Apidays Paris


# In a nutshell

Snapp'

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e2s UPPA
energy environment solutions

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Olivier Le Goaër

# Who I am?

## Associate Professor in Computer Science (France)

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

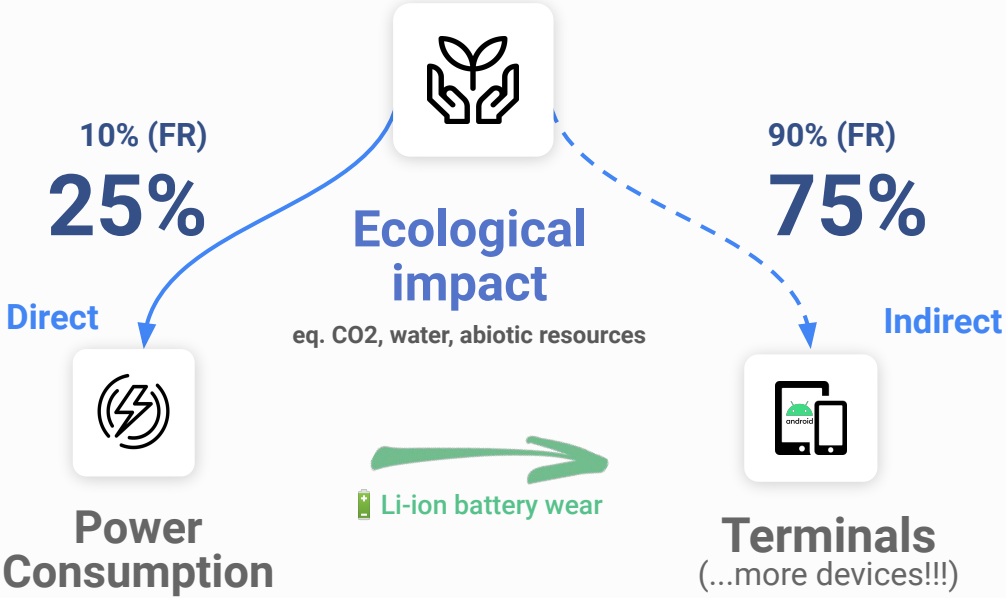
## Research in the field of Software Engineering

- How to build “greener” software?

## Teaching Android programming

- Online course (+130k views)

# Context




Loosely adapted from “iNUM : impacts environnementaux du numérique en France” (Jan. 2021)

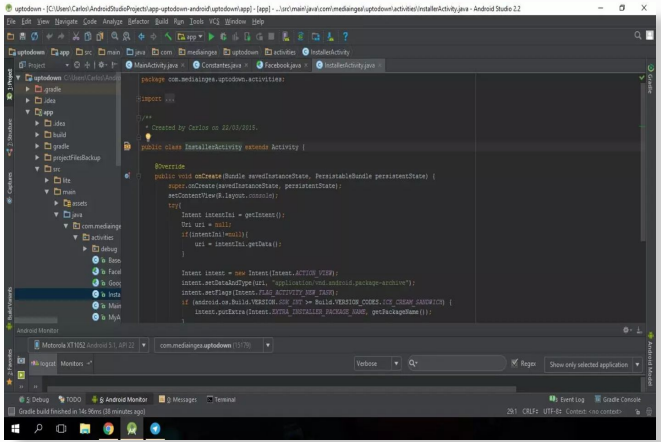
# Insights

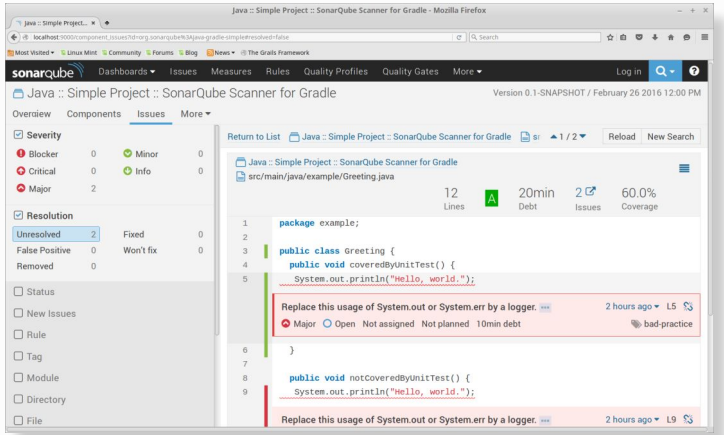
"Green code extends clean code with ecological concerns"

"Carbon debt adds to the technical debt"

"Software programs should have an eco-score too"

# Motivation





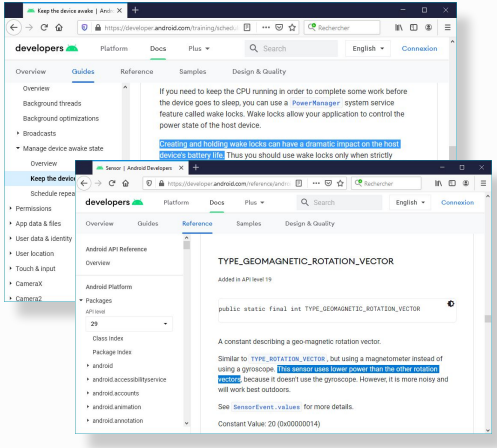

android studio

**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*

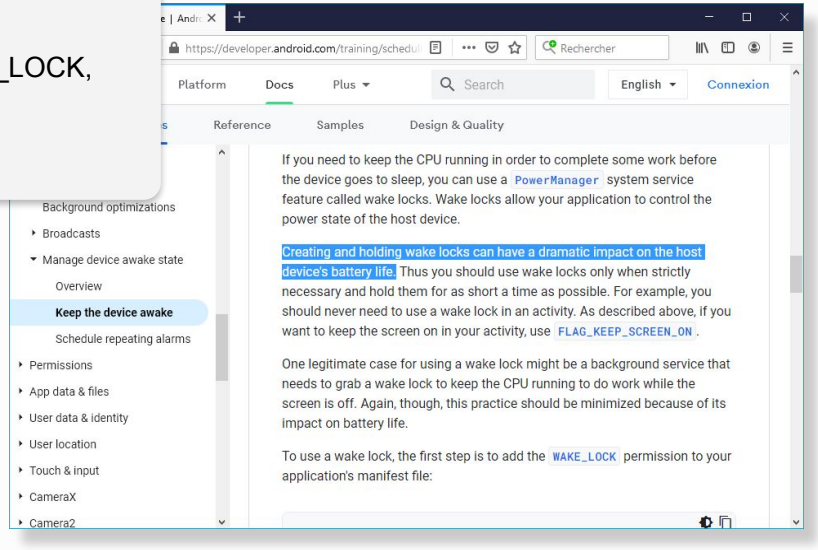
**# POWER (4)**
*Ignore Battery Optimizations, Companion in background, Charge Awareness, Save Mode Awareness*

**# 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(POWER_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*

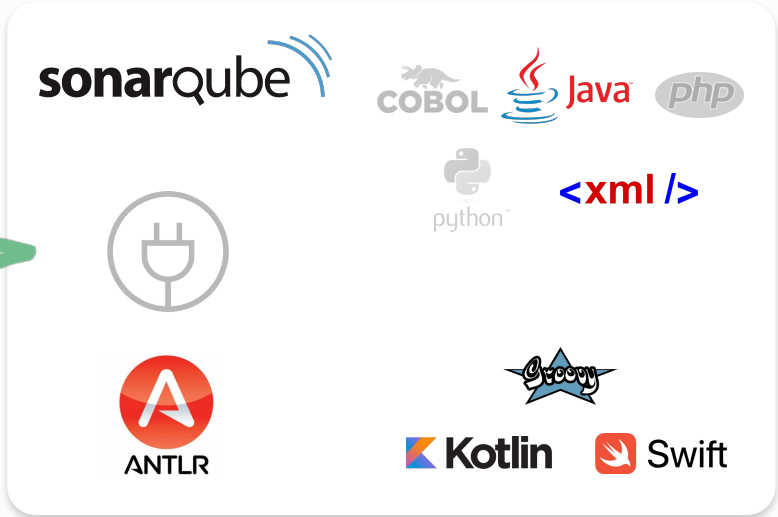
# Open Source Software

- 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**

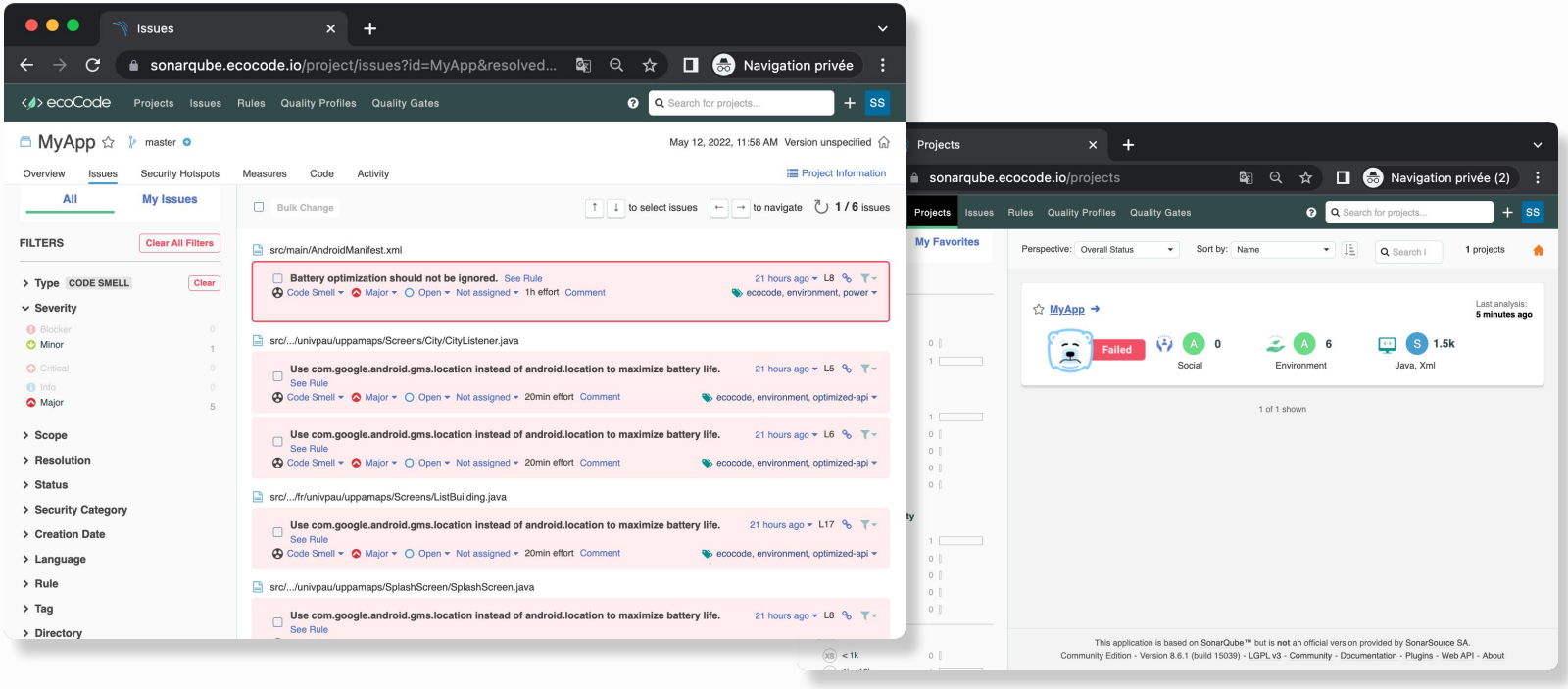
# Technical guidelines

## Currently


## Soon



# Screenshots

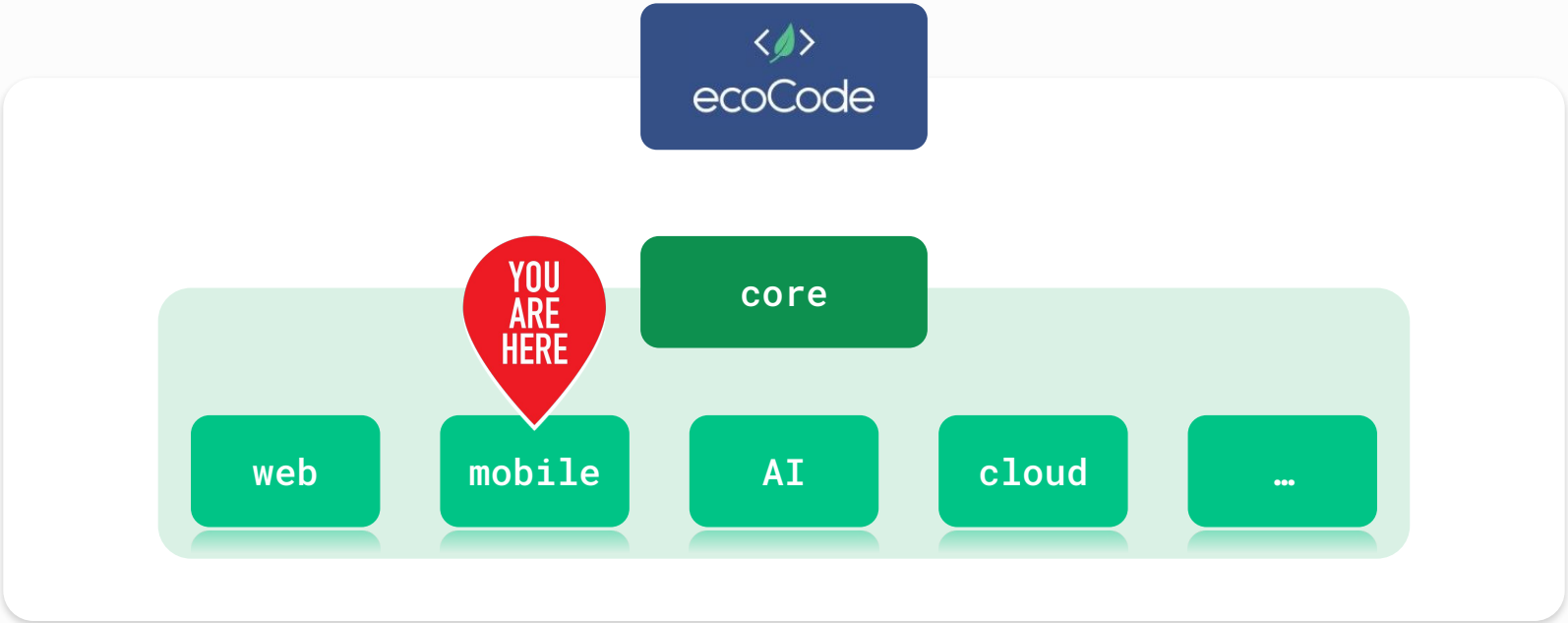


# Related works

- 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]
  - **Ecoscan** [Enedis, 2020]

# Roadmap



# Extended talk

**DevFest Perros-Guirec (oct. 2022)**

# Live demo?

(ekko, our mascotte)