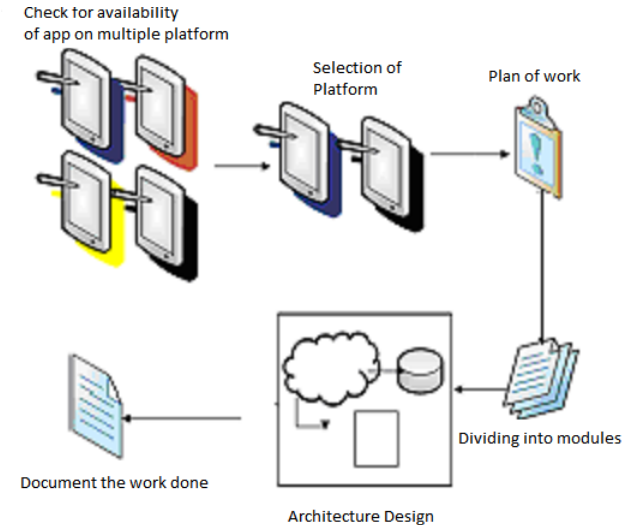
- Identification Phase
- Design Phase
- Development Phase
- Prototyping Phase
- Testing Phase
- Deployment Phase
- Maintenance

Mobile Application Development Life Cycle [7]

Identification Phase

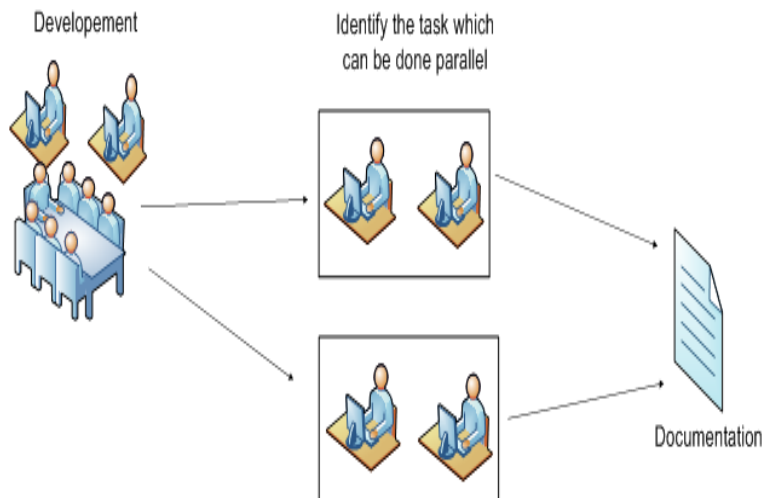


Design Phase

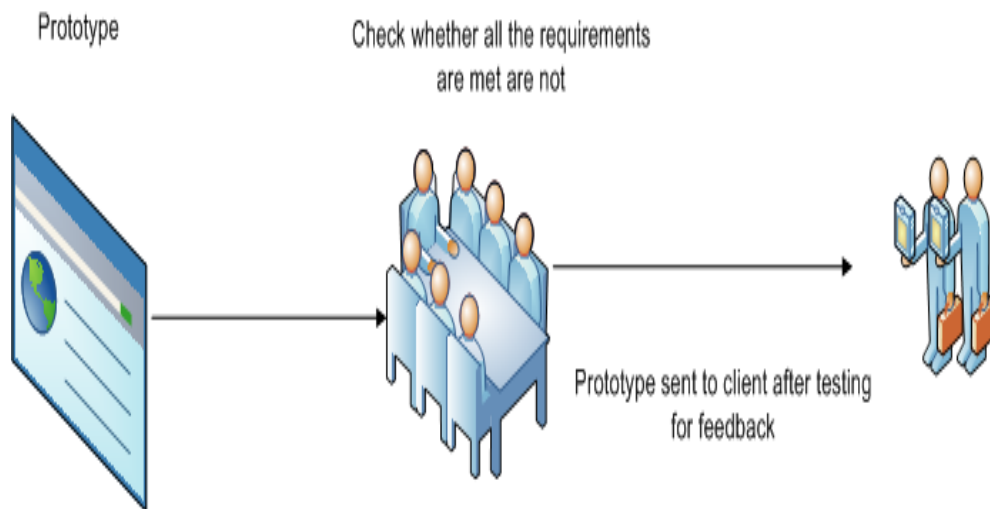


Mobile Application Development Life Cycle [7]

Development Phase



Prototyping Phase



Mobile Application Development Life Cycle [7]

Testing Phase

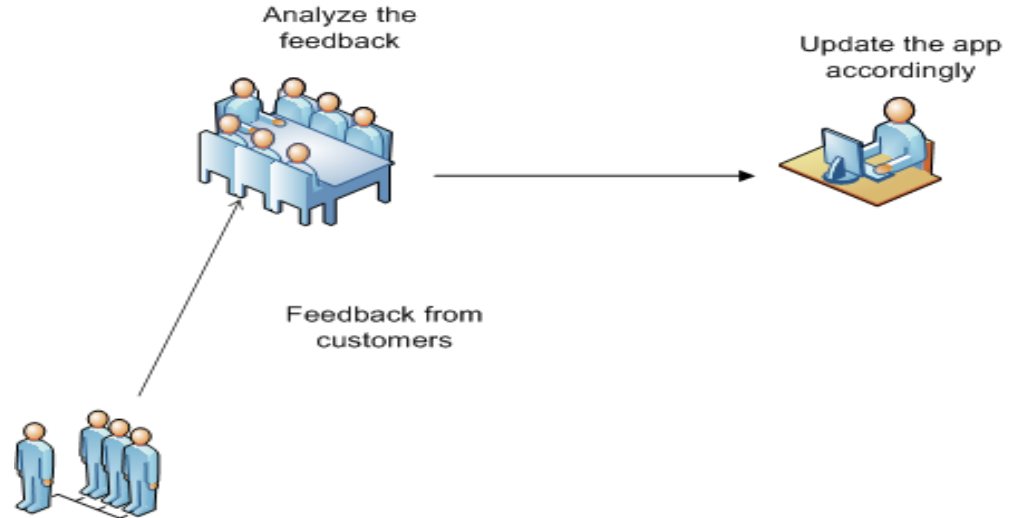


Deployment Phase



Mobile Application Development Life Cycle [7]

Maintenance Phase



References

- [1] Reid, Alan J., *Smartphone Paradox*. Springer International Publishing, 20
- [2] Statcounter Global Statistics, <https://gs.statcounter.com/os-market-share/mobile/united-states-of-america/#yearly-2009-2020> , retrieved 2021-01-16
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- [4] Statistikportalen, PTS E-tjänster, <https://statistik.pts.se>, retrieved 2021-01-14
- [5] Cerwall P., et al., *Ericsson Mobility Report November 2020*, Ericsson, 2020.
- [6] Business of Apps, <https://www.businessofapps.com/data/app-revenues/>, retrieved 2021-01-17
- [7] Vithani, T., and A., Kumar, Modeling the Mobile Application Development Lifecycle, in Proceedings of the International Multi Conference of Engineers and Computer Scientists 2014 Vol I, IMECS 2014.