



## In a nutshell



Olivier Le Goaër



Olivier Le Goaër

# Who I am?

## Associate Professor in Computer Science (France)

➡ STEE College (Sciences & Technologies for Energy and Environment)



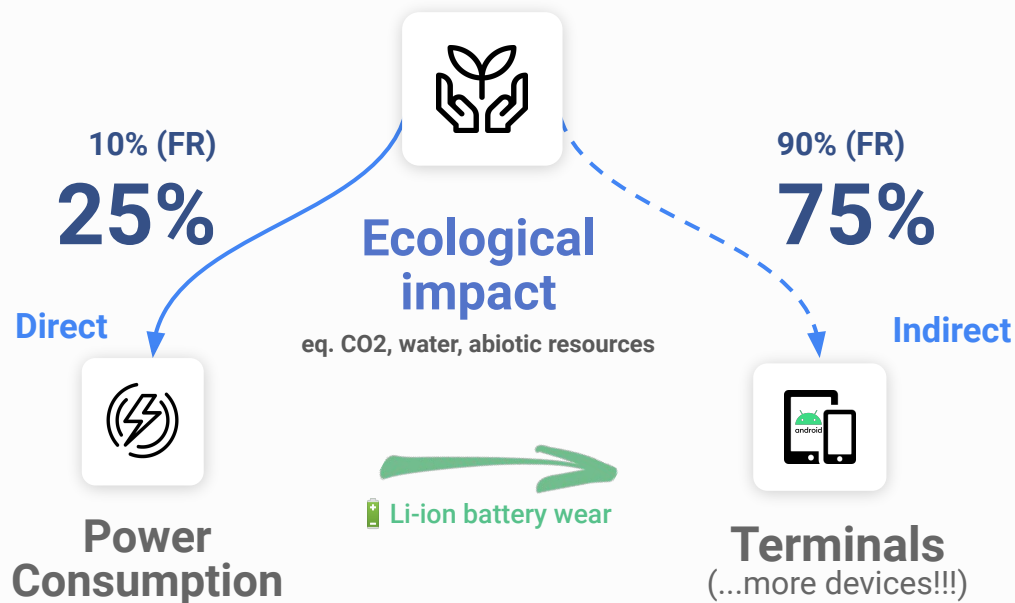
## Research in the field of Software Engineering

➡ How to build “greener” software?

## Teaching Android programming

➡ Online course (+130k views)

# Context



# Insights

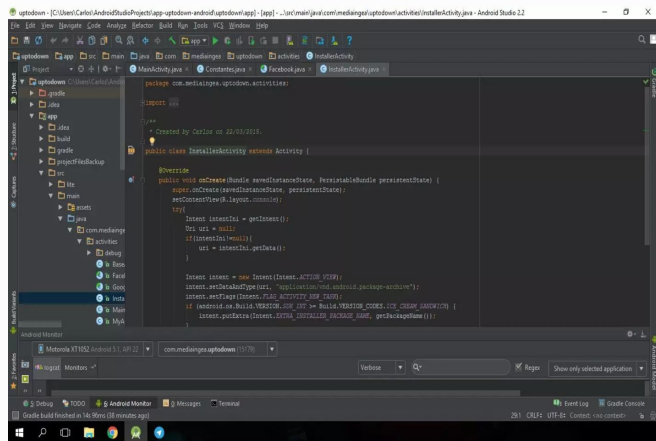
*“Green code extends clean code with ecological concerns”*

*“Carbon debt adds to the technical debt”*

*“Software programs should have an eco-score too”*



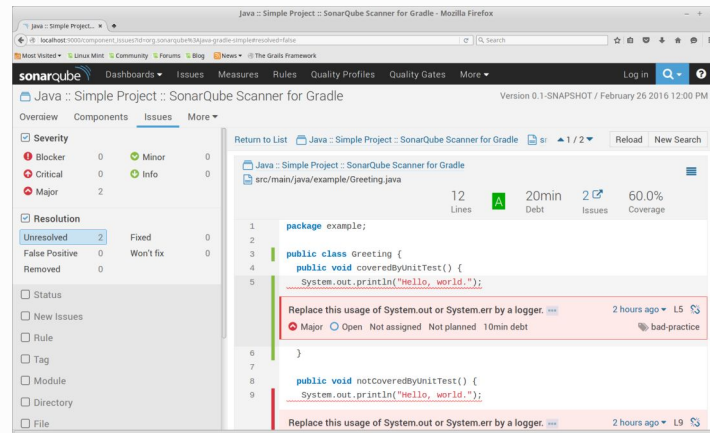
# Motivation



android  
studio



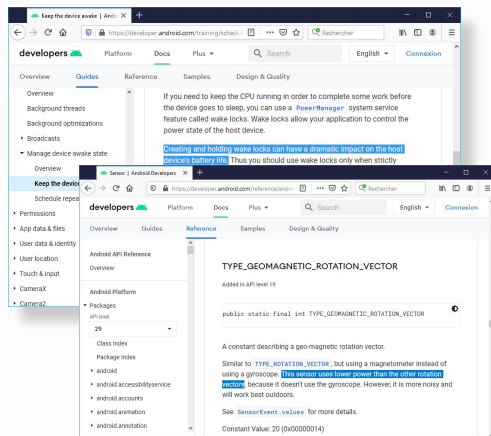
No guidelines on how to  
write energy-friendly apps



sonarqube

World-class solution to  
improve code quality

# Energy code smells for Android



API Reference Documentation



Research Papers



Dev Interviews

# Catalog of energy code smells

<http://olegoaer.perso.univ-pau.fr/android-energy-smells/>

## # OPTIMIZED API (2)

*Fused Location, Bluetooth Low-Energy*

## # LEAKAGE (3)

*Media Leak, Sensor Leak, Everlasting Service*

## # BOTTLENECK (4)

*Internet In The Loop, Wifi Multicast Lock, Uncompressed Data Transmission, Uncached Data Reception*

## # SOBRIETY (10)

*Dark UI, Day Night Mode, Brightness Override, Thrifty Geoloc, Thrifty BLE, Thrifty Motion Sensor, Thrifty Notification, Vibration-free, Torch-free, High Frame Rate*

## # IDLENESS (6)

*Keep Screen On, Keep CPU On, Durable Wake Lock, Rigid Alarm, Continuous Rendering, Keep Voice Awake*

## # POWER (4)

*Ignore Battery Optimizations, Companion in background, Charge Awareness, Save Mode Awareness*

## # BATCH (3)

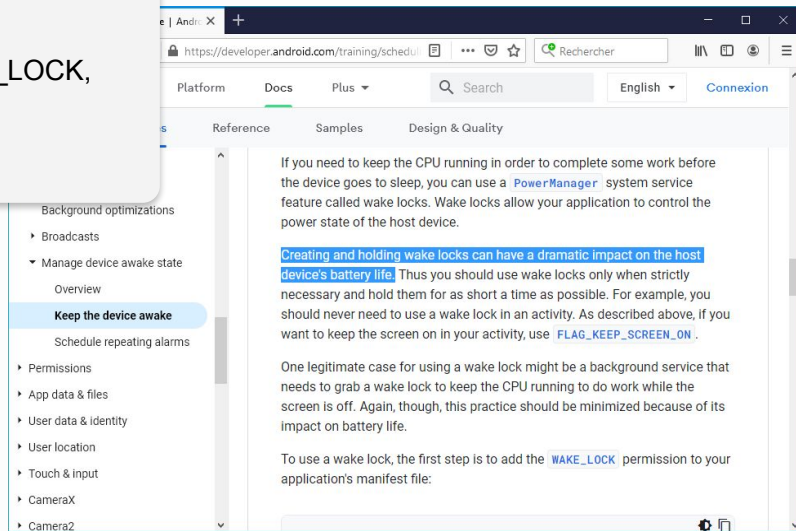
*Service@Boot-time, Sensor Coalesce, Job Coalesce*

## # RELEASE (8)

*Supported Version Range, Same dependencies, Duplicate dependencies, Fat app, Clear Cache, Disable Obfuscation, Shrink Resources, Convert to WebP*

# Focus on *Keep CPU On*

```
PowerManager powerManager = (PowerManager)
getSystemService(PowerManager.SERVICE);
WakeLock wakeLock =
powerManager.newWakeLock(PowerManager.PARTIAL_WAKE_LOCK,
    "MyApp::MyWakelockTag");
wakeLock.acquire();
```





# Highlights

## ➡ Statically detectable

- Few green best practices resist to this “**great filter**”

## ➡ Broader detection scope

- A native android project mixes **Java, XML, File System, Gradle**\*

## ➡ Good and bad smells

- Albeit code quality tools are only focused on **bad smells**

## ➡ Revamped User Interface

- Green code merits its own **user experience**

\*Groovy script

# Open Source Software

## ➡ Commitment to **digital commons**

- **Released as OSS** in January 2022 (hosted by Green IT assoc.)
- <https://github.com/green-code-initiative/ecoCode-mobile>

new

## ➡ Attract **early-adopters**

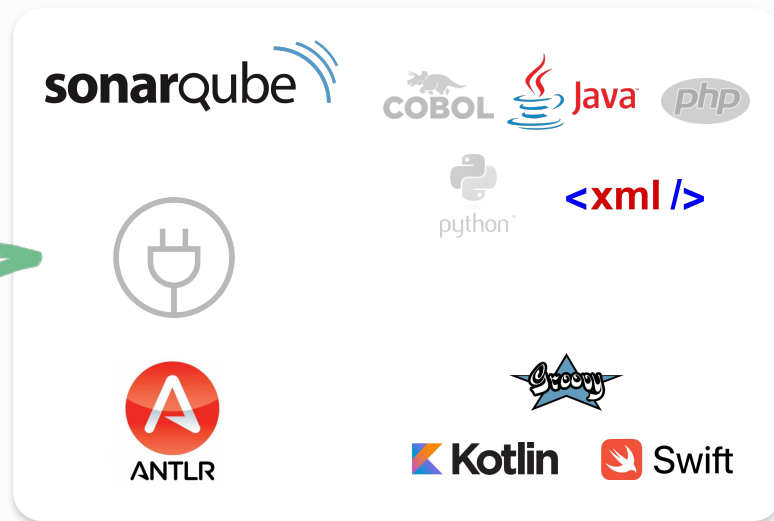
- **Hackathon in Paris in June 2022** (in the presence of the VP of Products @ SonarSource)
- **Next edition planned in March 2023**

# Technical guidelines

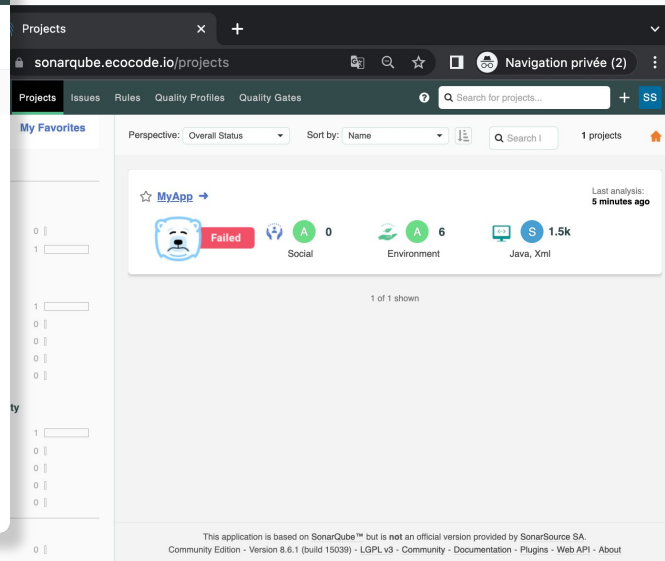
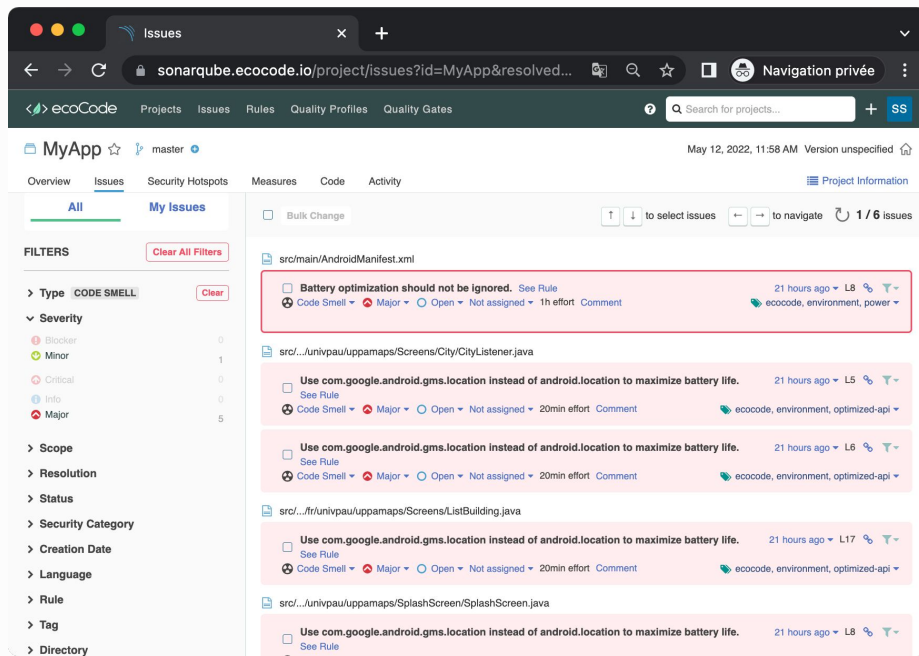
Currently



Soon



# Screenshots



# Related works



## From **academic**



**EcoAndroid** [Ribeiro et al., 2021]



**E-Debitum** [Maia et al., 2020]



**xAL** [Fatimaa et al., 2020]



**aDoctor** [Iannone et al., 2020]



**Green Android Lint** [Le Goaer, 2019]



## From **industry**

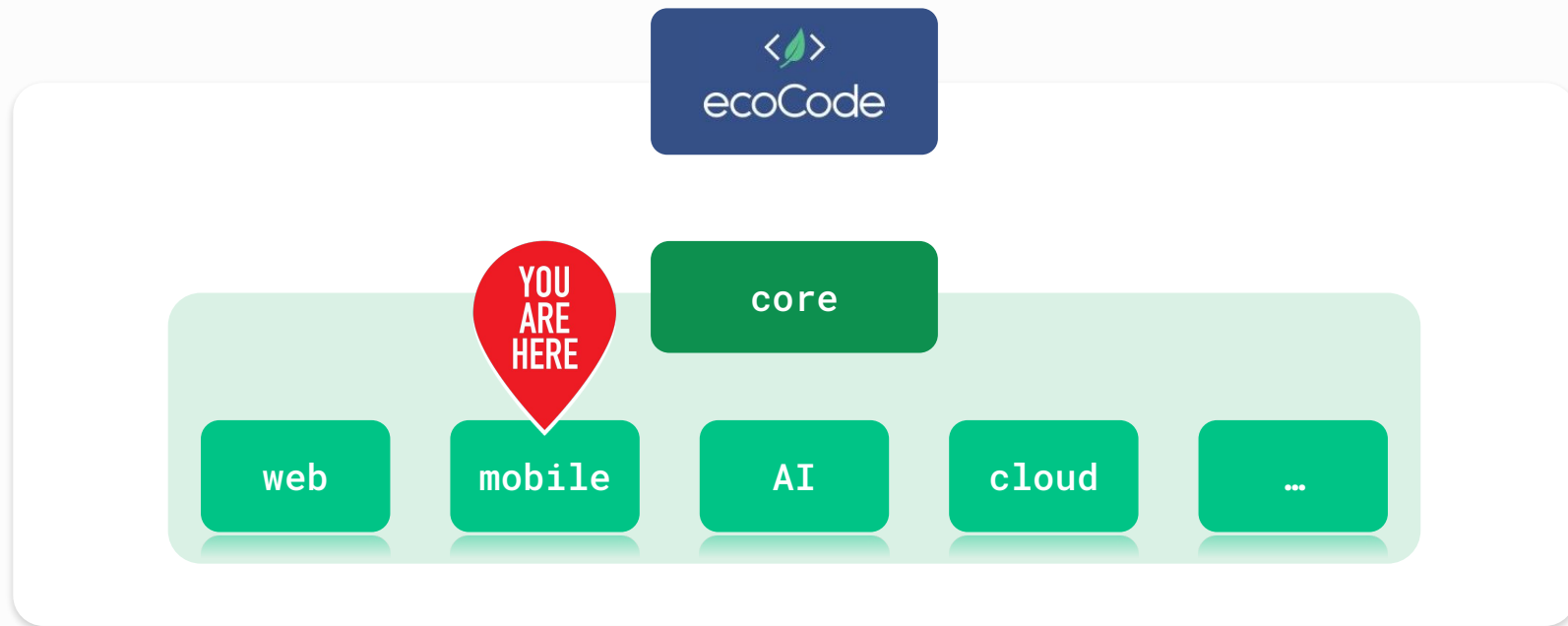


**EcoSonar** [Accenture, 2022]



**Greensight Sonar** [Capgemini, 2022]

# Roadmap



# Extended talk

DevFest Perros-Guirec (oct. 2022)



# Live demo?



(ekko, our mascotte)