



The initiative **that draws its strength from the** collective

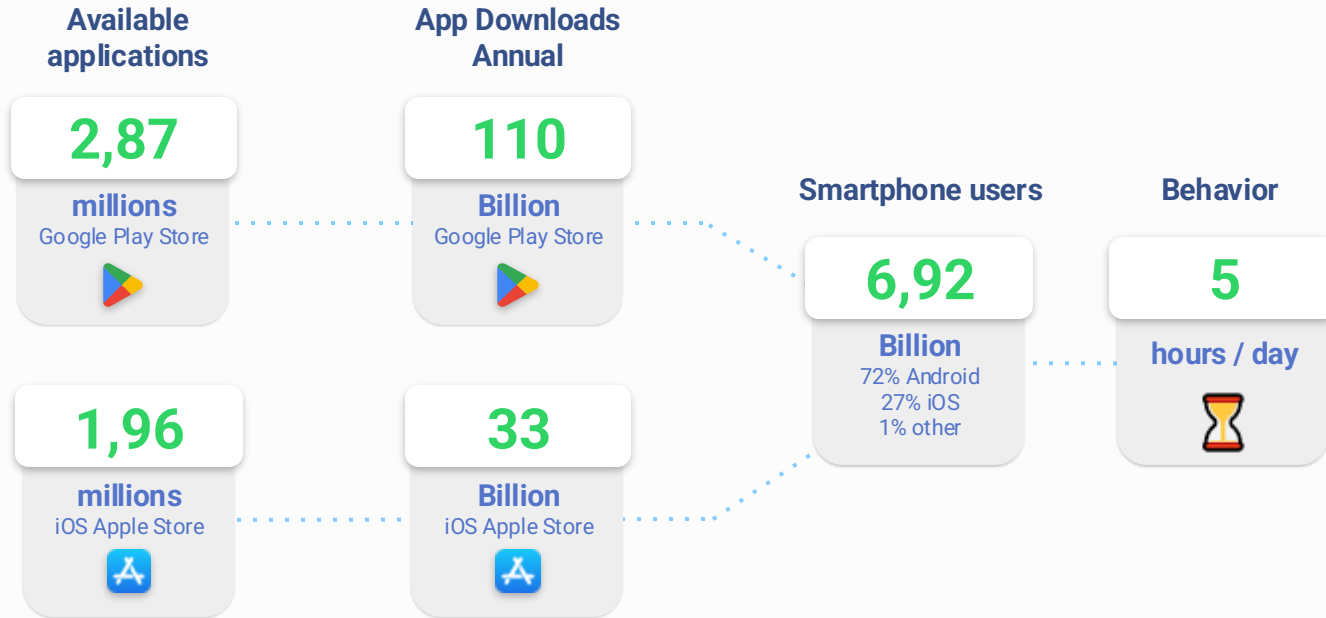
By Green Code Initiative (GCI)



A response to the  
Paris Climate Agreement:  $< +2^{\circ}\text{C}$

The digital industry must do its part

# Mobile Digital Drunkenness



# Digital Drunkenness Web

Available applications

1,93

Billion  
online websites



Websites visited

100

Website / day  
per user



Daily Connections

5,25

Billion  
on internet



Behavior

2,8

hours / day



# Orders of magnitude

## MATERIAL eco-design

Considers the life cycle of PCs/smartphones/tablets, from manufacturing to waste management and recycling



**PRODUCTION**

**80%**  
of energy consumption  
(and its corollary in GHGs)

**USAGE**

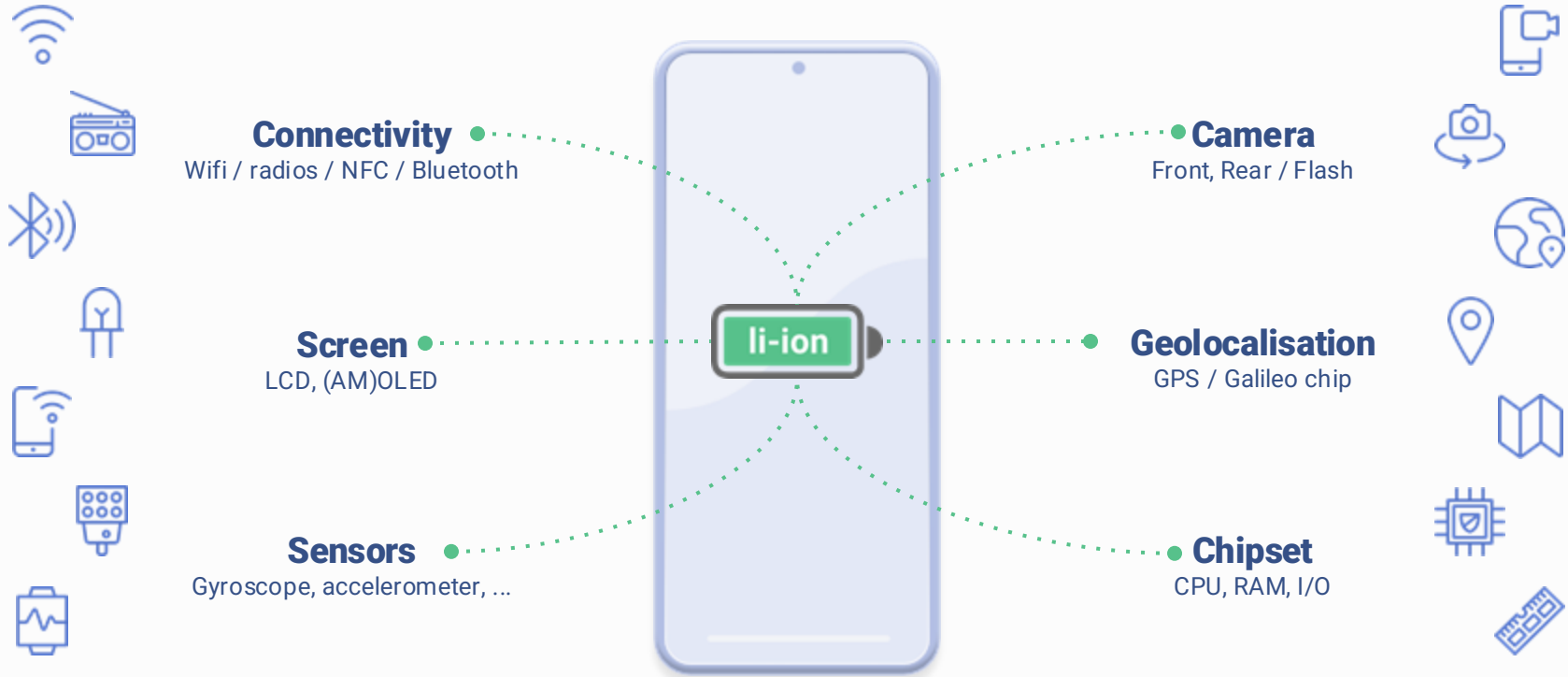
**20%**  
of energy consumption  
(and its corollary in GHGs)

## SOFTWARE eco-design

aims to reduce the power consumption of web and mobile apps during their use phase. Ensures backward compatibility



# But what drains the battery?



# Our fight as a developer!

As a developer, hardware design is not our job!

Focus on reducing the 20% impact on digital use by offering better software solutions while limiting the need for hardware changes.

# The interest of "eco-friendly" applications

A web or mobile application that wastes precious micro-watts :

- 1 Reduces **the life** of the device because the battery has a limited number of charge/discharge cycles
- 2 has a significant **cumulative effect**, every time the app is run and, on every device, where the app is installed/website is run.
- 3 Can create **unhappy** users who rate the app negatively on stores or don't return to the target web page.



# Software eco-design

Design websites and applications keeping in mind that they have an ecological footprint. **Train the new generation** of developers in eco-design (see French REEN law).

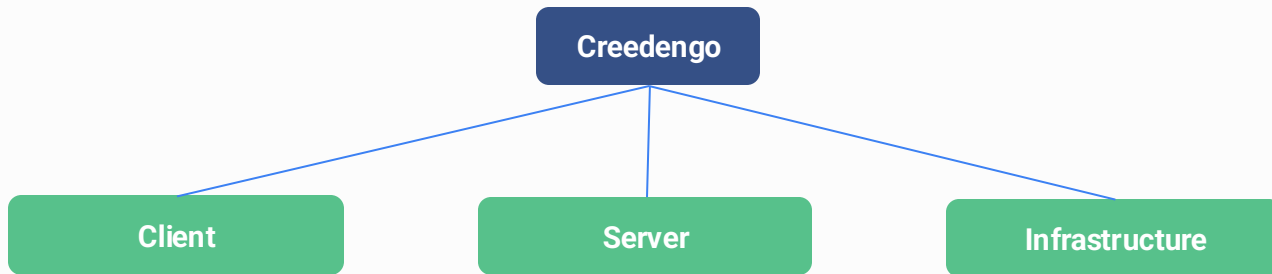
*“ Measures relating to the eco-design of digital services are very weak today. When you are trained in development, you are not very aware of the "ecology of the code"; It is necessary to make progress on this subject. ”*

Cédric O, French Secretary of State for the Digital Transition and Electronic Communications (December 2020)

# Eco-design is a whole...

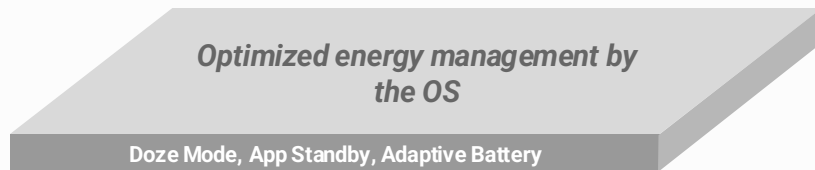
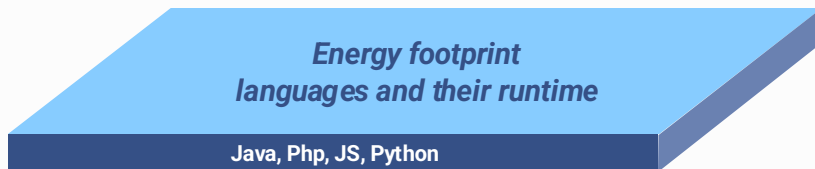
A web or mobile application is a **client-side** program only.

Creedengo is also aimed at the analysis of **server-side** programs and **infrastructure** in order to process **digital services** as widely as possible.



# Creedengo allows you to take action !

# Take action where you can



## Code smells ?

*“ Code Smells are patterns of code that suggest there might be a problem, that there might be a better way of writing the code or that more design perhaps should go into it. ”*

- ➡ Concept popularized via **Clean Code**
- ➡ **Is not a bug** because does not prevent the program from working
- ➡ Bad smells contribute to **technical debt**

# Energy code smells

Why not apply this concept to energy efficiency? (*especially* on devices limited by their battery)

- Detect "**not good**" code structures for the battery
- Smells are **potentially everywhere**: source code, configuration files, build definition files, organized resources (layouts, images, etc.)
- Assess the time needed to remedy it (**pay off technical debt**)
- **Correct** them automatically if possible

# Technologies

## Platforms

Android

iOS

## Langages

Java

PHP

C#

JS

Python

Kotlin  
(android)

Swift

HTML

Rust

## Frameworks

Spring  
Boot

Angular

React

VueJS

## Infrastructure

Kubernetes

Terraform

Ansible



Theme already covered



Topic not yet addressed






Available on the SonarQube marketplace



Available on IDE

# Creedengo - 106 Energy Code Smells

[ecoCode/RULES.md at main · green-code-initiative/ecoCode \(github.com\)](https://github.com/green-code-initiative/ecoCode/blob/main/ecoCode/RULES.md)

	Java	Php	Js	Python	Rust	C#	
 Available rules	15	10	10	10	0	0	45
 In progress	6	0	3	0	0	3	12
 Identified rules	2	3	17	2	13	3	40
 Awaiting specifications rules	7	0	0	2	0	0	9
	30	13	30	14	13	6	106

Last update : 15/03/2024



# Creedengo-mobile – 40+ Energy Code Smells

<https://github.com/green-code-initiative/ecoCode-android/blob/main/android-plugin/RULES.md>

<https://github.com/green-code-initiative/ecoCode-ios/blob/main/RULES.md>

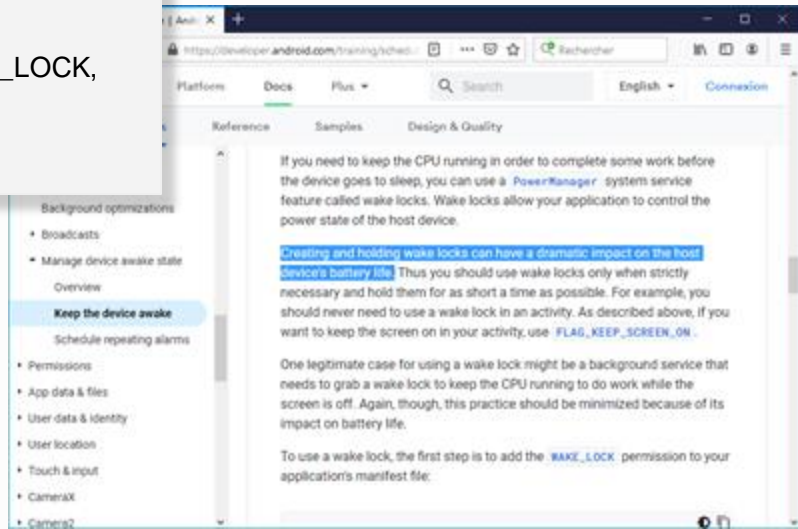
	Android	iOS	
 <b>Available rules</b>	30	10	40
 <b>In progress</b>			0
 <b><u>Rules catalog</u></b>	43	10	53
 <b>Awaiting specifications rules</b>	2		2

Last update : 14/03/2024

## Energy Code Smell by example

# Keep CPU On

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



## Energy Code Smell by example

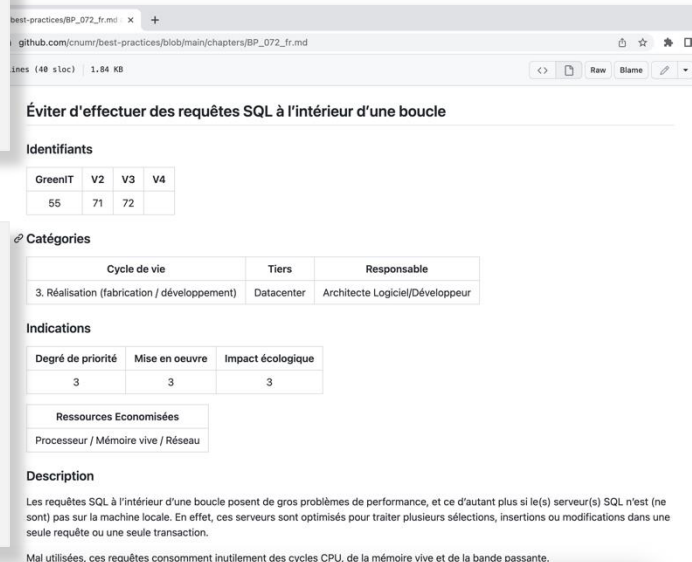
# SQL queries inside a loop

### Do not write ...

```
foreach ($userList as $user) {
    $query = 'INSERT INTO users (first_name,last_name) VALUES("'.
    $user['first_name'] .'", "'. $user['last_name'] .'")';
    mysql_query($query);
}
```

### But prefer ...

```
$userData = array();
foreach ($userList as $user) {
    $userData[] = '("'. $user['first_name'] .'", "'.
    $user['last_name'] .'")';
}
$query = 'INSERT INTO users (first_name,last_name) VALUES'. implode(',',
$userData); mysql_query($query);
```



best-practices/BP\_072\_fr.md

github.com/cnumy/best-practices/blob/main/chapters/BP\_072\_fr.md

Lines 48 (slac) | 1.84 KB

### Éviter d'effectuer des requêtes SQL à l'intérieur d'une boucle

Identifiants

GreenIT	V2	V3	V4
55	71	72	

Catégories

Cycle de vie	Tiers	Responsable
3. Réalisation (fabrication / développement)	Datacenter	Architecte Logiciel/Développeur

Indications

Degré de priorité	Mise en oeuvre	Impact écologique
3	3	3

Ressources Economisées

Processeur / Mémoire vive / Réseau
------------------------------------

Description

Les requêtes SQL à l'intérieur d'une boucle posent de gros problèmes de performance, et ce d'autant plus si le(s) serveur(s) SQL n'est (ne sont) pas sur la machine locale. En effet, ces serveurs sont optimisés pour traiter plusieurs sélections, insertions ou modifications dans une seule requête ou une seule transaction.

Mal utilisées, ces requêtes consomment inutilement des cycles CPU, de la mémoire vive et de la bande passante.



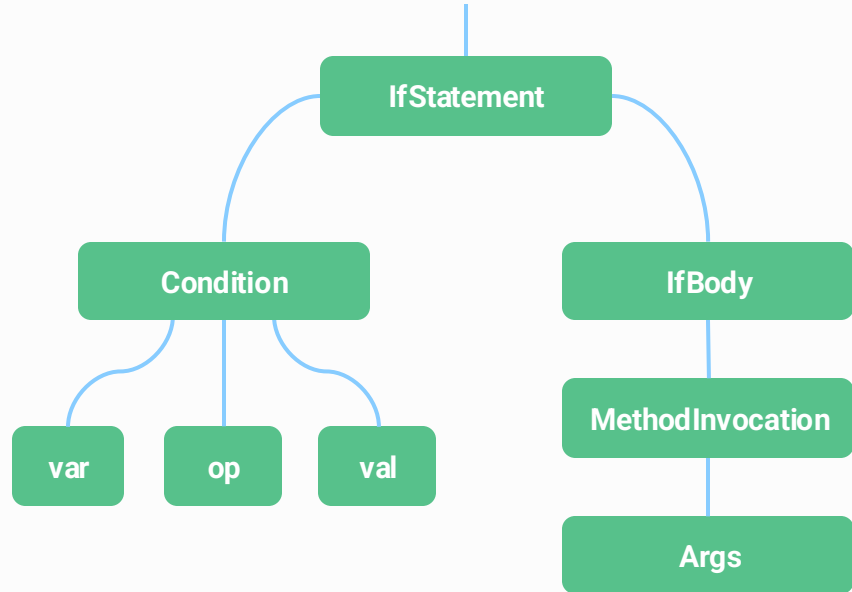
A tool for developers

Computer-Aided Software Engineering (CASE)

# Abstract Syntax Tree (AST)

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

```
if (wakeLock != null) {
    wakeLock.acquire();
}
```



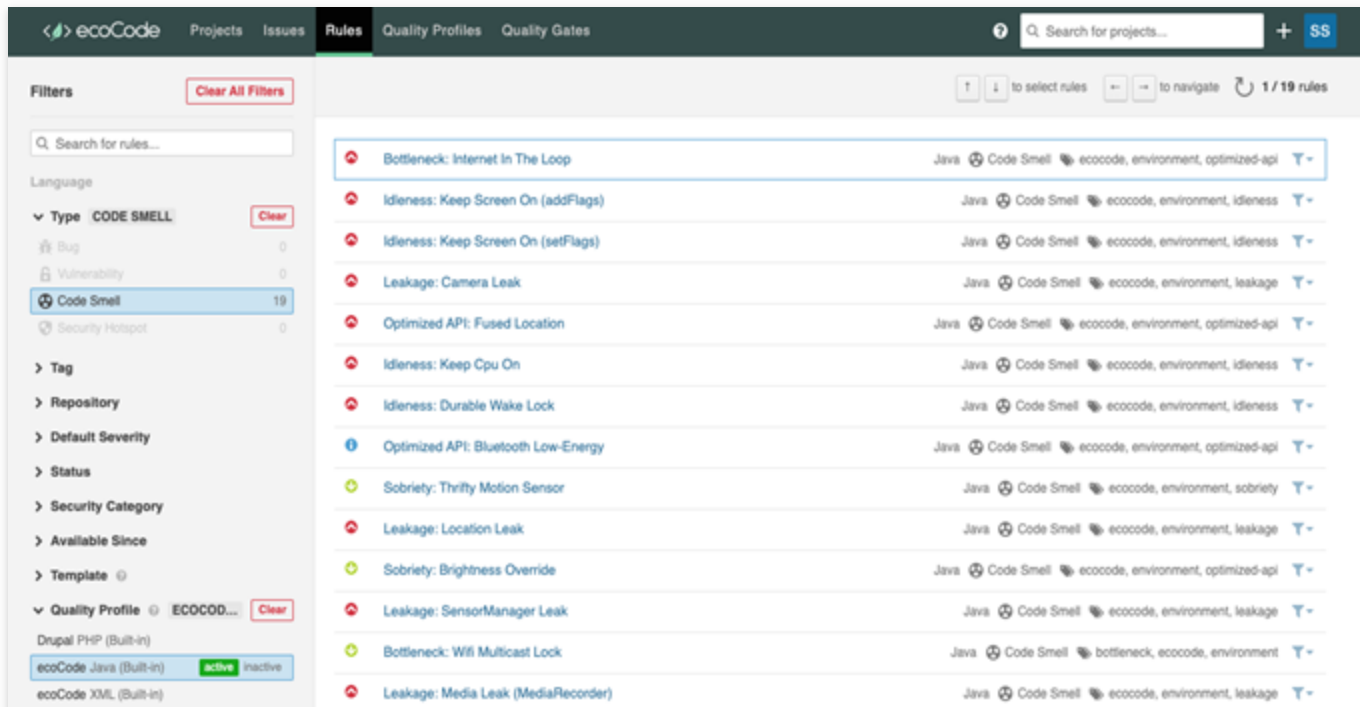
Creedengo

# A collection of SonarQube plugins

- SonarQube is the **most popular** code quality tool on the market
- **Static code analysis**: the program is never executed!
- Completely **independent** of size, category, and features
- An **eco-score** (from A to E) can be assigned
- Automated differential comparison via **CI/CD pipeline**
- Aimed at **developers / project managers / lead devs / ...**

## Creedengo (Ecocode)

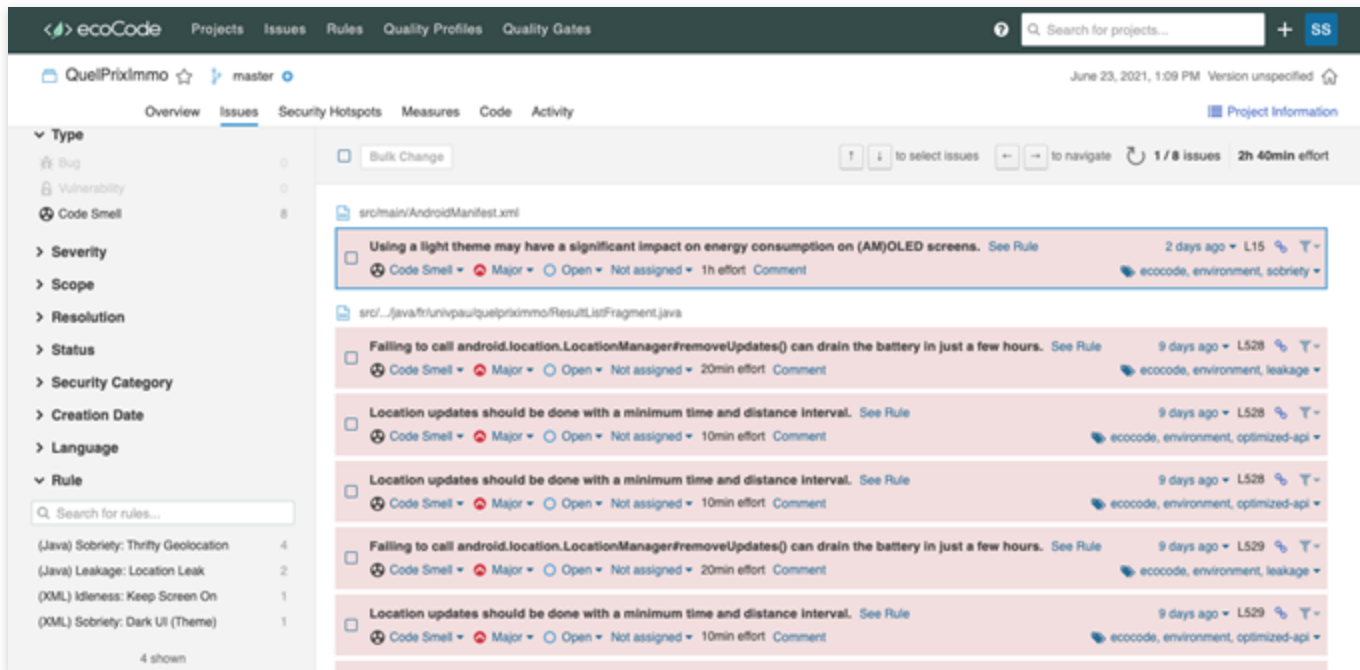
# Rules Base



The screenshot displays the 'Rules' tab in the Creedengo (Ecocode) application. The interface includes a top navigation bar with tabs for 'ecoCode', 'Projects', 'Issues', 'Rules' (selected), 'Quality Profiles', and 'Quality Gates'. A search bar on the right of the top bar contains the text 'Search for projects...'. Below the navigation bar, the left sidebar contains a 'Filters' section with a 'Clear All Filters' button. The filters include a search bar for rules, a 'Language' dropdown, a 'Type' dropdown set to 'CODE SMELL' with a 'Clear' button, and a list of categories: Bug (0), Vulnerability (0), Code Smell (19), and Security Hotspot (0). The 'Tag' section includes 'Repository', 'Default Severity', 'Status', 'Security Category', 'Available Since', and 'Template'. The 'Quality Profile' section shows 'ECOCOD...' as the active profile, with a 'Clear' button. Below this, a list of quality profiles is shown: 'Drupal PHP (Built-in)', 'ecoCode Java (Built-in)' (active), and 'ecoCode XML (Built-in)'. The main content area displays a list of rules, each with a red circular icon, a title, a language (Java), a severity (Code Smell), and a list of tags. The rules are: 'Bottleneck: Internet In The Loop', 'Idleness: Keep Screen On (addFlags)', 'Idleness: Keep Screen On (setFlags)', 'Leakage: Camera Leak', 'Optimized API: Fused Location', 'Idleness: Keep Cpu On', 'Idleness: Durable Wake Lock', 'Optimized API: Bluetooth Low-Energy', 'Sobriety: Thrifty Motion Sensor', 'Leakage: Location Leak', 'Sobriety: Brightness Override', 'Leakage: SensorManager Leak', 'Bottleneck: Wifi Multicast Lock', and 'Leakage: Media Leak (MediaRecorder)'. Each rule has a 'Y' icon in the rightmost column.

Rule Name	Language	Severity	Tags
Bottleneck: Internet In The Loop	Java	Code Smell	ecocode, environment, optimized-api
Idleness: Keep Screen On (addFlags)	Java	Code Smell	ecocode, environment, idleness
Idleness: Keep Screen On (setFlags)	Java	Code Smell	ecocode, environment, idleness
Leakage: Camera Leak	Java	Code Smell	ecocode, environment, leakage
Optimized API: Fused Location	Java	Code Smell	ecocode, environment, optimized-api
Idleness: Keep Cpu On	Java	Code Smell	ecocode, environment, idleness
Idleness: Durable Wake Lock	Java	Code Smell	ecocode, environment, idleness
Optimized API: Bluetooth Low-Energy	Java	Code Smell	ecocode, environment, optimized-api
Sobriety: Thrifty Motion Sensor	Java	Code Smell	ecocode, environment, sobriety
Leakage: Location Leak	Java	Code Smell	ecocode, environment, leakage
Sobriety: Brightness Override	Java	Code Smell	ecocode, environment, optimized-api
Leakage: SensorManager Leak	Java	Code Smell	ecocode, environment, leakage
Bottleneck: Wifi Multicast Lock	Java	Code Smell	bottleneck, ecocode, environment
Leakage: Media Leak (MediaRecorder)	Java	Code Smell	ecocode, environment, leakage

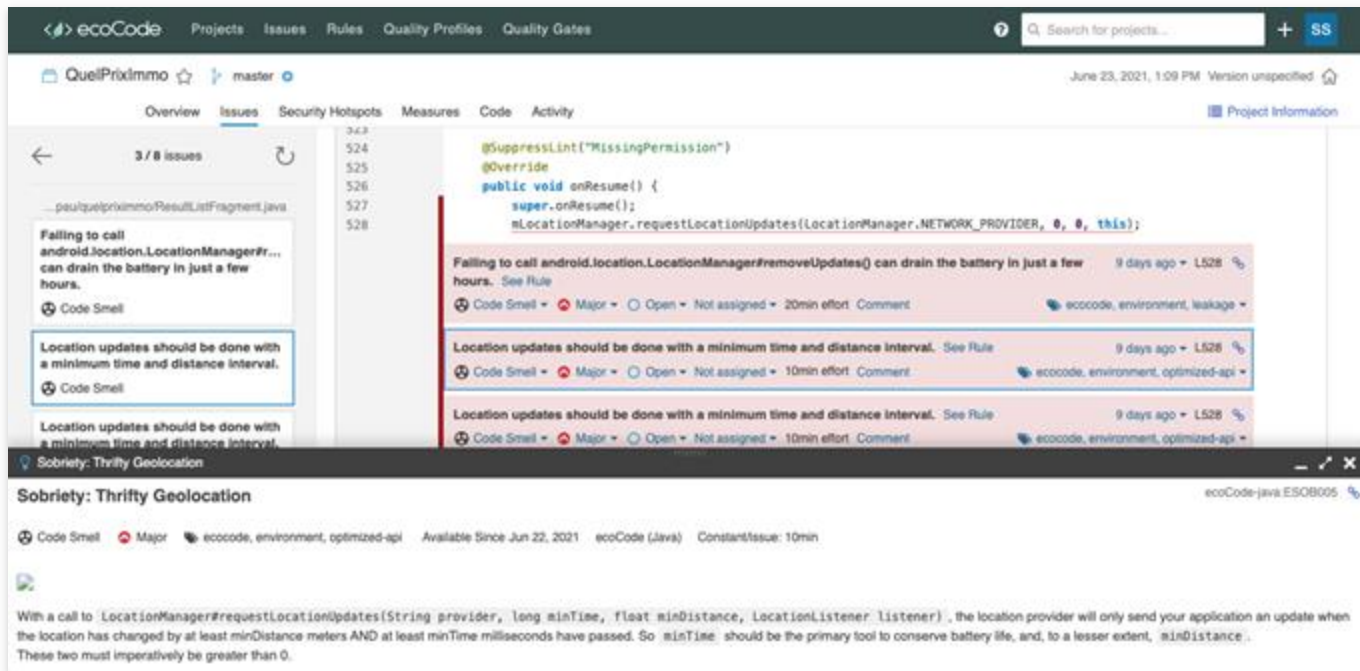
## Problems detected



The screenshot displays the Creedengo web application interface. At the top, there is a navigation bar with tabs for 'ecoCode', 'Projects', 'Issues', 'Rules', 'Quality Profiles', and 'Quality Gates'. A search bar is located on the right side of the navigation bar. Below the navigation bar, the main content area is divided into two sections. On the left, there is a sidebar with a 'Type' section containing 'Bug', 'Vulnerability', and 'Code Smell' (with a count of 8). Below this is a 'Severity' section with 'Major', 'Open', and 'Not assigned'. Further down is a 'Scope' section with 'ecocode', 'environment', and 'sobriety'. Below that is a 'Resolution' section with 'L15', 'L528', and 'L529'. Below that is a 'Status' section with '20min effort', '10min effort', and '2h 40min effort'. Below that is a 'Security Category' section with 'ecocode', 'environment', and 'optimized-api'. Below that is a 'Creation Date' section with '9 days ago' and '2 days ago'. Below that is a 'Language' section with 'Java' and 'XML'. Below that is a 'Rule' section with 'Sobriety: Thrifty Geolocation', 'Leakage: Location Leak', 'Idleness: Keep Screen On', and 'Sobriety: Dark UI (Theme)'. On the right, there is a list of detected issues. The first issue is 'Using a light theme may have a significant impact on energy consumption on (AM)OLED screens. See Rule' with a severity of 'Major', status of 'Open', and effort of '1h effort'. The second issue is 'Falling to call android.location.LocationManager#removeUpdates() can drain the battery in just a few hours. See Rule' with a severity of 'Major', status of 'Open', and effort of '20min effort'. The third issue is 'Location updates should be done with a minimum time and distance interval. See Rule' with a severity of 'Major', status of 'Open', and effort of '10min effort'. The fourth issue is 'Falling to call android.location.LocationManager#removeUpdates() can drain the battery in just a few hours. See Rule' with a severity of 'Major', status of 'Open', and effort of '20min effort'. The fifth issue is 'Location updates should be done with a minimum time and distance interval. See Rule' with a severity of 'Major', status of 'Open', and effort of '10min effort'.



## Problem detail



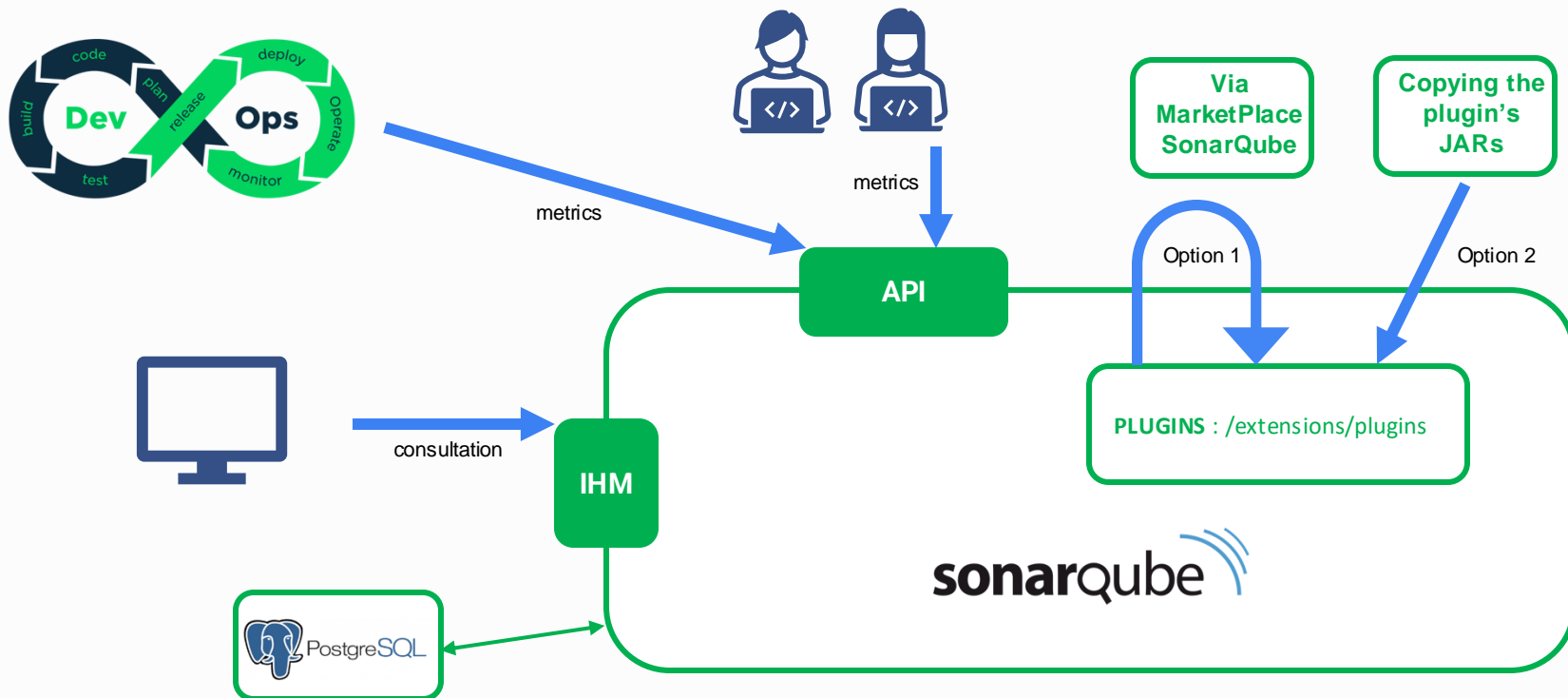
The screenshot shows the Creedengo IDE interface. At the top, there's a navigation bar with tabs for Projects, Issues, Rules, Quality Profiles, and Quality Gates. A search bar is on the right. Below the navigation bar, the 'Issues' tab is selected, showing a list of 3/8 issues. The first issue is highlighted, showing a code snippet from `android.location.LocationManager#requestLocationUpdates` with a red squiggly line indicating a problem. The issue description states: "Falling to call android.location.LocationManager#requestLocationUpdates() can drain the battery in just a few hours." The issue is categorized as a "Code Smell" and is marked as "Major". The code snippet shows a `public void onResume()` method that calls `super.onResume()` and then `mLocationManager.requestLocationUpdates(LocationManager.NETWORK_PROVIDER, 0, 0, this);`. The issue is linked to a rule named "Sobriety: Thrifty Geolocation".

**Sobriety: Thrifty Geolocation**

Code Smell Major ecocode, environment, optimized-api Available Since Jun 22, 2021 ecoCode (Java) Constant Issue: 10min

With a call to `LocationManager.requestLocationUpdates(String provider, long minTime, float minDistance, LocationListener listener)`, the location provider will only send your application an update when the location has changed by at least `minDistance` meters AND at least `minTime` milliseconds have passed. So `minTime` should be the primary tool to conserve battery life, and, to a lesser extent, `minDistance`. These two must imperatively be greater than 0.

# Creedengo Architecture Diagram (PROD)

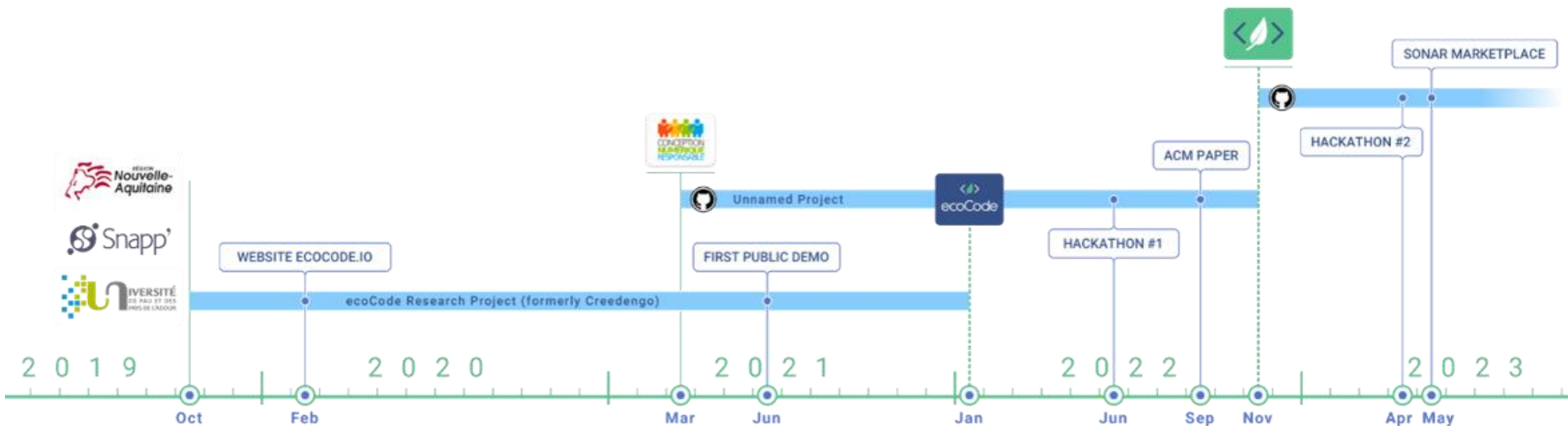


# The collective behind the project

« Alone, we go faster; Together, we go further » - **Cyrus McCormick**

# Creedengo

## Our Timeline



## Creedengo 3 Hackathons



June 2-3, 2022



April 5-6, 2023



May 29-30, 2024

# Creedengo Its members

## Core-team



**Olivier LE GOAËR**  
Teacher/researcher in  
computer science  
UPPA / GDR CNRS GPL



**Jules DELECOUR**  
Tech culture lead  
Davidson consulting



**Geoffrey LALLOUE**  
Lead dev  
Keendoo



**Julien HERTOUT**  
DevOps engineer  
Snapp'



**Gilles GROUSSET**  
CTO  
InsideApp



**Maxime MALGORN**  
Tech Lead  
Natixis (BPCE)



**David DE CARVALHO**  
Solution Architect  
Capgemini



**Johanna DUGOU**  
Development  
Engineer  
Mobile iOS / Android  
Orange Business



**Justin BERQUE**  
Android Developer  
Webwag Mobile



**Jean-Yves CRONIER**  
DevOps  
Crédit Agricole  
Payment Services



**Vianney DE BELLABRE**  
Software Architect  
C2S Bouygues



**Jérôme CARDON**  
Senior Cloud  
DevOPS Engineer  
Accenture

## Main contributors

And + 200 other contributors  
or committers active on the  
project



# A large network of partners

## 2024 Partners



## 2024 Sponsor



## Creedengo

# A user club



### Expand use

Facilitate adoption

Engaging teams



### Promoting exchanges

Share the problems encountered

Best practices

Report needs to the Green Code Initiative





Creedengo

# Channels



<https://github.com/green-code-initiative>



<https://www.linkedin.com/company/green-code-initiative/>  
<https://www.linkedin.com/company/ecocode-io/>



<https://www.youtube.com/@GreenCodeInitiative>



<https://ecocode.io/>



<https://ecocode-workspace.slack.com/>

# The "leaf" of the road

# Technologies

## Platforms

Android

iOS

## Langages

Java

PHP

C#

JS

Python

Kotlin  
(android)

Swift

HTML

Rust

## Frameworks

Spring  
Boot

Angular

React

VueJS

## Infrastructure

Kubernetes

Terraform

Ansible



Theme already covered



Topic not yet addressed



Available on the SonarQube marketplace



Available on IDE

Creedengo

# SWOT Analysis

## STRENGTHS

Academic/industry partnership

## WEAKNESSES

Insufficient rule base  
Empirical adjustments

## OPPORTUNITIES

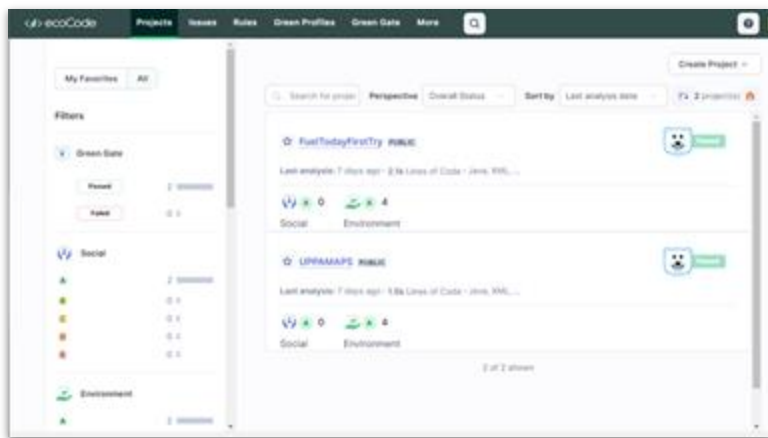
Growing public/political interest  
Regulations are evolving

## THREATS

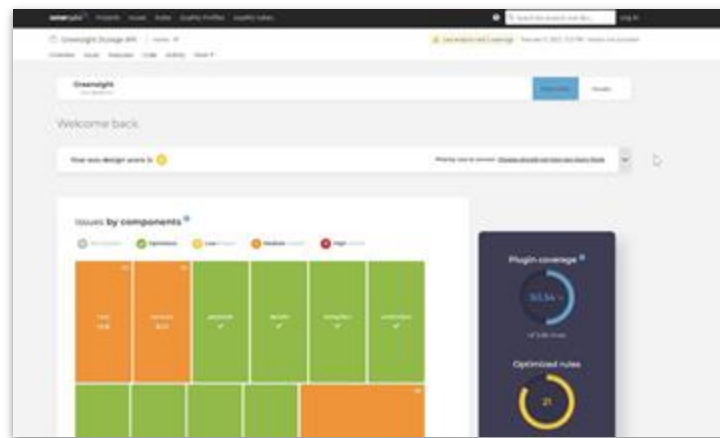
The big players are coming  
Risk of greenwashing

# Creedengo

## Green Look 'n' Feel



PoC Creedengo (Android)



PoC **GREENSIGHT**  
**Sonar**  
By Capgemini

I propose

Creedengo

## The measure



Scaphandre



Hubblo



PowerJoular

JoularJX

PowDroid

# 2023 Roadmap - Previous Version of Creedengo

- Completed topics
- Topics not completed
- Next Topics

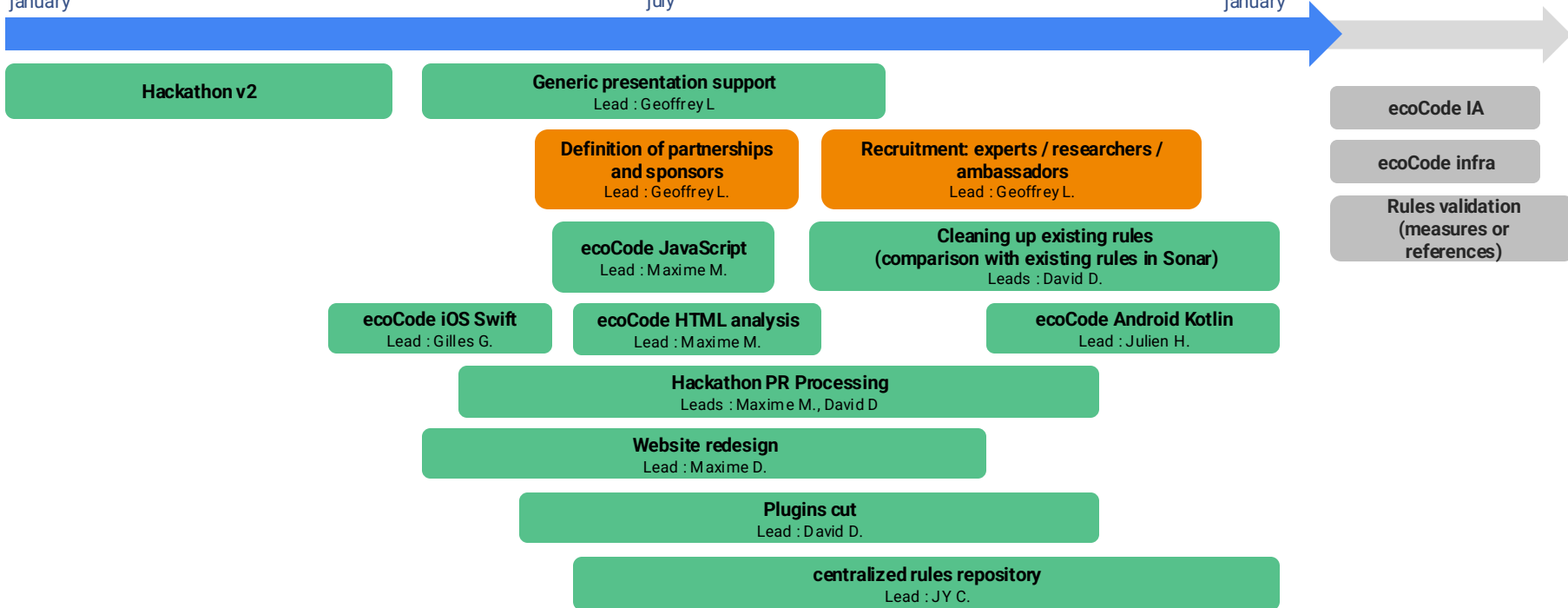
2023

january

july

2024

january





# Creedengo 2024 Roadmap

- Current topics
- New topics
- Next topics

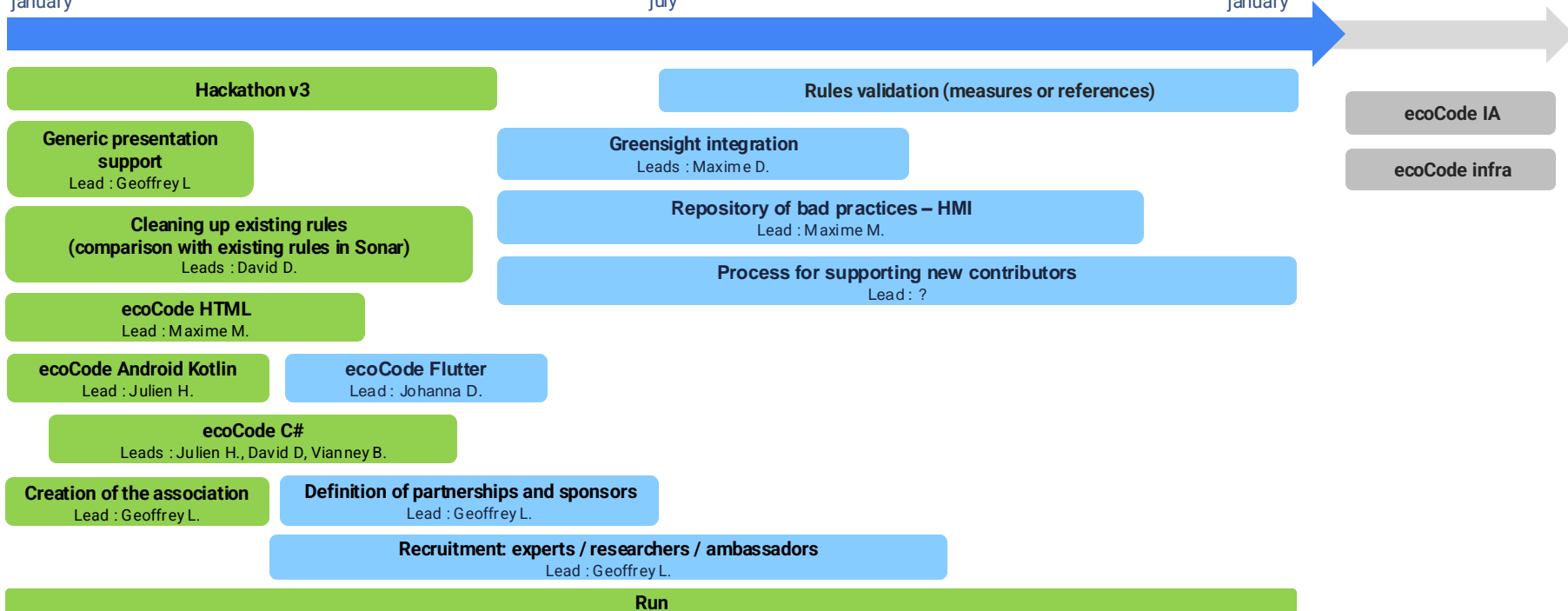
2024

january

july

2025

january



# Green Code Initiative



**Association constituted in accordance with the French law of 1901 concerning non-profit organizations**

**Headquarters: University of Pau (UPPA)**

## Objectives :

- **Structuring** the collective
- **Evangelizing** and implementing green coding
- **Bringing together** people and companies wishing to participate in the development of green coding
- **Mutual help** between developers who are members of the
- **Raising awareness** and training in sustainable software development
- Develop **tools for measuring** and reporting environmental impact

# They talk about our project

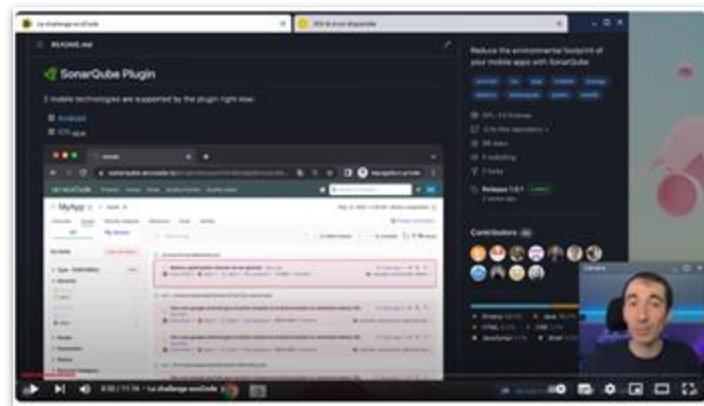
## Specialized press



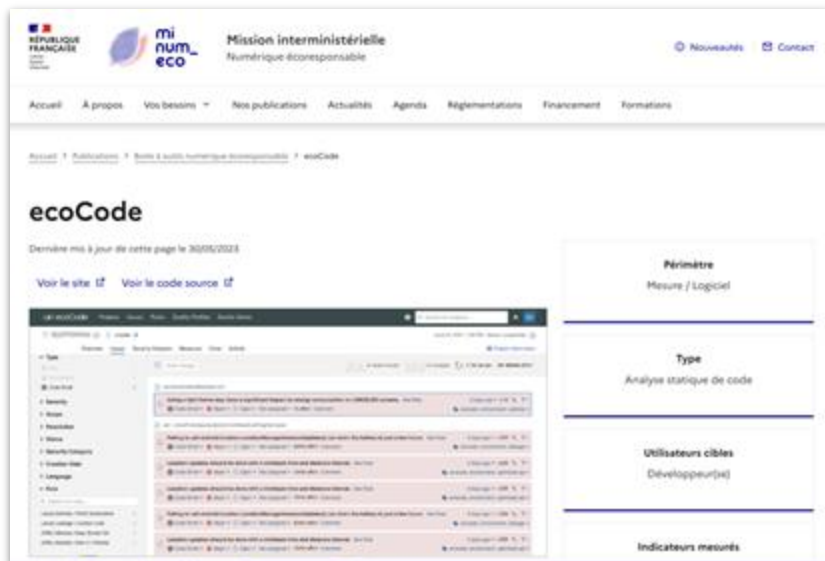
📖 « *programmez!* » Magazine #257

ecoCode: Reduce your apps' environmental debt!

« Dev Café » channel 📺  
Episode of 28/03



# French Government Websites



The screenshot shows the homepage of the ecoCode website, part of the Mission interministérielle Numérique écoresponsable. The header includes the French Republic logo, the mission name, and navigation links like 'Nouveautés' and 'Contact'. A secondary navigation bar lists 'Accueil', 'À propos', 'Vos besoins', 'Nos publications', 'Actualités', 'Agenda', 'Réglementations', 'Financement', and 'Formations'. The main content area features the 'ecoCode' logo, a date 'Dernière mise à jour de cette page le 30/05/2023', and links to 'Voir le site' and 'Voir le code source'. A large code editor window displays the source code of the page. To the right, a sidebar lists 'Périmètre: Mesure / Logiciel', 'Type: Analyse statique de code', 'Utilisateurs cibles: Développeur(x)', and 'Indicateurs mesurés'.



The screenshot shows the homepage of the SPOTE website, part of the Ministère Écologie Territoires. The header includes the French Republic logo, the mission name, and a search bar labeled 'Rechercher par mot-clé'. A secondary navigation bar lists 'Accueil', 'Nos thématiques', 'Actualités', 'Autour des offres', 'Voir toutes les offres', 'Porteurs d'Offres', 'Contact', and 'Se connecter'. The main content area features a 'Retour aux actualités' button, the title 'ecoCode ou Eco-conception de logiciel', a date 'Le 2 avril 2023', and a section 'plugins intégrés à SonarQube'. The text describes the tool's purpose in reducing carbon footprint and mentions its integration with SonarQube. A 'Temps de lecture estimé : 2 min' button is present. The ecoCode logo is displayed in the bottom right corner.

# Conferences



# Call for participation

WE NEED YOU!



- **Software developer** beginner or advanced, in any language
- **Designer** UX / UI
- **Project manager**
- **Community manager**
- **researcher**
- **Communication** professionnall
- Conf **ambassadors**, school relations, forums, fairs
- Partner **Companies** or sponsors
- **Entrepreneurs**
- **Individuals**

**See you soon !**  
*Stay Green, Stay Lean*