LA TROBE
UNIVERSITY
All kinds of clever

CSE2MAD

Mobile Application Development
Lecture 1

Important things…

WHAT IS THIS SUBJECT ABOUT?

WHY IS THIS TOPIC IMPORTANT?

WHAT WILL I TAKE AWAY FROM THIS SUBJECT?

WHAT DO I NEED TO DO TO PASS?

WHAT SKILLS DO I NEED TO DO WELL IN THIS SUBJECT?

HARDWARE/DEVICES NEEDED?

CSE2MAD CORE Roadmap

+3 special interest topics from you

- Introduction to Mobile Computing
- Introduction to Android
- User-Centered Design Concepts for Mobile Applications
- Mobile Interaction Design : Patterns, Tools & Techniques
- Android Activities &Intents, lifecycle, permissions
- Event driven programming, callbacks & Android Listeners
- Android Views, UIs for multiple screens
- Services &Async Tasks
- Connectivity
- Context-Aware Computing for mobile applications
- Mobile databases
- Mobile sensing &activity recognition, Physical Web
- Cross-platform development & Progressive Web Apps
- Internet of Things, Android Things

Teaching Team

Subject Coordinator:

- Dr Scott Mann

Lecturer:

- Ms Marita Fitzgerald
- M.Fitzgerald2@latrobe.edu.au

Tutors:

- TBA (depending on lab numbers)

Structure

- 2 hr Lectures which will cover CORE topics
- Practical aspects of lectures will be covered in Labs (Yay! lots of coding!)
- Group project will be in 3 phases. Expect to develop using a lite agile methodology.

1.1 Introduction to Mobile Computing: terms, features, motivation

1.1 Outline

- What is Mobile Computing?
- Motivation
- What is special about Mobile Computing?
- Mobile Devices
- Mobile Computing Software
- Types of Mobile Apps
- Things to consider when developing a mobile app
- Mobile App Eco-System

1.1.1 What is Mobile Computing?

- Computing involving mobile devices and often wireless networking
- Connectivity – various: IR, Bluetooth, Wi-Fi Direct, WLAN (Wi-Fi), WiMAX, GSM, GPRS, 3/4/5G
- Application development – user interfaces, resource- constraints of CPU, memory, and battery power
- New sets of applications on mobile phones, wearables, etc…
- BRAINSTORM AN APPLICATION IDEA THAT WOULD INCORPORATE 2 OF THESE CONNECTIVITY TECHNOLOGIES

Let's explore the keyword cloud

Mobile Computing vs. Mobile Communications

- **Mobile Computing** involves computations and data transfer over distributed and mobile nodes, not **just voice communication**
- Not necessarily point-to-point (or person-to-person) as in telecommunications, e.g. from mobile node to databases
- Mobile computing applications over telecommunication networks (voice+data)

Mobile Computing vs. Wireless Computing

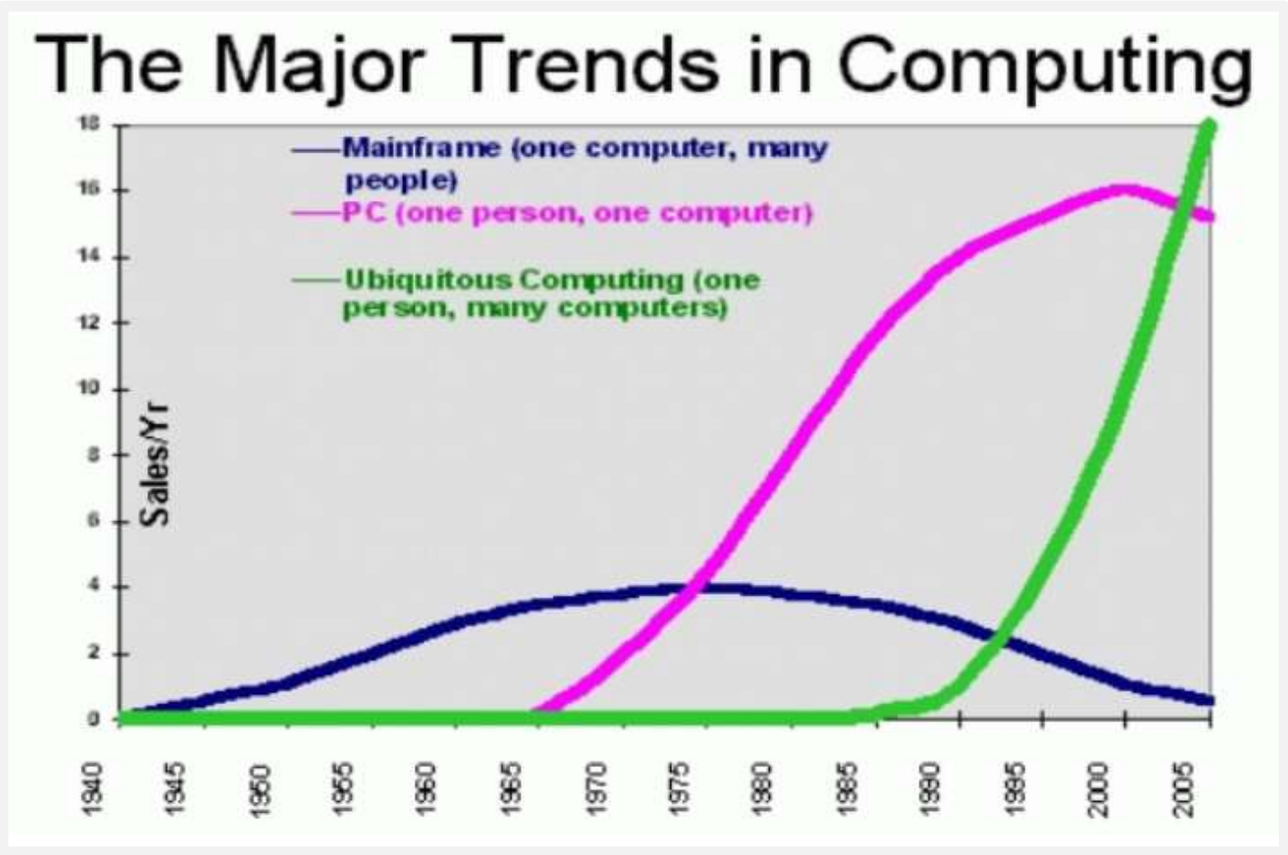
- **Mobile computing involves mobility**, but not necessarily with wireless computing; there can be stationary nodes connected wirelessly
- **Wireless computing aids mobile computing**
- Mobile computing without wireless networks? Nomadic computing - often means user mobility without device mobility

Pervasive Computing

- Computing that “pervades” into our life
- Mobile devices (embedded) in the environment (and surrounding users) workingtogether
- Embedding computation/computers into everyday life

Pervasive = diffused throughout

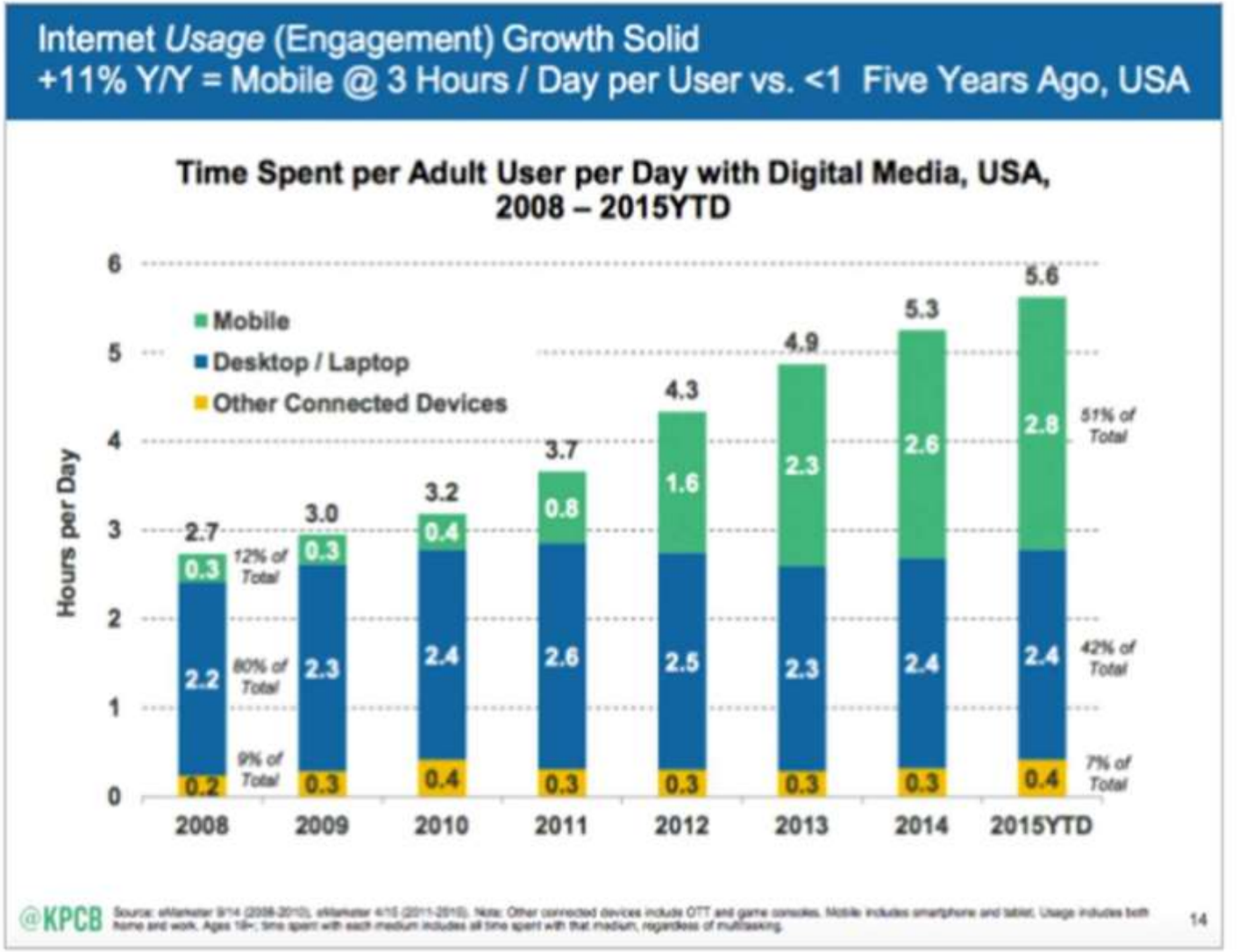
1.1.2 Why study mobile computing?



Hansmann, Uwe (2003). Pervasive Computing: The Mobile World. Springer

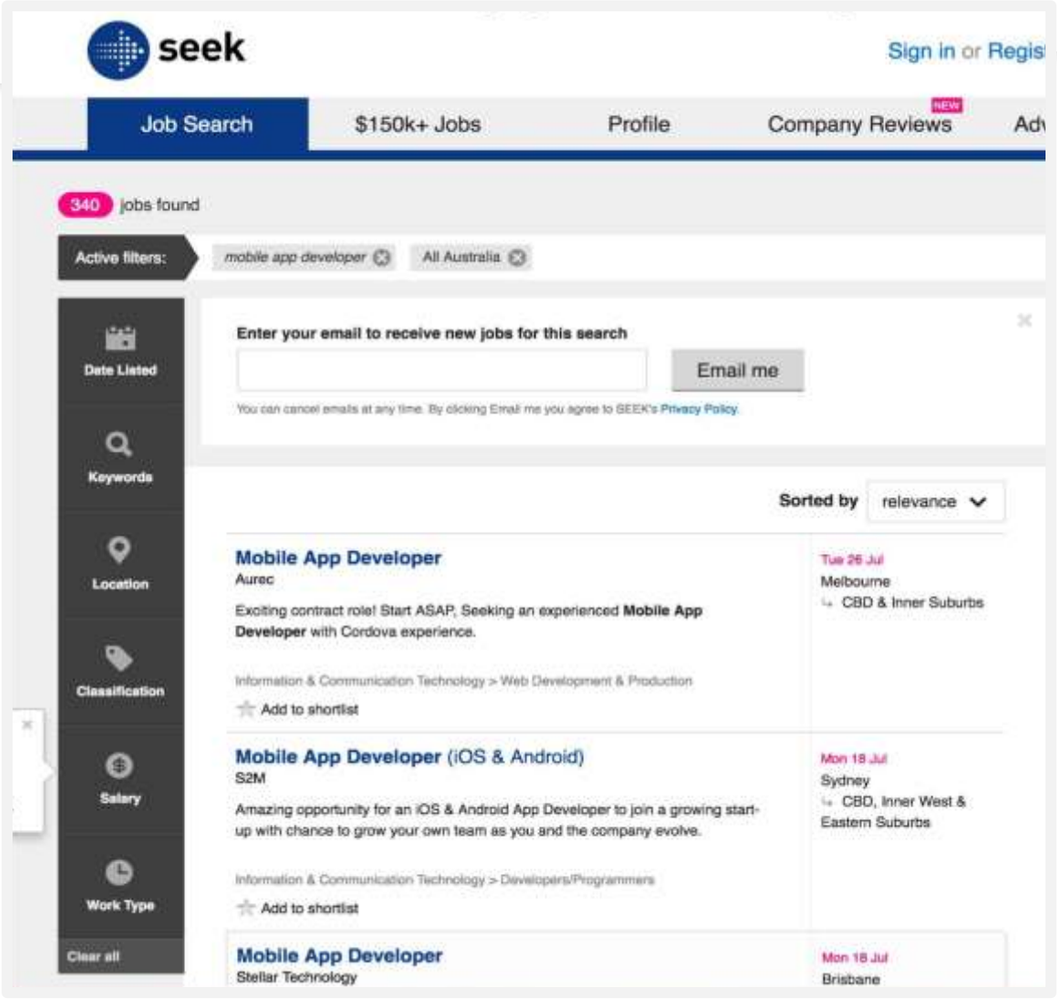
- Can you live without your mobile device?
- A computing tool, anywhere anytime!

How much time do consumers spend using mobile media?



http://www.smartinsights.com/mobile-marketing/mobile-marketing-analytics/mobile-marketing-statistics/

Are there jobs for mobile app developers?



1.1.3 What is special about ‘mobile’ computing?

- Unique capabilities:
  - Sensing (Location, accelerometer, compass, bodysensing)
  - Social Connectivity- your mobile device is almost tied to you
  - Media capture: photo, recording -> share yourexperiences
- Inherent limitations:
  - Not a lot of computing resources compared todesktops/servers, i.e., low computational power (CPU, memory)
  - Form factor has implications for UI (screen size, inputmethods)
  - Low connectivity
  - Limited energy (battery)
- Characteristics of user: on the move, less patience (expects just- in-time information), may change devices

Let’s think about you for a moment…

What would you like out get from this subject?

Where does this subject fits into your degree & career?

User Stories

- As a student I am curious about mobile computing..
- As a student I want to build apps
- As a student I want a career in mobile development

1.1.4 Mobile devices

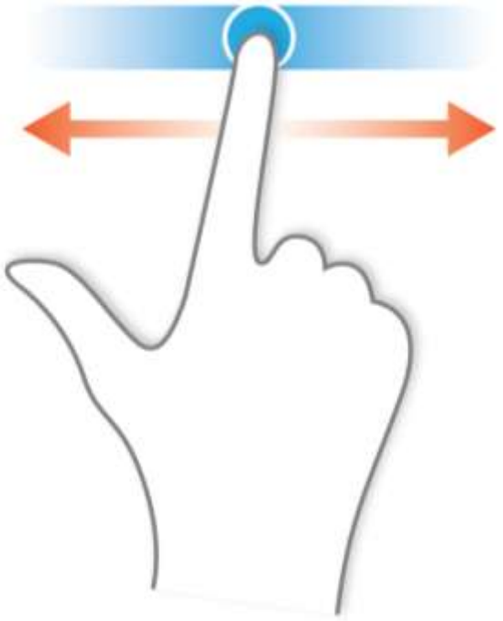
Two tracks:

- horizontal devices: general applications (e.g., smartphones, communicators)
- vertical devices: narrow function and specific application (e.g., bar code scanners, mobile game consoles, in-car mobile clients)

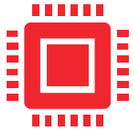
Mobile devices contd…

Input Mechanisms:

- finger gestures, voice recognition (on client or server) , pen-based (Graffiti, natural handwriting , etc), keyboard, keypad (e.g., on some retro phones)



1.1.5 Mobile Computing Software



Hardware, operating system, applications

e.g., new OS…

energy conservation…

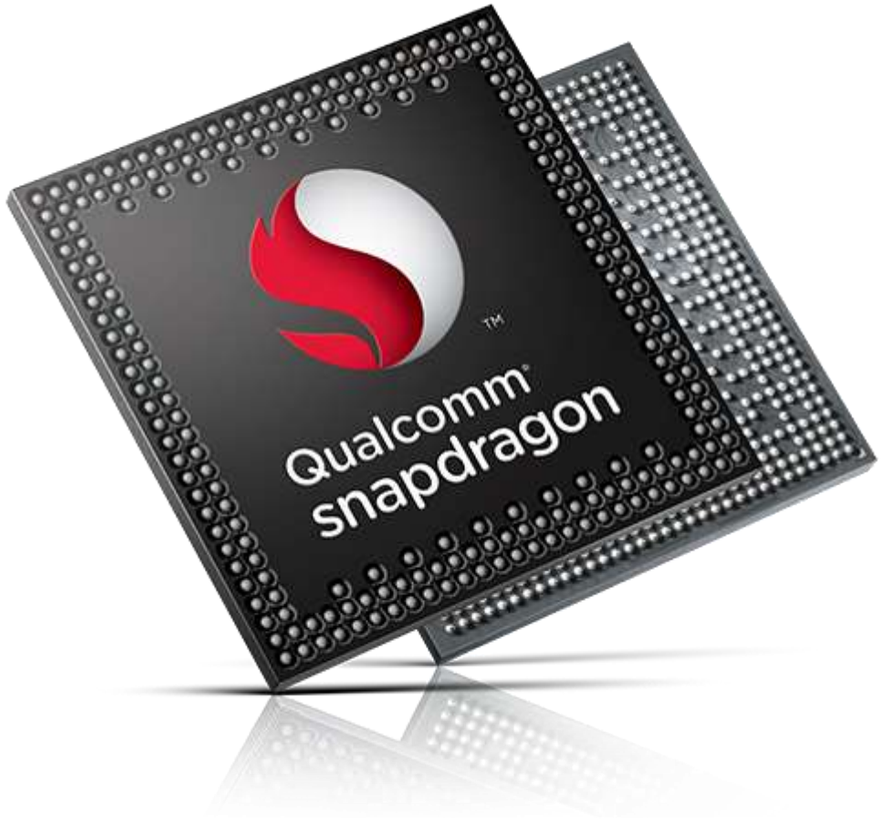
networking ability…

input mechanism…

Mobile devices' intrinsic limitations influence the design of mobile computing hardware and software at all levels, otherwise similar structure as on a desktop:

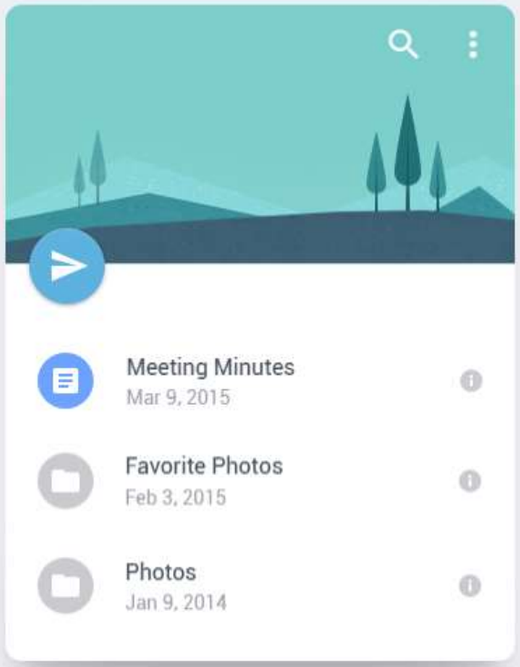
Case study – impact of power on hardware

1. Reduce capacitance by increasing the multichip module technology.
2. Reduce voltage by redesigning chips operating at lower voltage.
3. Reduce clock frequency by trading off computational speed for power savings.
4. Power management has spawned a new breed of energy efficient CPU's.



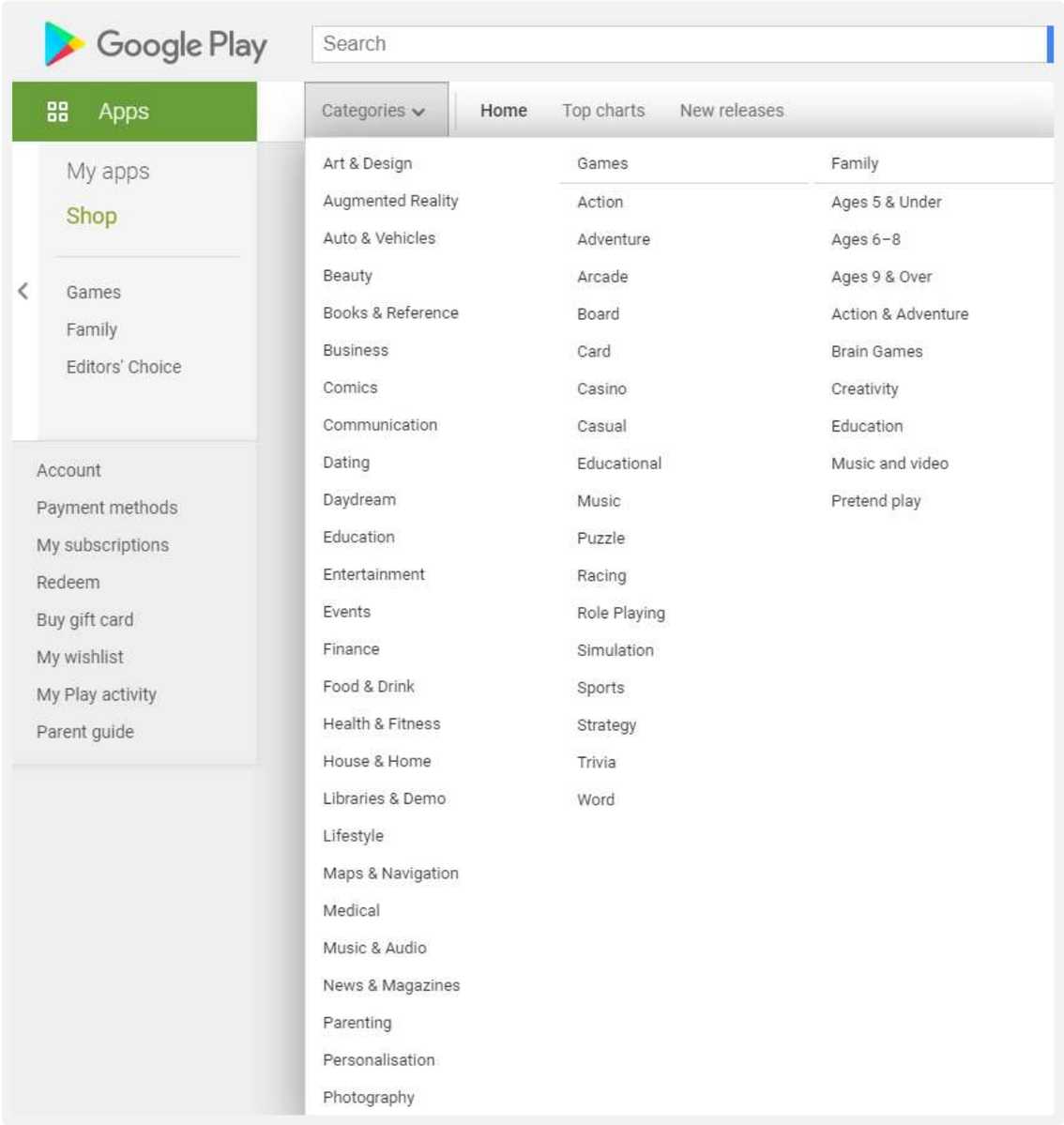
Case study – impact of power on software

- Appropriate GUI design reduces power consumption
- E.g. Low-energy colour schemes, reduced screen changes, hotkeys, user input cache & content placement increases user productivity and reduces energy cost per task



Applications of Mobile Computing

What apps do you use on your smartphone?



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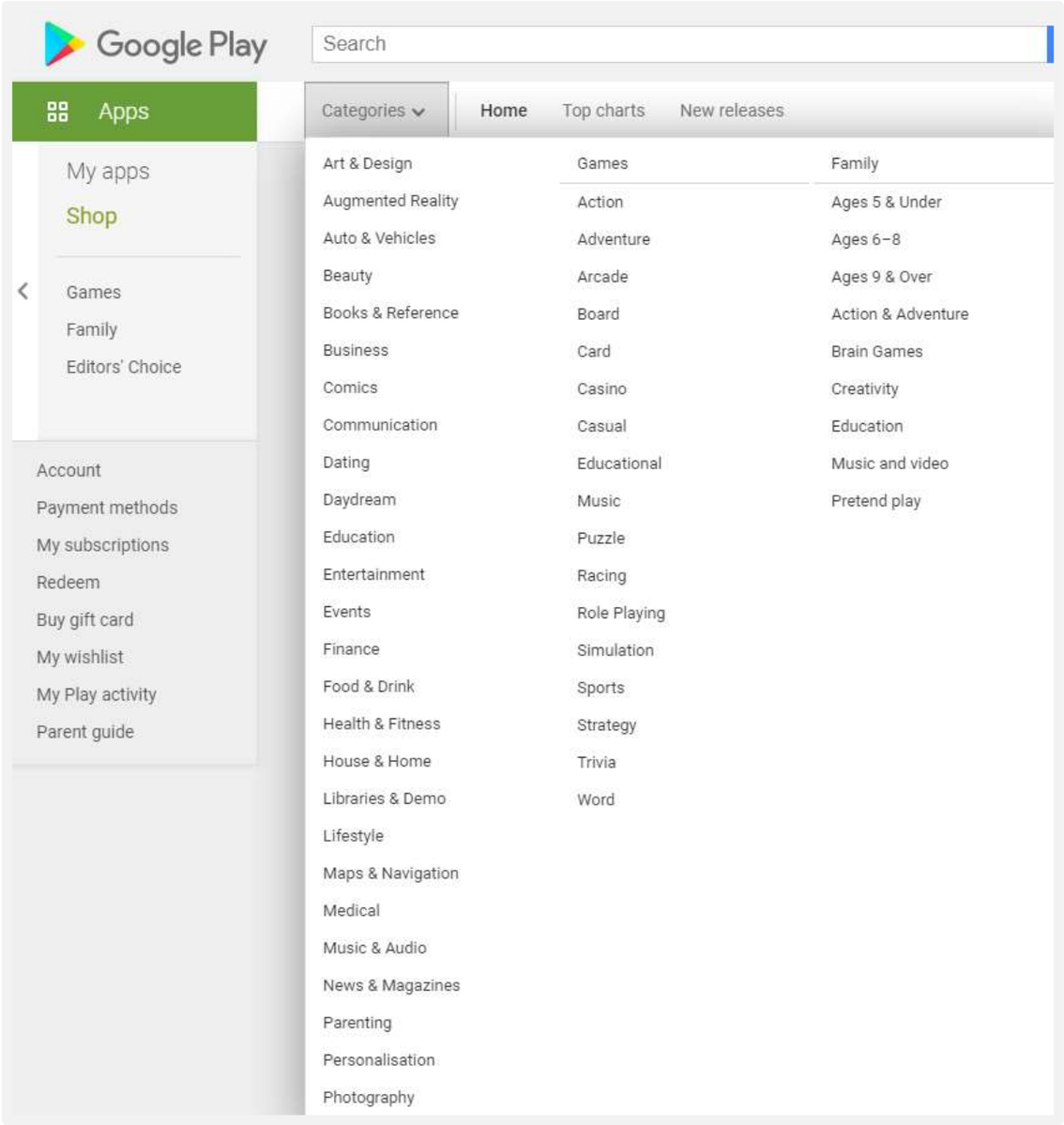
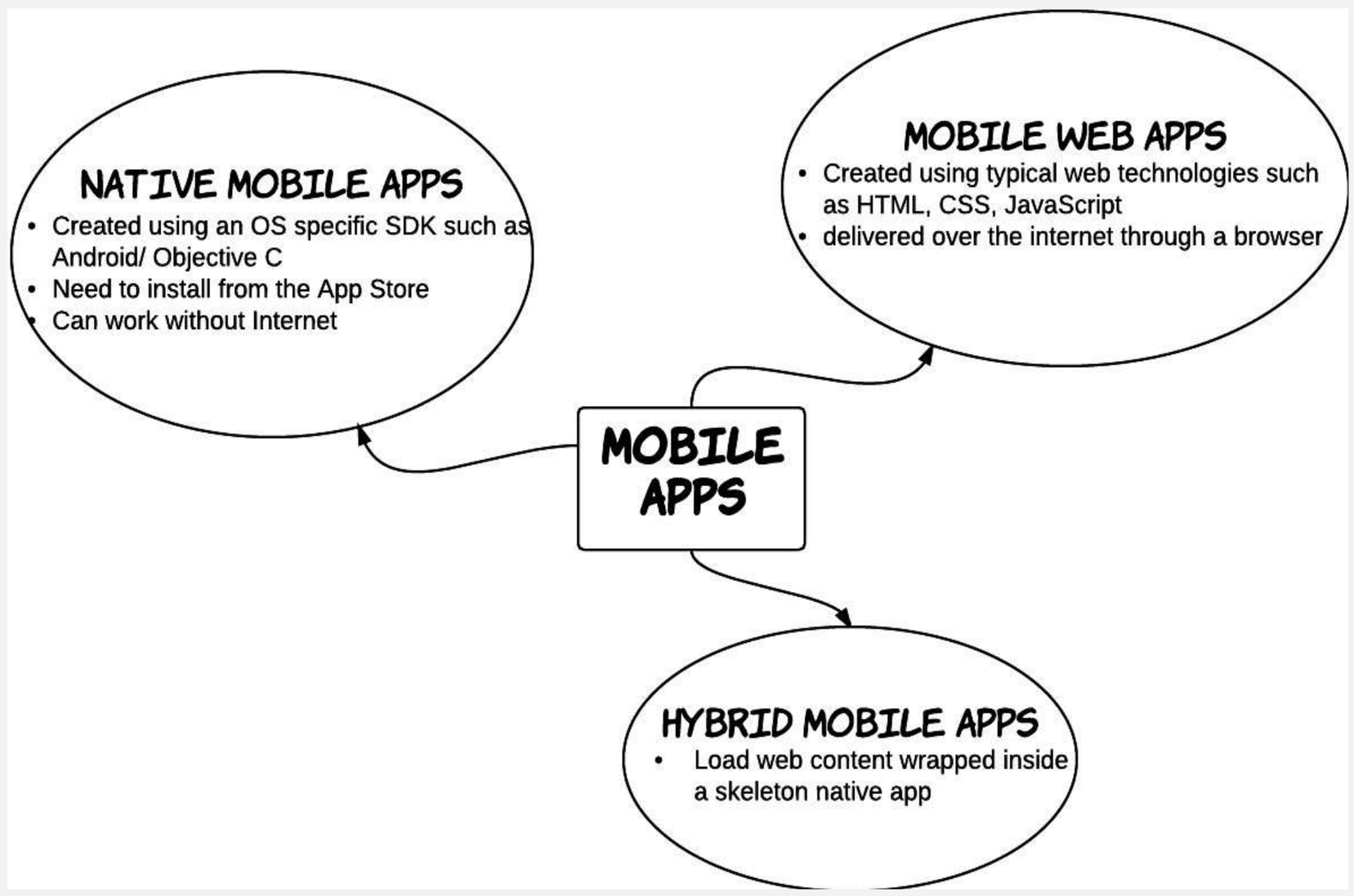


1.1.6 Types of Mobile Apps

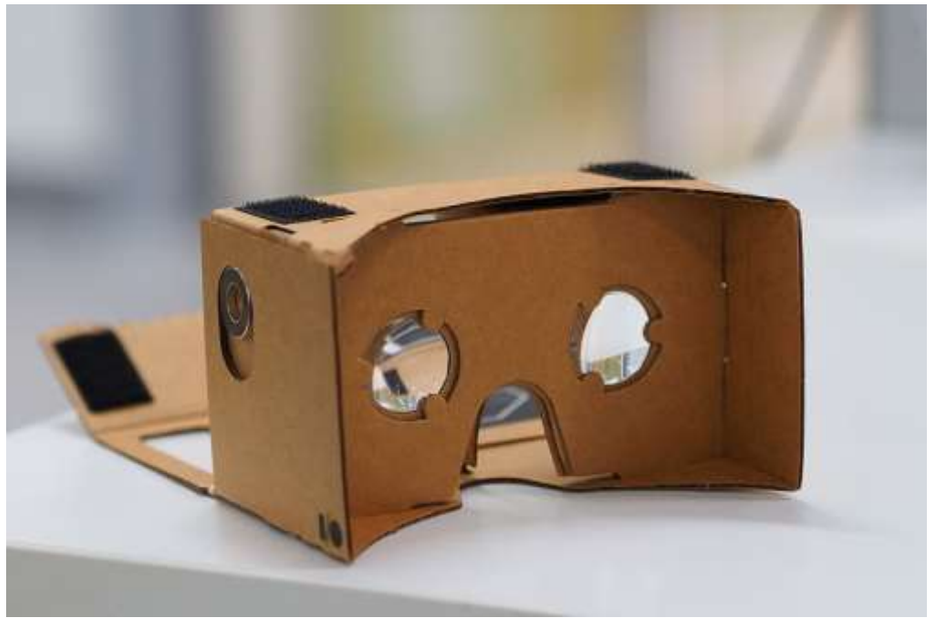


1.1.6 Types of Mobile Apps

https://youtu.be/Ns-JS4amlTc

Mobile Apps

- Banking – cardless cash, wallet
- Weather
- Navigation – maps, tram tracker, journey planner
- Games – Angry birds, Candy crush
- Control your home remotely
- Music : Spotify
- Exercise: Strava (cycling)
- Productivity: Evernote, Keep, sync Calendars
- Mobile VR
- Social networks: FB, Snapchat
- Communication: Whatsapp, Viber



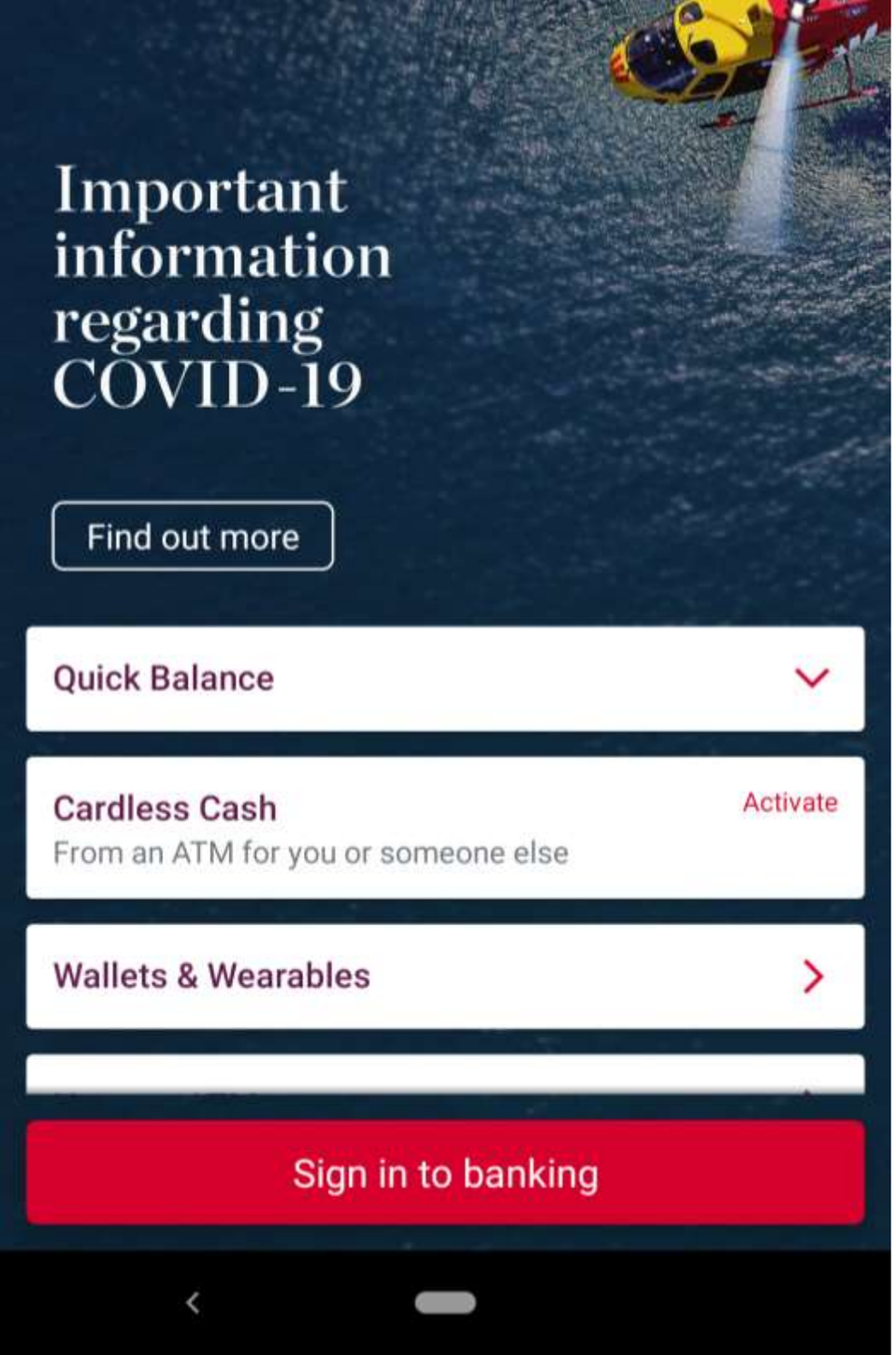
What goes in to making these apps?

1.1.7 Considerations when developing a mobile app

- Web-based vs App

  Is it a business function that the user is going to perform often, and which they need readily available at all times their mobile device?
- What services to offer?
- Key concerns?

How people use mobile applications is fundamentally different than how they use websites. Need to consider the *context of use.*



Example: A Banking App

Key concerns:

- Security
- Services offered
- Reliability
- User authentication

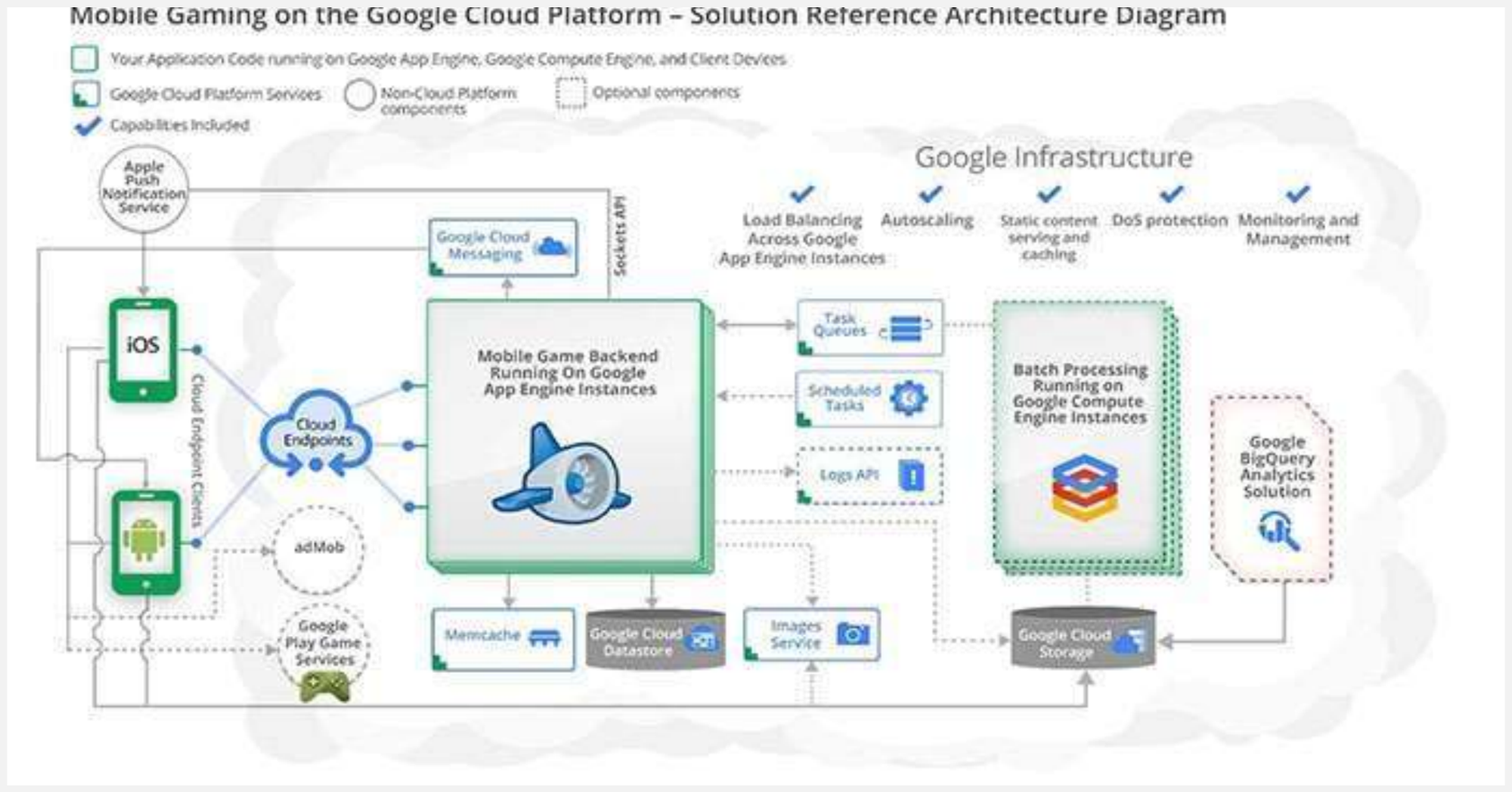
Are there any services that you are more likely to need on your mobile banking app than on your online banking site? Find the nearest ATM? Cardless Cash?

https://youtu.be/I10NsB4TXtw

Example: A Gaming App

- Offline/ Online?
- Performance
- Support multiple resolutions - a wide range of different screen sizes and aspect ratios
- User authentication - Log in using social networks?
- Multi-player or Single player?
- Pricing? Download for free, pay for extras?
- Advertising

Example: Mobile gaming on the Google Cloud platform



https://youtu.be/M2H1VRqSYF4

Pause for a moment…

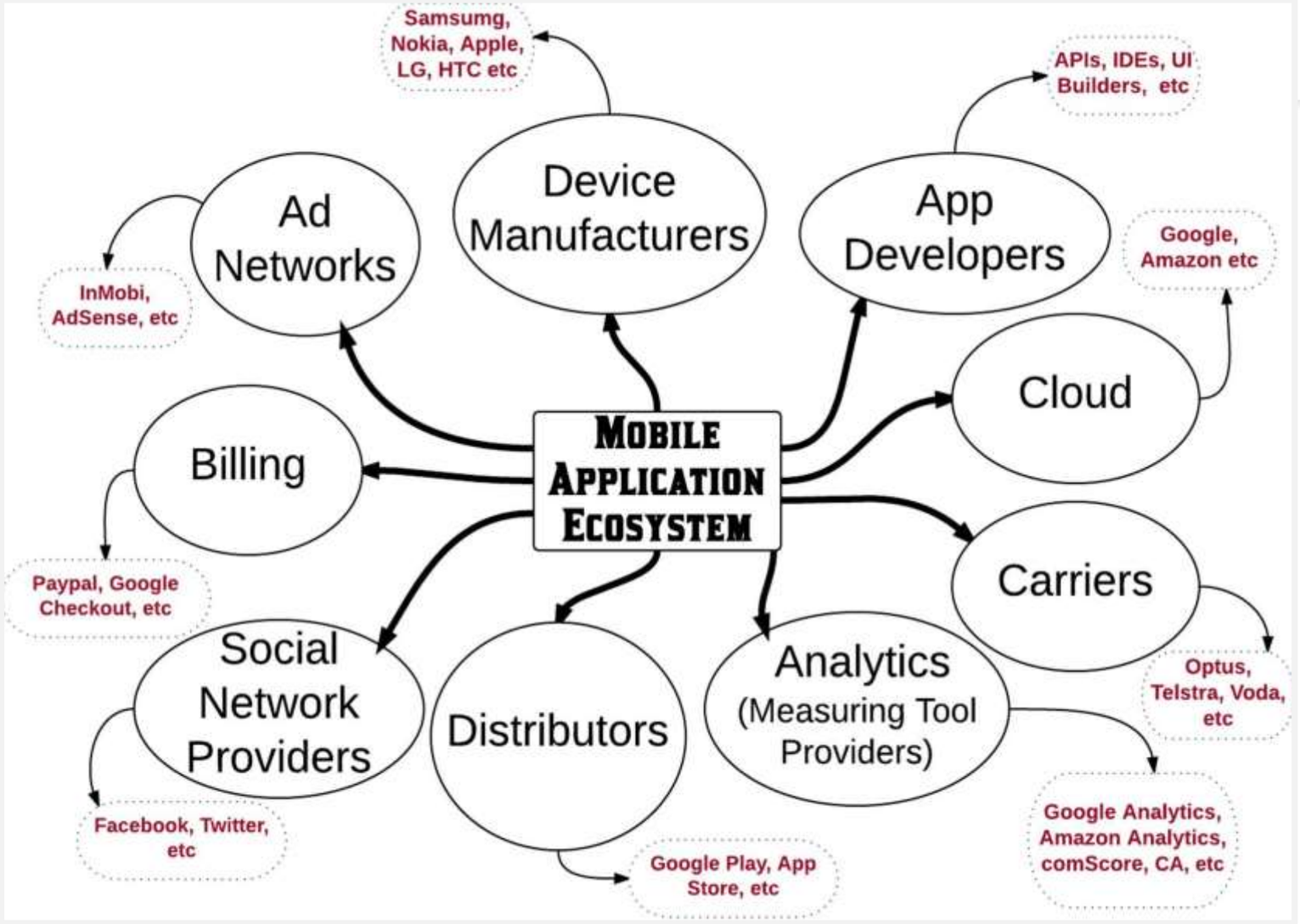
https://youtu.be/DQLyhcMoZUQ

We'll have a whole topic on this later this semester

Progressive Web Apps use the latest web capabilities to deliver an app-like experience

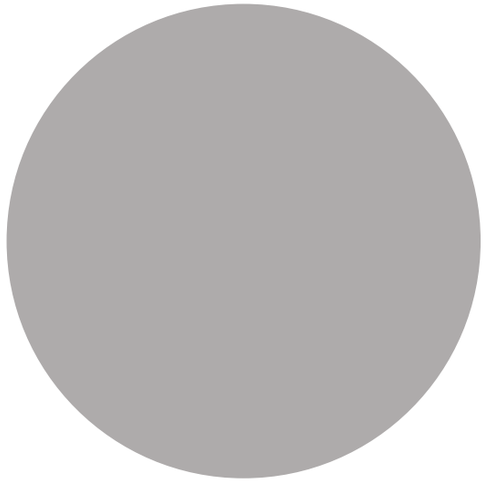
If you want to know morecheck out; https://youtu.be/mmq-KVeO-uU

1.1.8 Mobile App Eco-System



Summary

- Mobile computing and related terms
- Characteristics &Limitations of Mobile computing
- Mobile devices
- Mobile computing software &applications




Android Studio

Practical first steps
Interactive demo

https://github.com/latrobe-cs-educator/CSE2MAD_Lecture1_DemoApp