



# Programming with Android: Module Overview



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Università di Bologna**



# Android ... **Why?**

## GOALS OF THE MODULE:

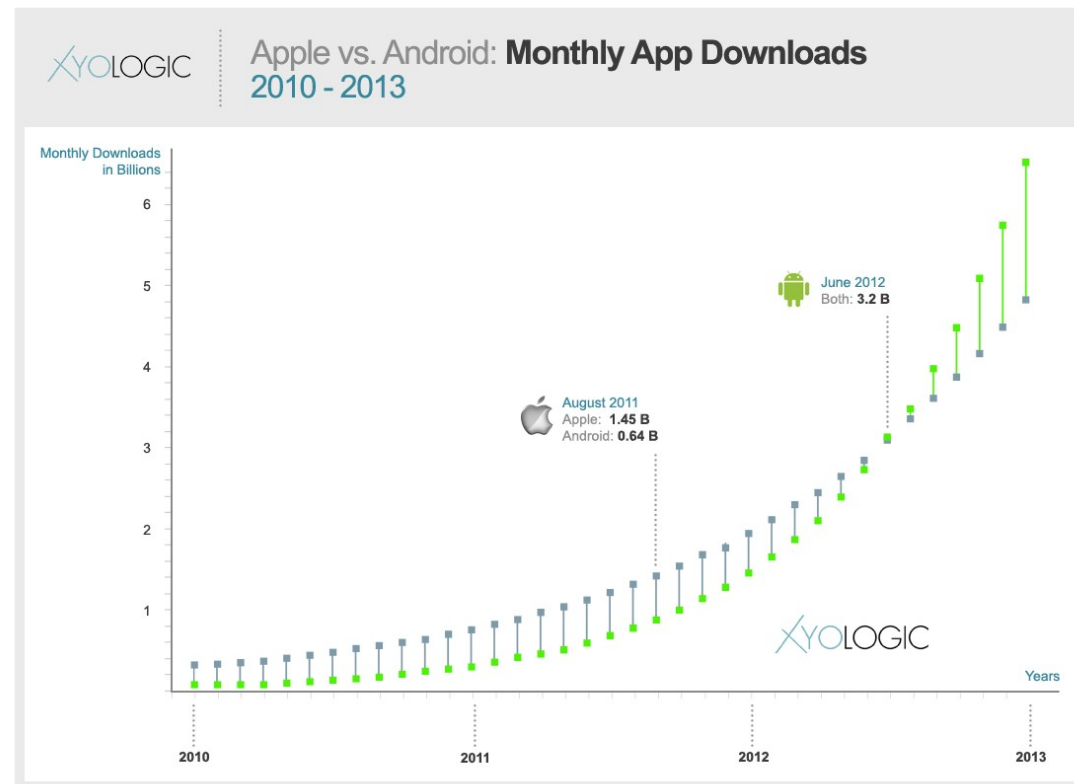
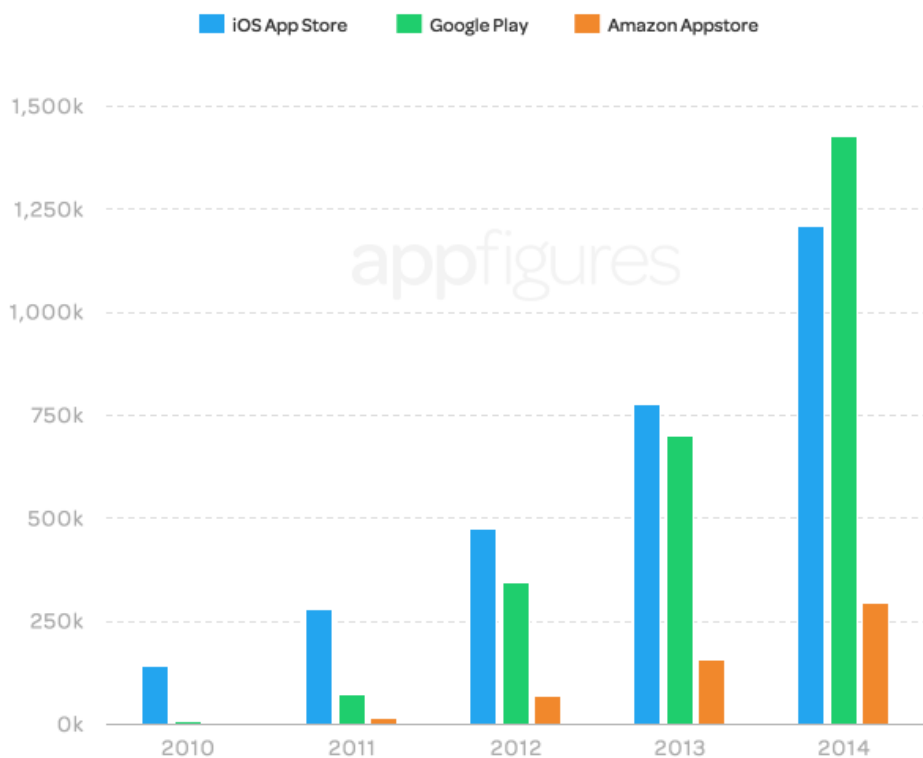


- Introduce the Android architecture
- Implement Android applications
- Think in *Android terms*



# Android ... Why?

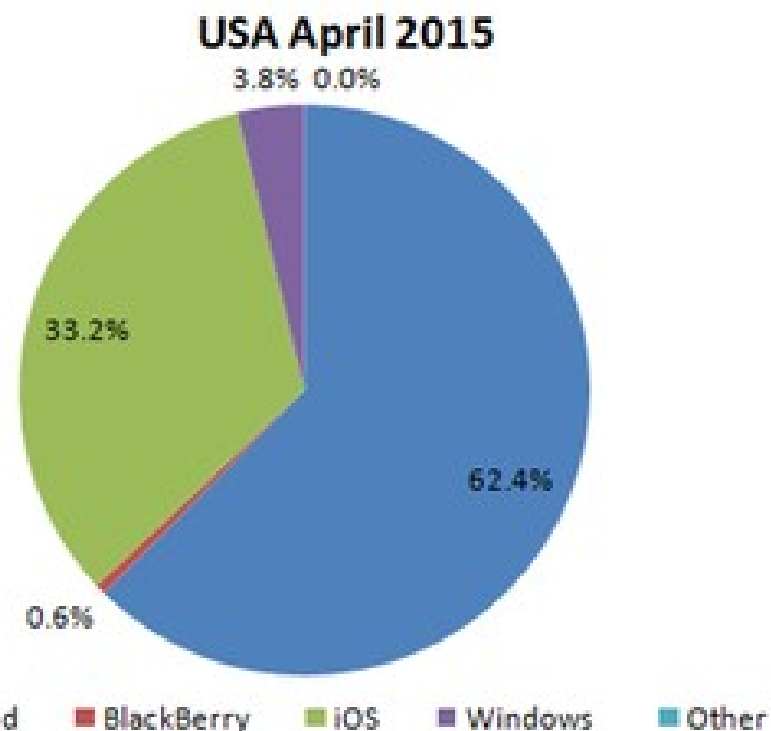
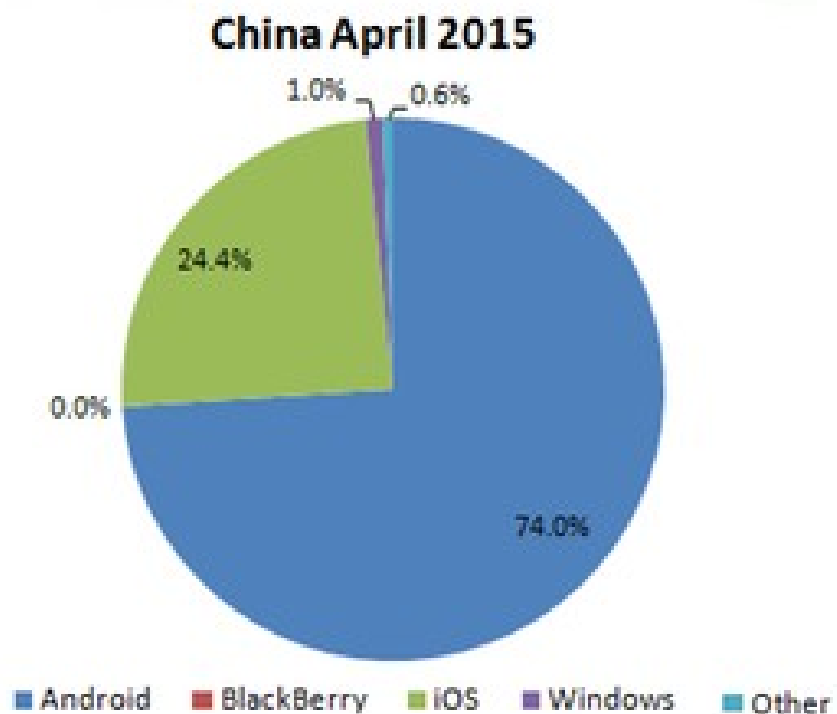
Total Number of Apps by App Store





# Android ... Why?

## Smartphone Operating System Market Share



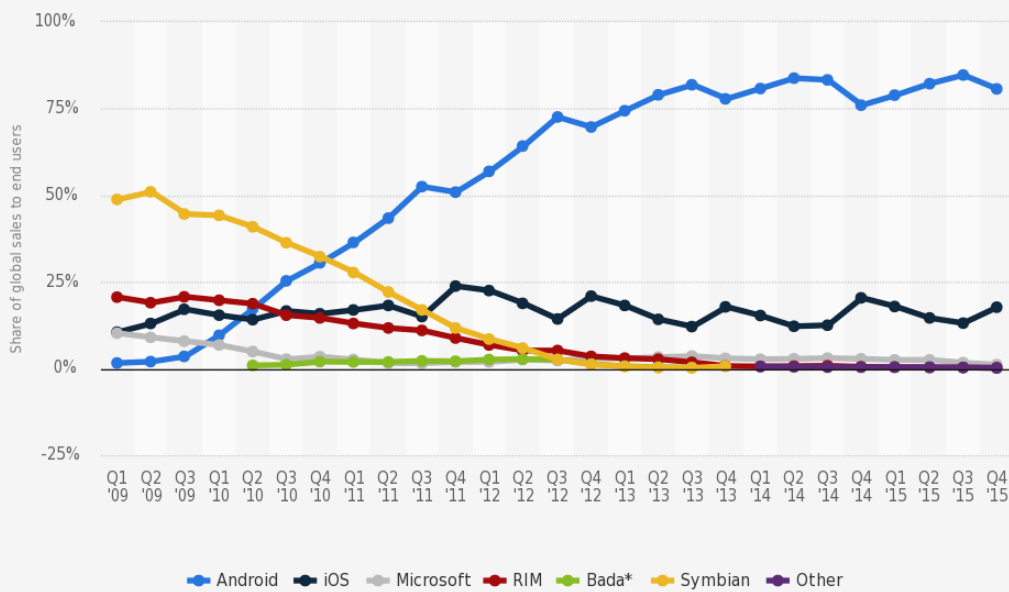
Market Realist

Source: Kantar World Panel



# Android ... Why?

Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 4th quarter 2015

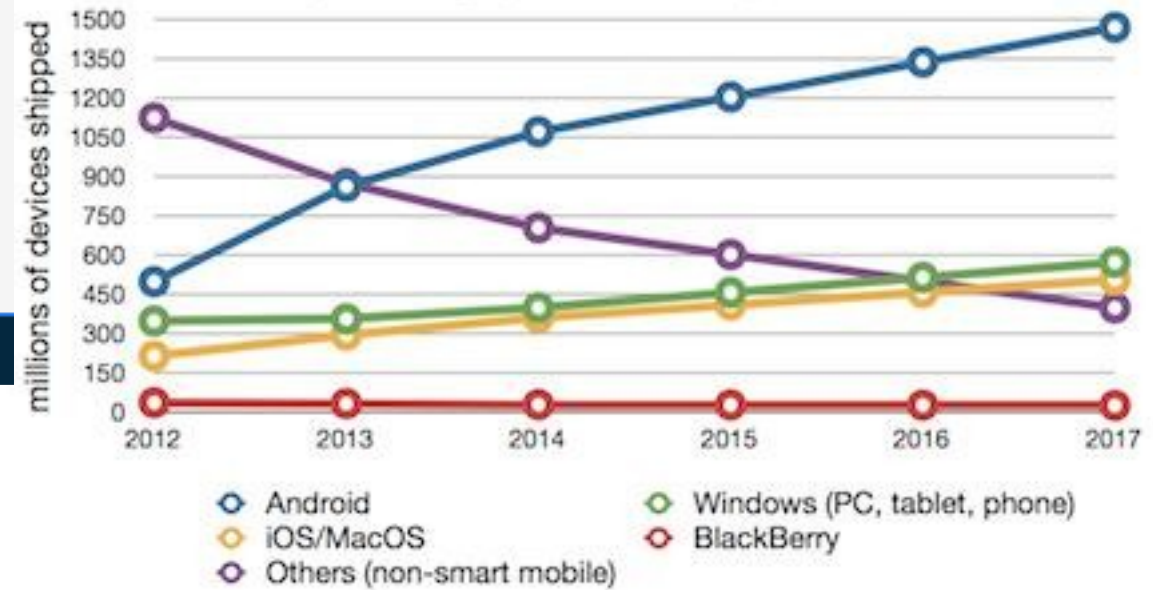


Source: Gartner  
© Statista 2016

Additional Information: Worldwide, Gartner



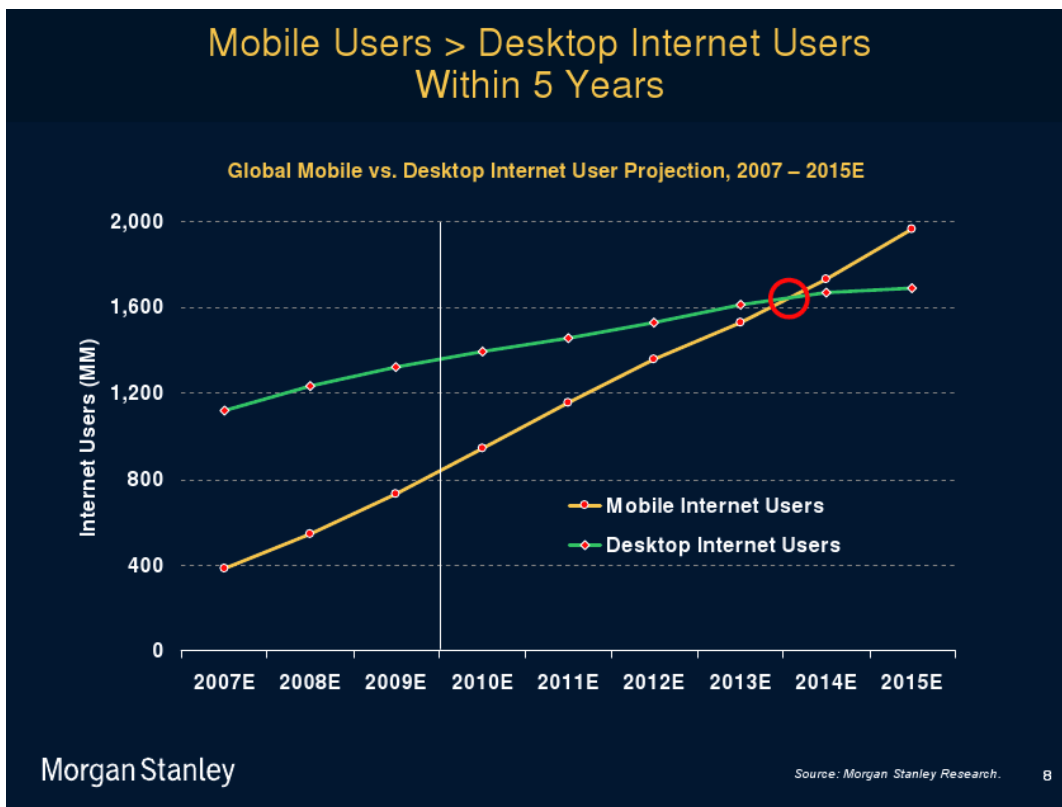
Operating systems: the years ahead



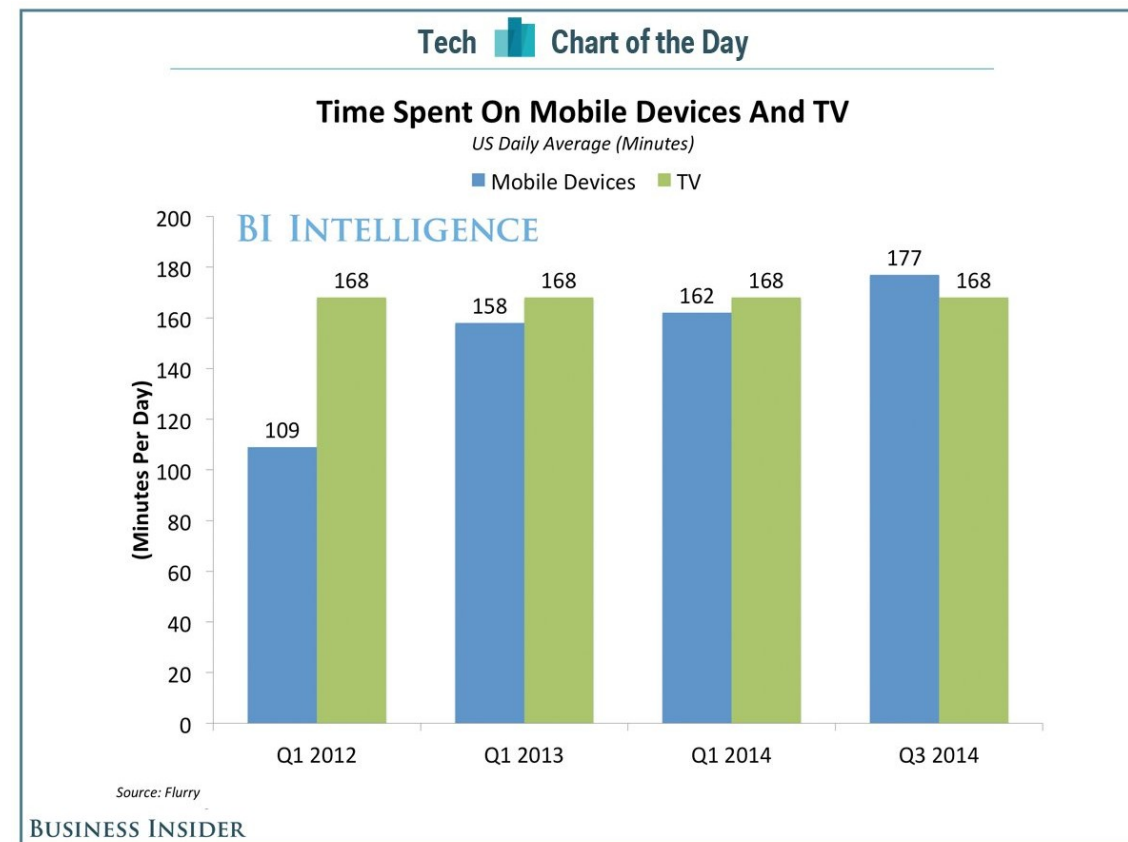


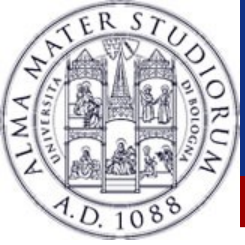
# Android ... Why?

## MOBILE INTERNET USERS WORLDWIDE

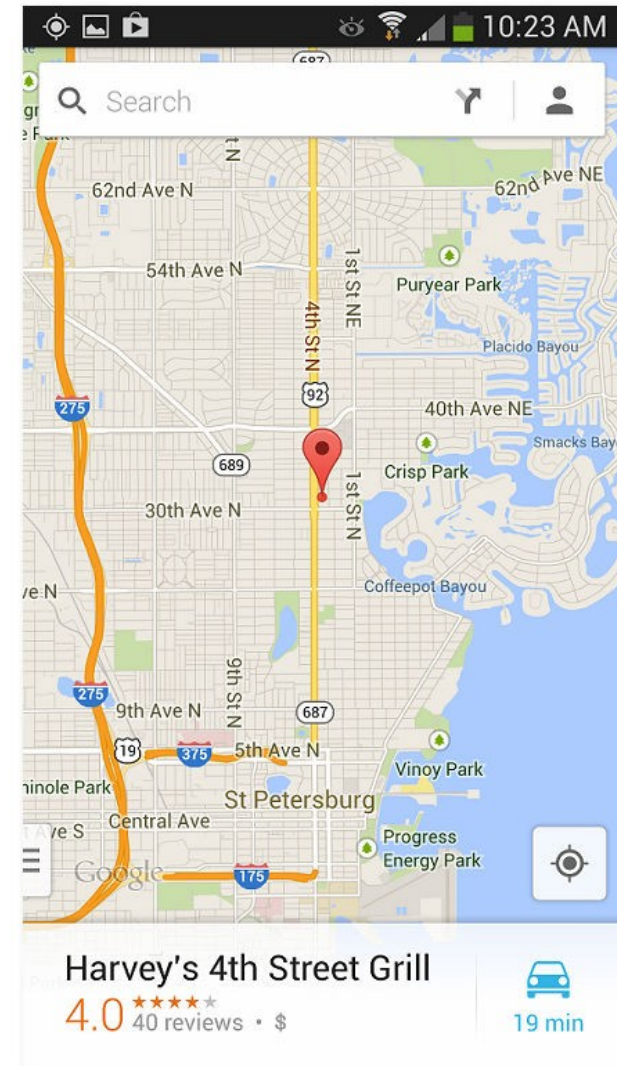
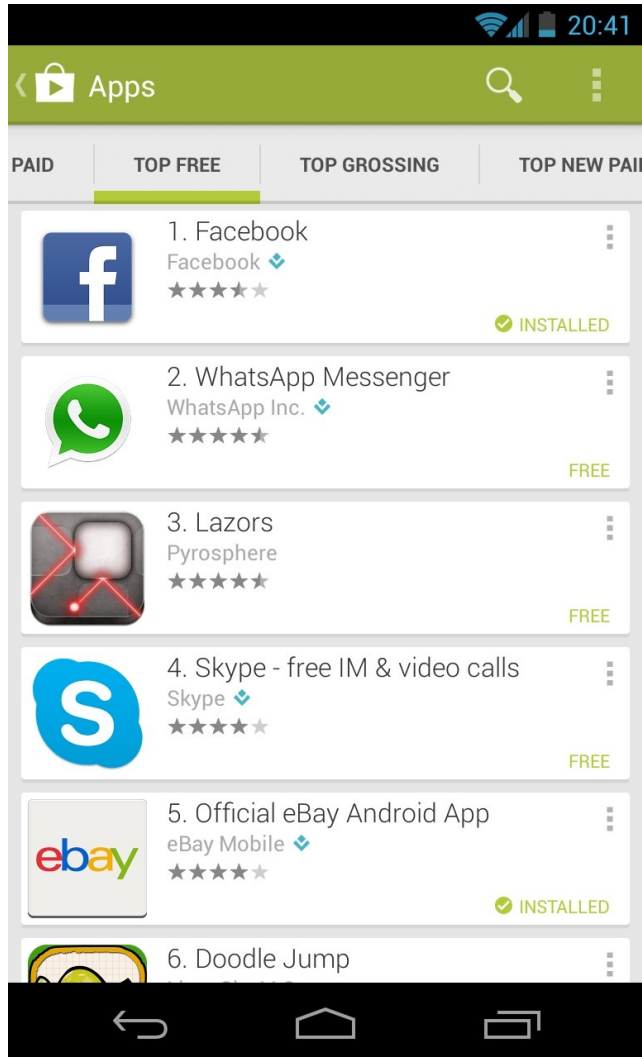


## MOBILE DEVICE DIVERSIFICATION



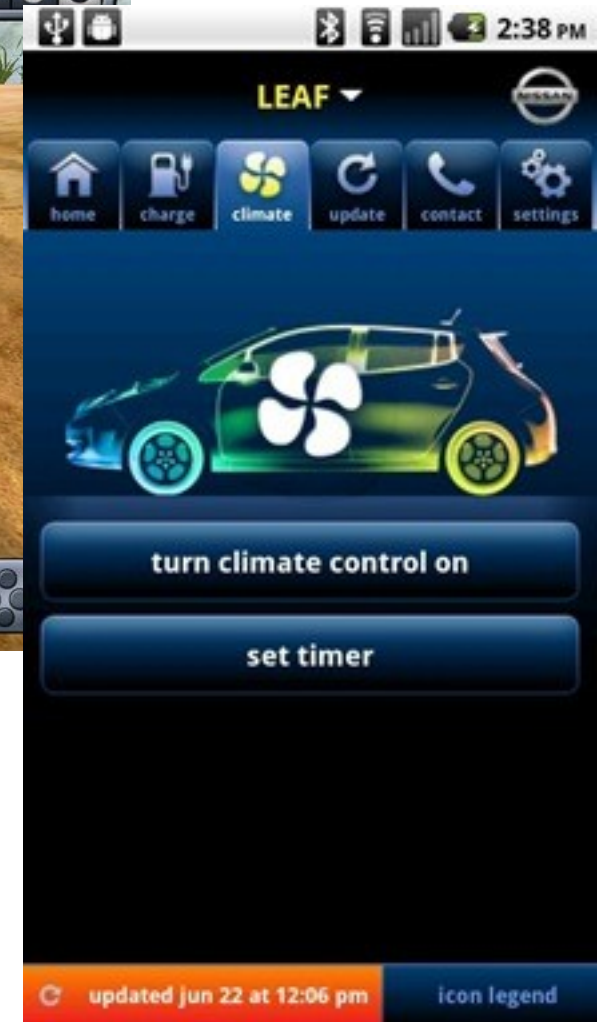
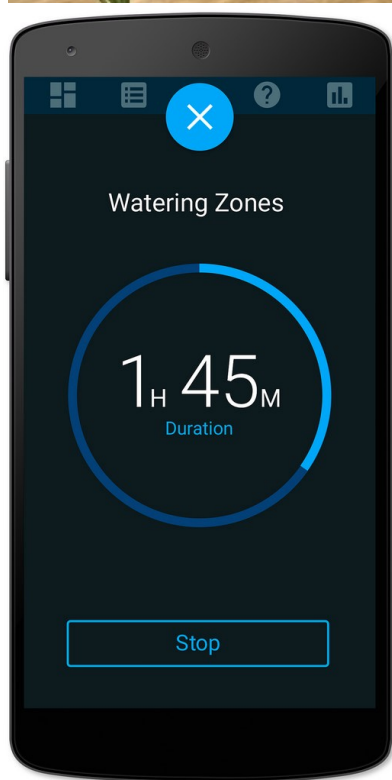
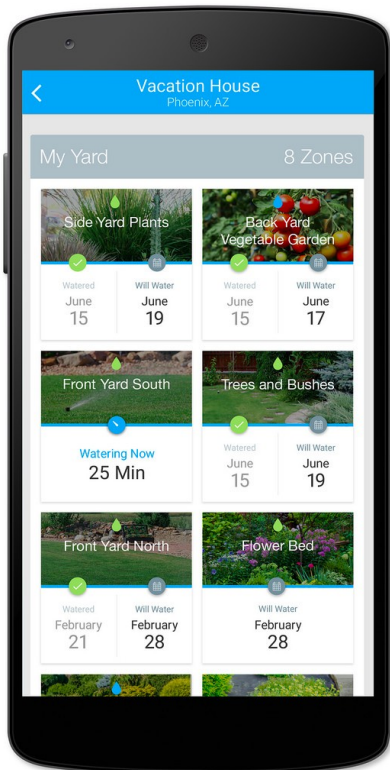
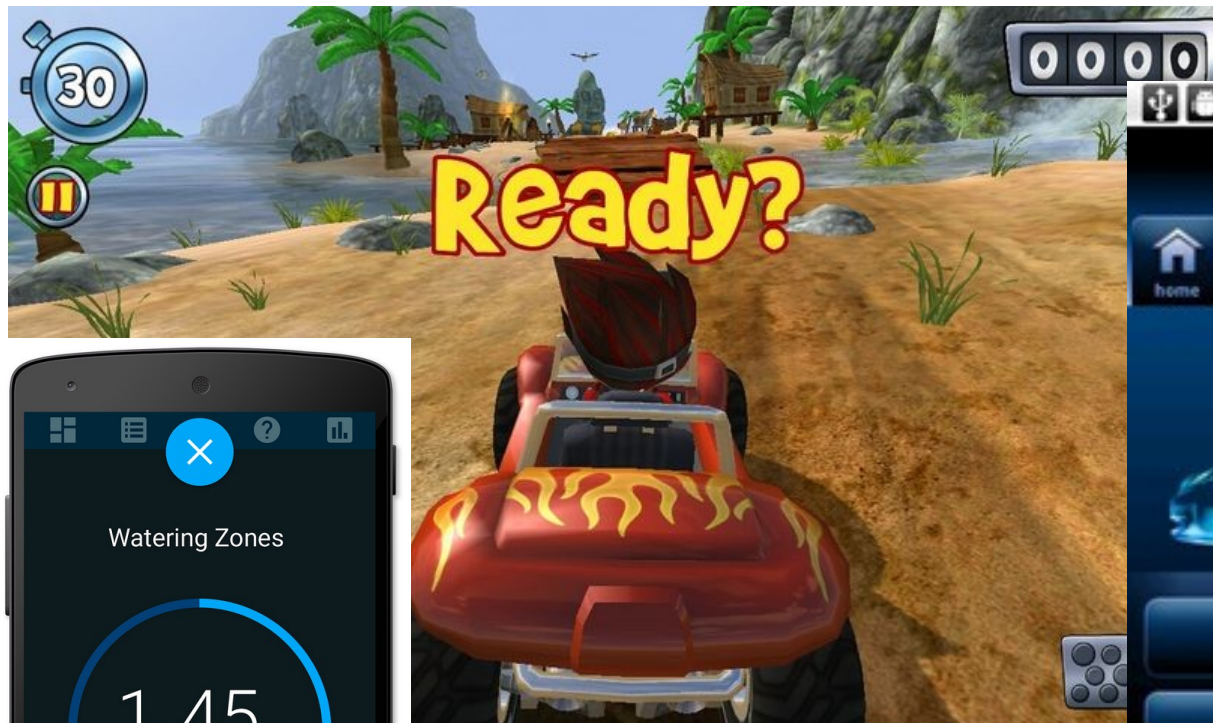


# Android: Some Examples ...

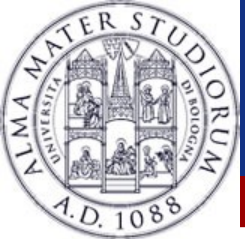




# Android: Some Examples ...















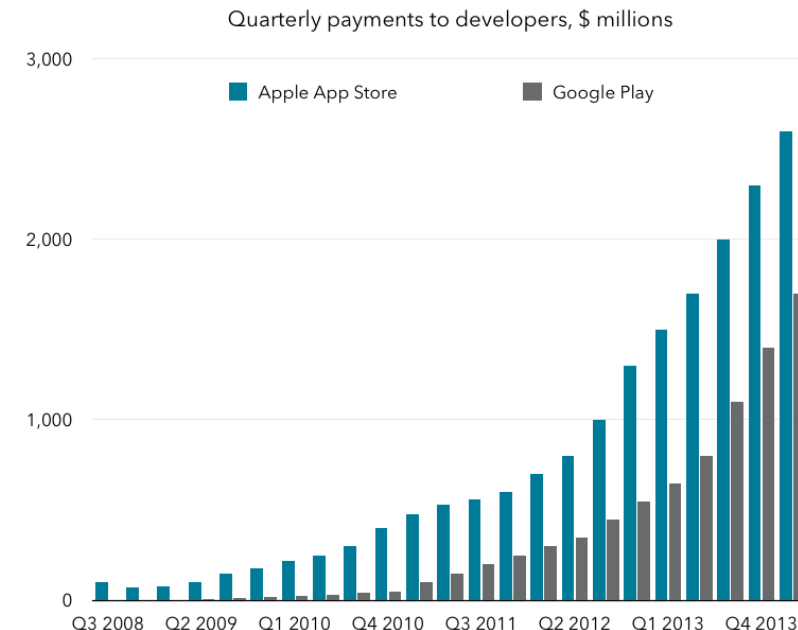




# Android: where is the business?

App: più popolari a pagamento

 1. Minecraft Mojang ★★★★★ 6,99 €	 2. Geometry Dash RobTop Games ★★★★★ 1,99 €	 3. IPTV Extreme Pro Paolo Turatti ★★★★★ 1,19 €	 4. F1 2016 Codemasters Software ★★★★★ 2,29 €	 5. Hitman Sniper SQUARE ENIX Ltd ★★★★★ 0,99 €	 6. Football Manager SEGA ★★★★★ 7,49 €
 7. Scribblenauts Re-imagined Warner Bros. Internatio ★★★★★ 0,74 €	 8. Costruisci con SpongeBob Nickelodeon ★★★★★ 0,10 €	 9. 60 Seconds! Atomic Adventure Robot Gentleman ★★★★★ 4,09 €	 10. Nova Launcher Prime TeslaCoil Software ★★★★★ 4,50 €	 11. WeCroak KKIT Creations ★★★★★ 0,99 €	 12. Torque Pro (OBD2 Scanner) Ian Hawkins ★★★★★ 3,55 €

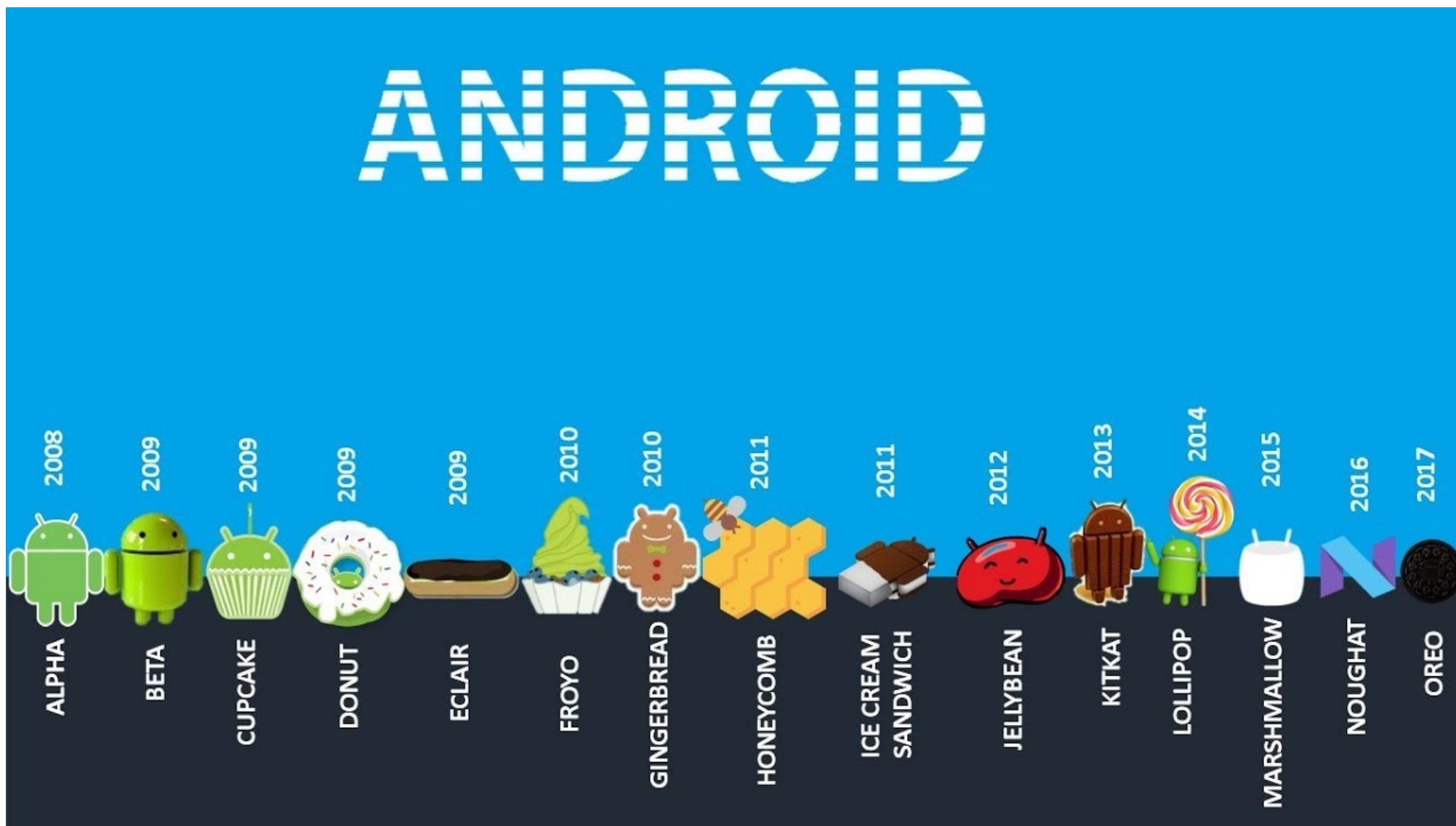


Source: Google, Apple, Jackdaw Research estimates

➤ **RATIONALE:** Focus on amount of applications sold, not on price of single applications ...

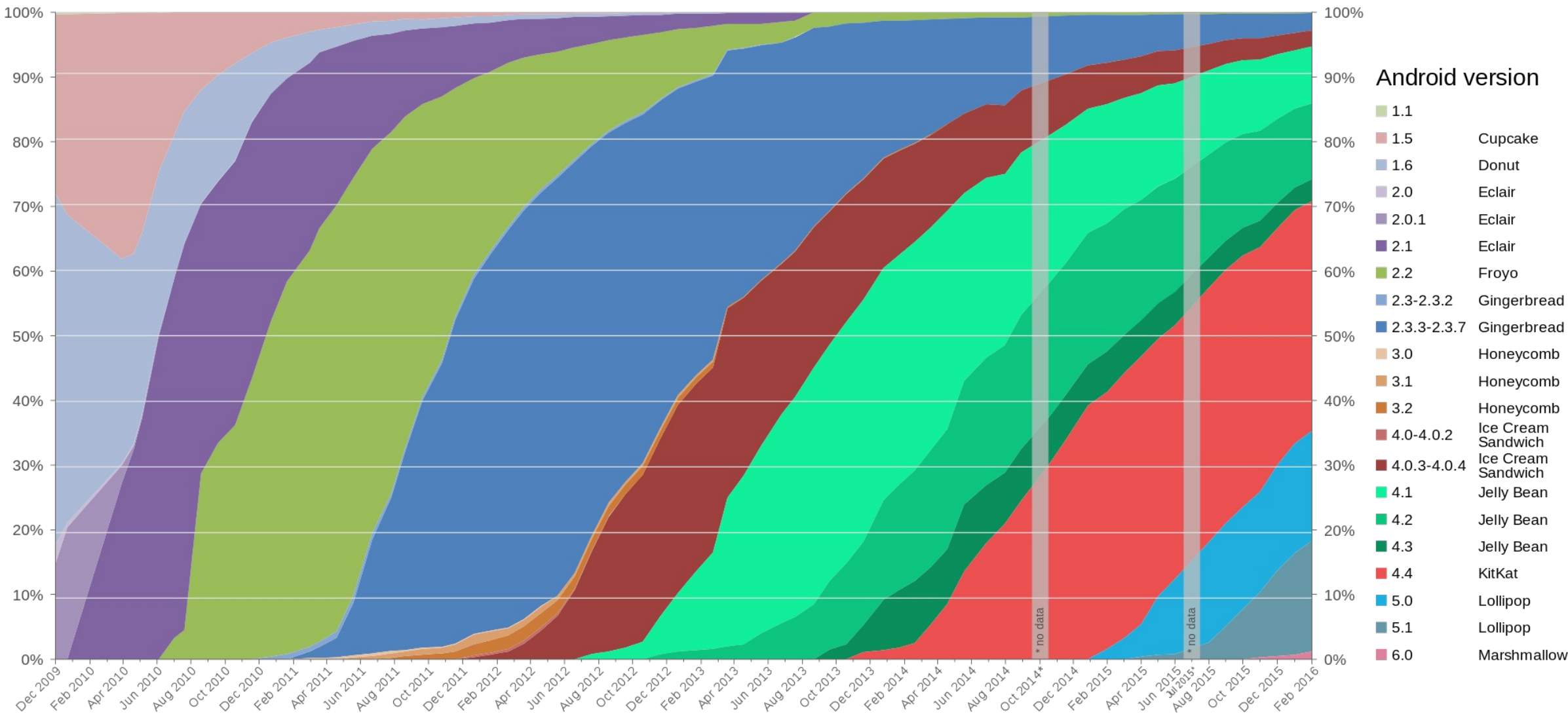
	Google	Apple	Microsoft
Number of users (in millions)	900	600	12
Number of apps (in thousands)	800	1250	160
Number of developers (in thousands)	150	235	45
Number of downloads (in billions)	48	50	.65
Paid to developers (in millions)	900	5000	100

# Android: versions





# Android: versions





# Android ... **How?**



1. The Android **Project**
2. Android **Architecture** and **Components**
3. Android Component: **Activities**
4. Android Component: **Intents**
5. Android **Resources** System
6. Android **Layout**: View and ViewGroups
7. Android **Event** Management Systems
8. Android **Animation**, **Menu**, **Dialog**
9. Android **Data** Management



# Android ... **How?**



10. Android **Network** Management System
11. Android and Google **Maps**
12. Android **Gesture** and **TextSpeech**
13. Android **System** Services
14. Android and **Bluetooth**
15. Android for **Tablets**



# Android ... How?



**Textbook**

*Android: Guida per lo sviluppatore*

**Author**

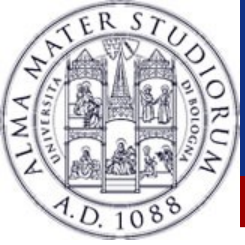
*Massimo Carli*

**Other resources:**

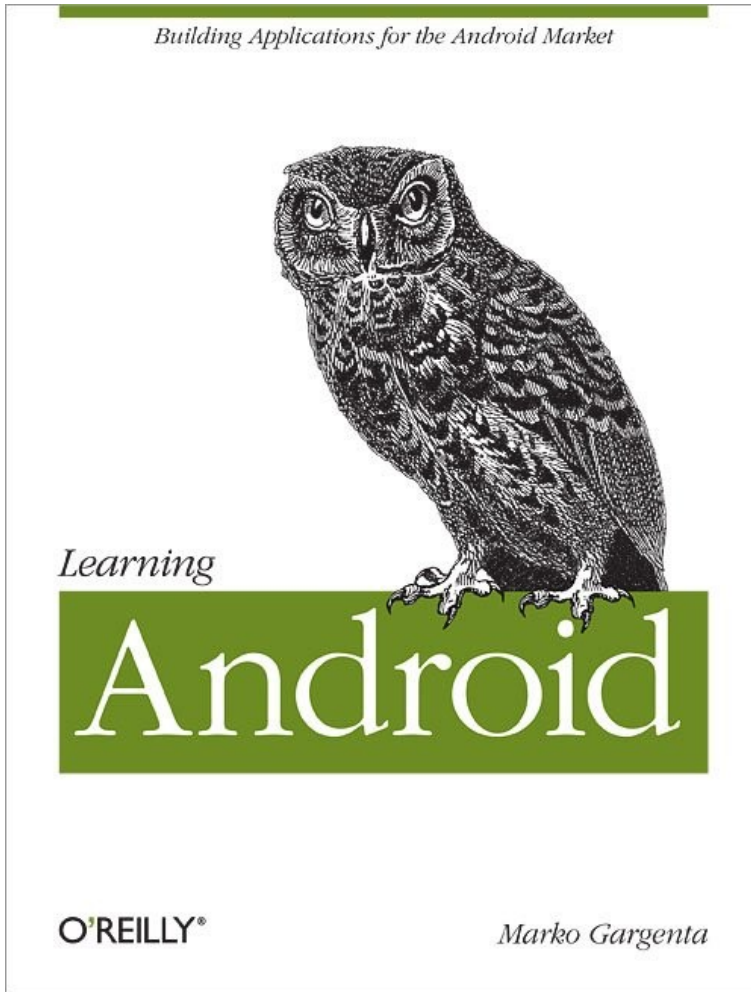
➤ **Slides**

➤ **Online Tutorials**

➤ **Newsgroups**



# Android ... **How?**



## Textbook

*Learning Android (O'Reilly)*

## Author

*Marko Gargenta*

## Other resources:

- **Slides**
- **Online Tutorials**
- **Newsgroups**



# Android ... **How?**

## PRE-REQUISITES:

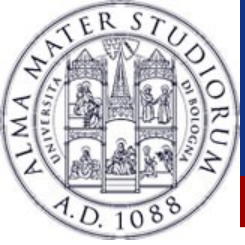
- Object-Oriented Programming

(We will use **Java** for Android applications coding ...)

- XML Essentials

(We will mix *declarative* and *programmative* approaches)





# Android ... **Contacts**

## WEBSITE

➤ <http://cs.unibo.it/projects/android>

Slides, projects proposals, useful links

➤ [ibedogni@cs.unibo.it](mailto:ibedogni@cs.unibo.it)

For meetings, questions, thesis



# Android ... Piazza

## WEBSITE

- Register at:
  - [www.piazza.com](http://www.piazza.com)
  
- Class URL
  - <https://piazza.com/class#spring2018/lam>

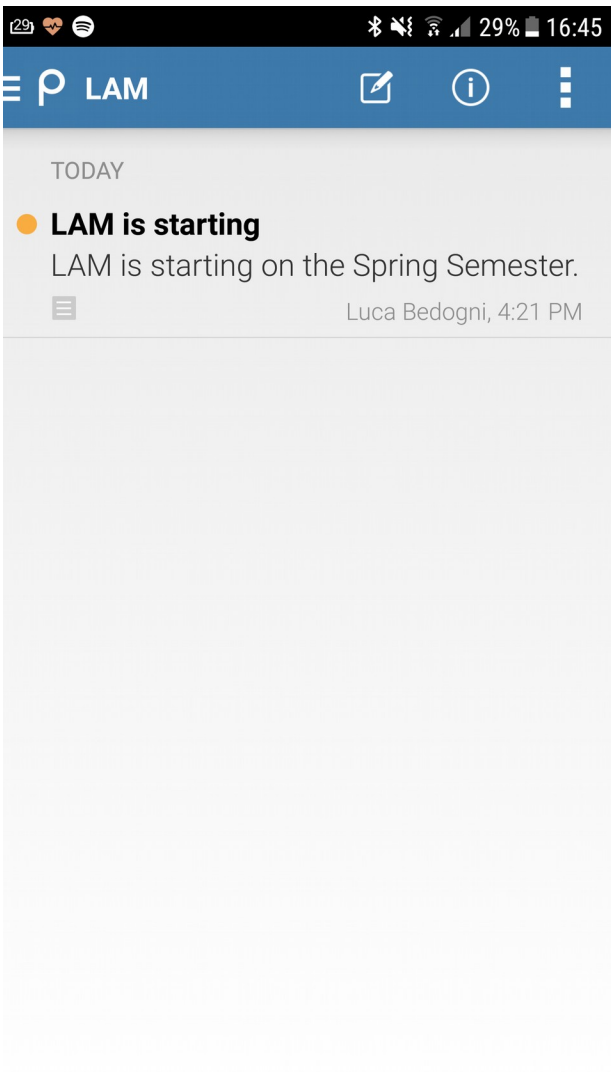


# Android ... Piazza

The screenshot displays the Piazza mobile application interface. At the top, there is a navigation bar with the Piazza logo and menu options: LAM, Q & A, Resources, Statistics, and Manage Class. The user's name, Luca Bedogni, is visible in the top right corner. On the left side, there is a sidebar menu with categories: Unread, Updated, Unresolved, and Following. Below this, there are sections for Pinned posts (e.g., 'Search for Teammates!'), Favorites (e.g., 'Introduce Piazza to your stu...'), and Today's posts (e.g., 'Instr LAM is starting'). The main content area shows a note titled 'LAM is starting' with the text 'LAM is starting on the Spring Semester.' Below the note, there are options to 'edit' and 'good note', and a '0 views' indicator. A section for 'followup discussions' is also visible, with a prompt to 'Start a new followup discussion' and a text input field. At the bottom, there is a summary bar with 'Average Response Time: N/A', 'Special Mentions:', and 'Whoa! Luca Bedogni answered hh in 10 sec. 10 days ago'. The bottom right corner shows 'Online Now' and 'This Week' statistics.



# Android ... Piazza



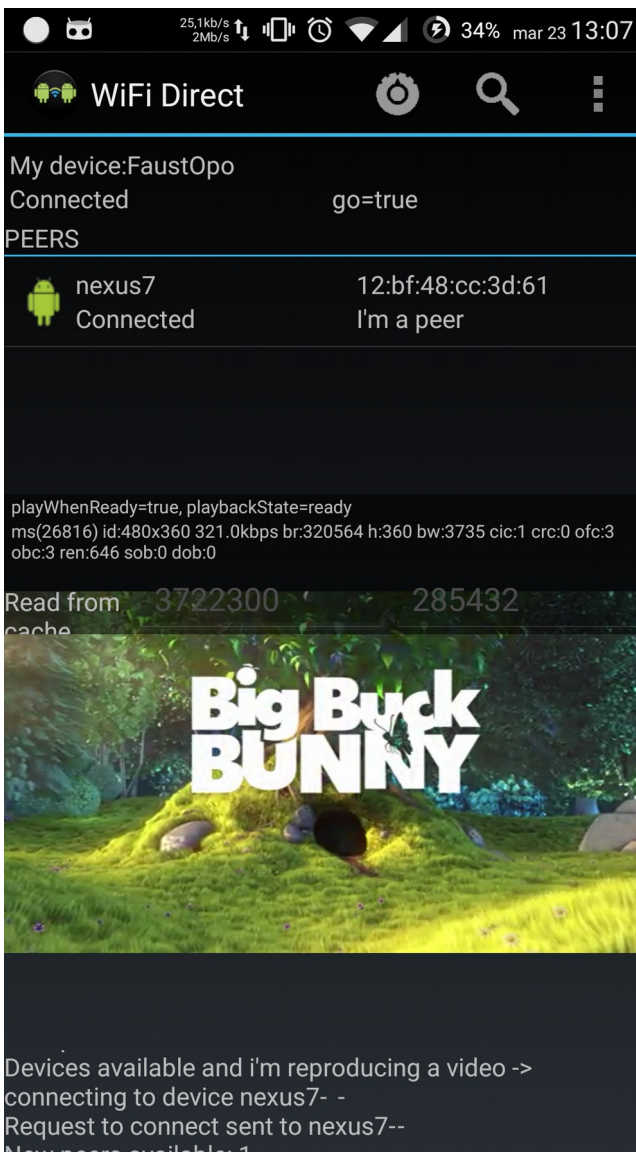
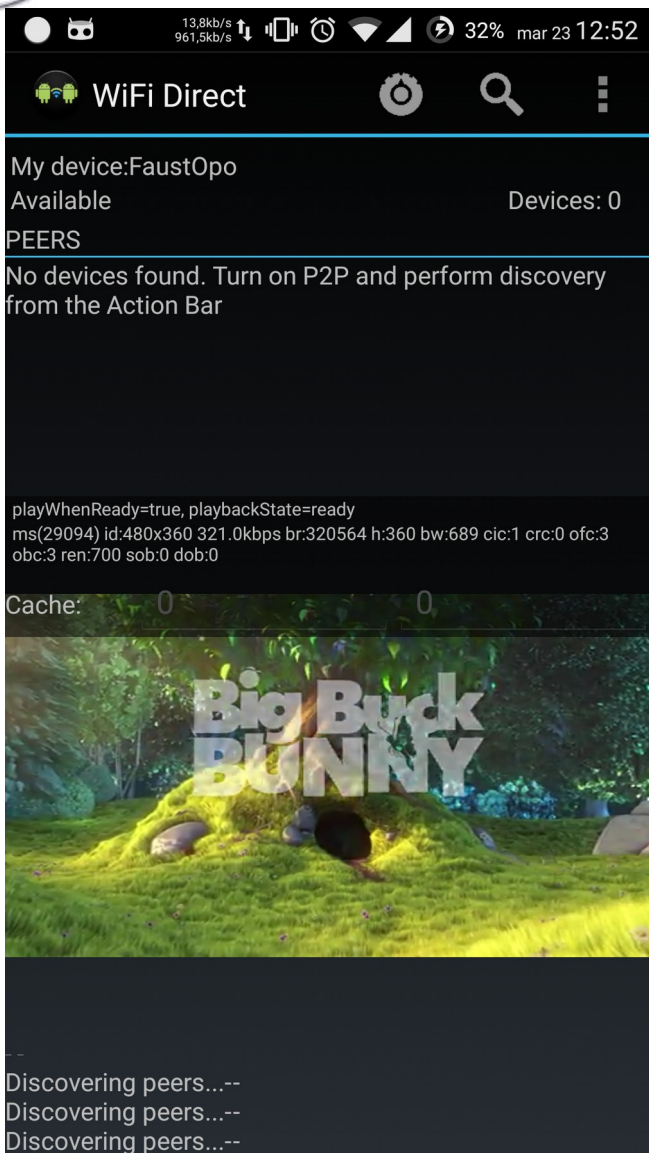
Possible to ask questions (class-wide or specific)

Web and App interfaces

Will be used to deliver all the information concerning the class



# Students Projects



**Fausto Di Natale**  
Collaborative Dynamic  
Adaptive Video Streaming



# Students Projects

Espiel Espiel

LPS

Coordinate 44,6896  
10,65217

Elevazione 56m s.l.m

Altitudine 0m

Piano Terra

Reggio Ospizio

Via Donatello

Parco gli Ippocastani

Google

Espiel Gestione Edifici

▶	Piano: 0	Calcolato: 0	11:29:08	0
	Altitudine: 0	Calcolata: 0	1010.3180	0
	Piano: 0	Calcolato: 0	11:29:09	1
	Altitudine: 0	Calcolata: 0	1010.3080	1
	Piano: 0	Calcolato: 0	11:29:10	2
	Altitudine: 0	Calcolata: 0	1010.2764	2
	Piano: 0	Calcolato: 0	11:29:11	3
	Altitudine: 0	Calcolata: 0	1010.2813	3

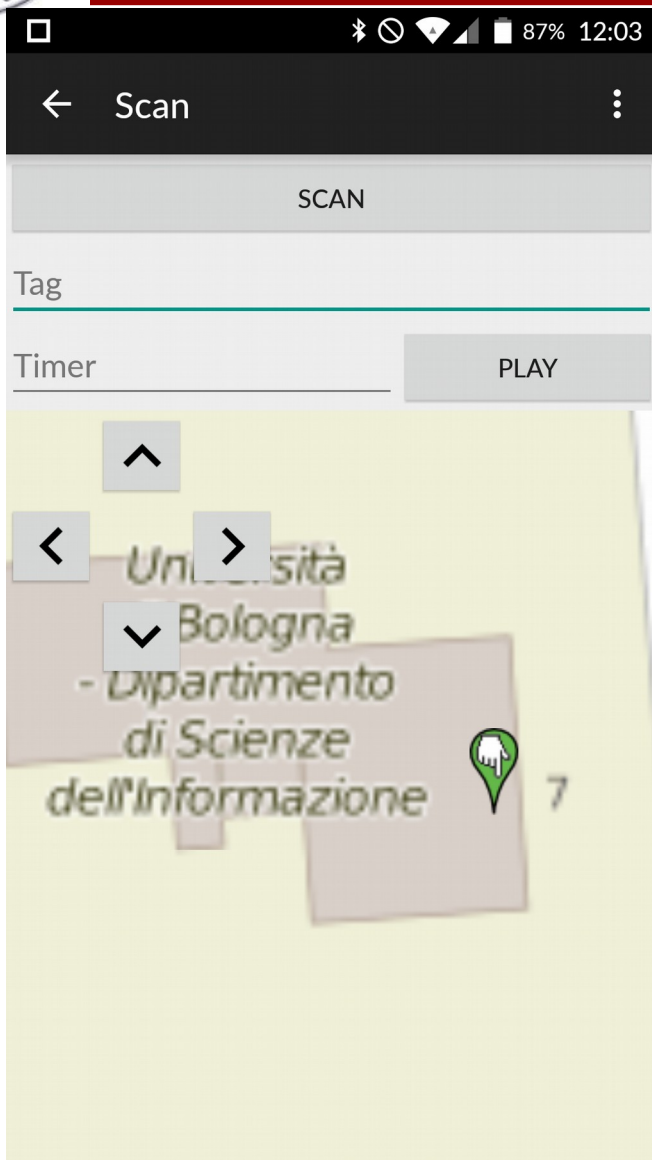
## Fabio Franzoso

Espiel – Floor level recognition  
Usin atmospheric pressure

L. Bedogni, F. Franzoso, L. Bononi, “A Self-Adapting Algorithm based on Atmospheric Pressure to Localize Indoor Devices”, on Proceedings of the 2016 IEEE Global Communications Conference: Ad Hoc and Sensor Networks (Globecom 2016) December 4-8 2016, Washington DC, USA

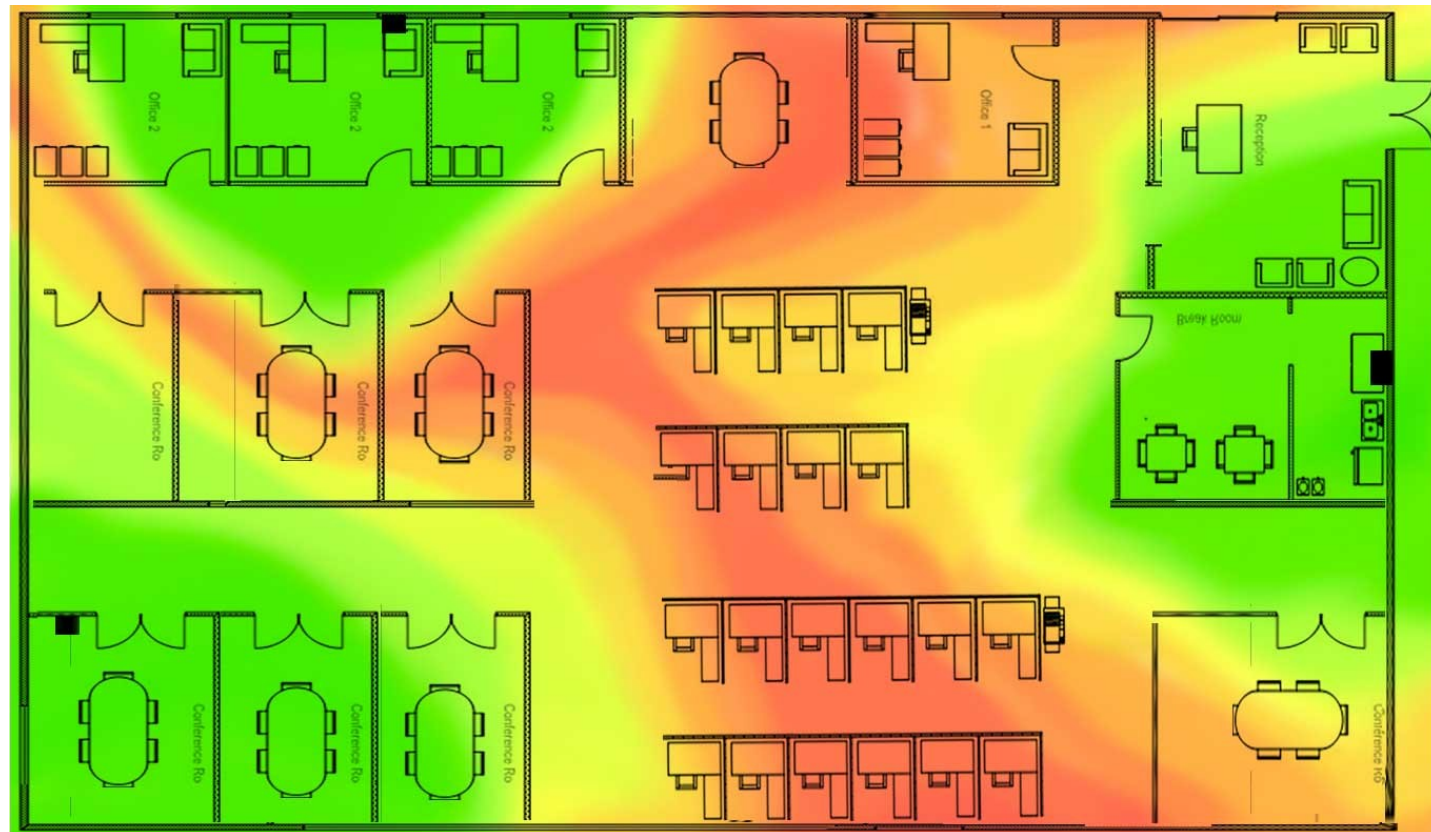


# Students Projects



## Erik Minarini

Heterogeneous indoor  
Localization using WIFI  
Fingerprints





# Students Projects

**Alain Di Chiappari, Davide Crestini, Valentina Tosto**  
Sensquare, an heterogeneous platform for the IoT

