#CREEDENGO

The initiative that draws its strength from the collective

By Green Code Initiative (GCI)

#CREEDENGO

A response to the Paris Climate Agreement: < +2°C

The digital industry must do its part

Mobile Digital Drunkenness

Available applications

2,87
millions
Google Play Store

1,96
millions
iOS Apple Store

App Downloads Annual

110
Billion
Google Play Store

33
Billion
iOS Apple Store

Smartphone users

6,92
Billion
72% Android
27% iOS
1% other

Behavior

5
hours / day

Digital Drunkenness Web

Available applications

1,93

Billion
online webites

Websites visited

100

Website / day
per user

Daily Connections

5,25

Billion
on internet

Behavior

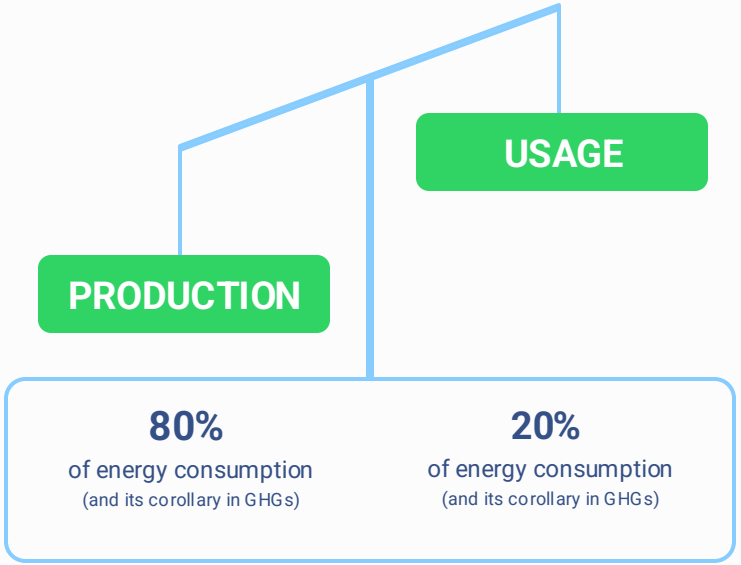
2,8

hours / day

Orders of magnitude

MATERIAL eco-design

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

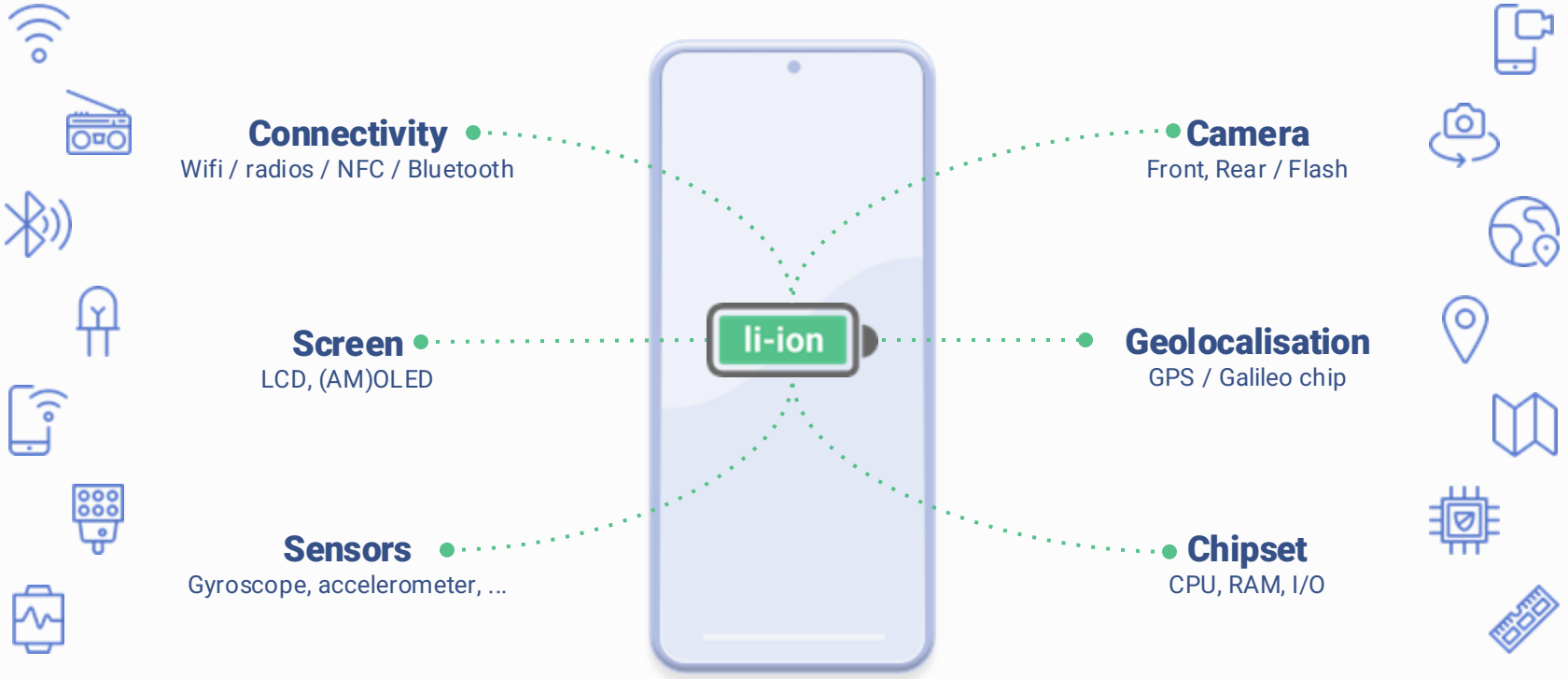


SOFTWARE eco-design

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

Référentiel Environnemental du Numérique (The Shift Project, 2018)

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

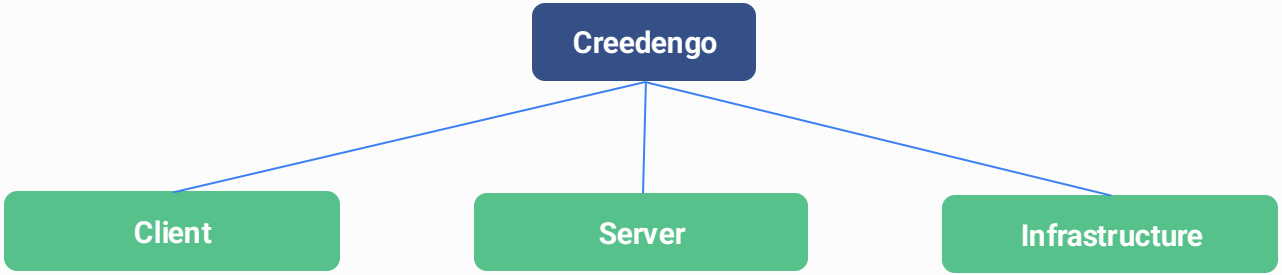
Design websites and applications keeping in mind that they have an ecological footprint. **Train the new generation** of developers in eco-design (see French REEN law).

> *“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...

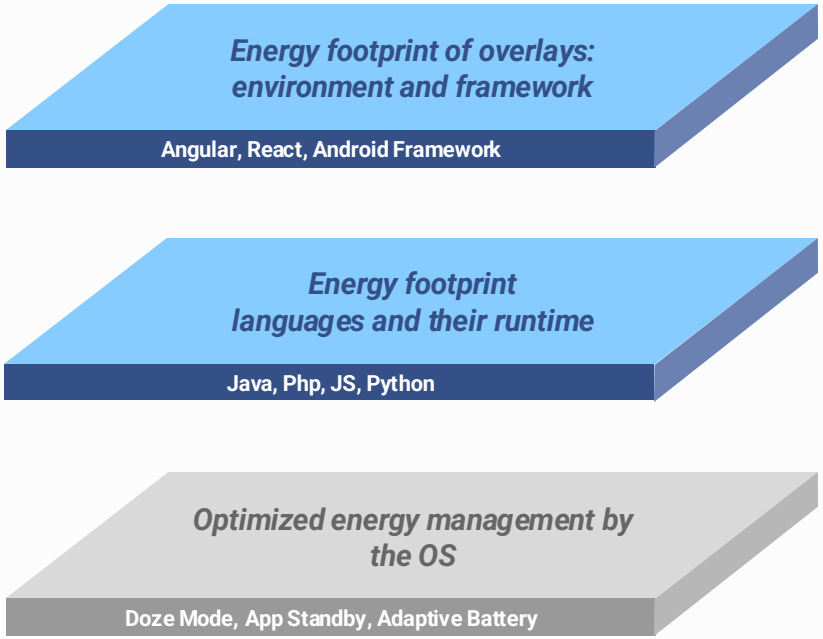
A web or mobile application is a **client-side** program only.

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	Langages	Frameworks	Infrastructure
Android	Java	Spring Boot	Kubernetes
iOS	PHP	Angular	Terraform
	C#	React	Ansible
	JS	VueJS	
	Python		
	Kotlin (android)		
	Swift		
	HTML		
	Rust		

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)

	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

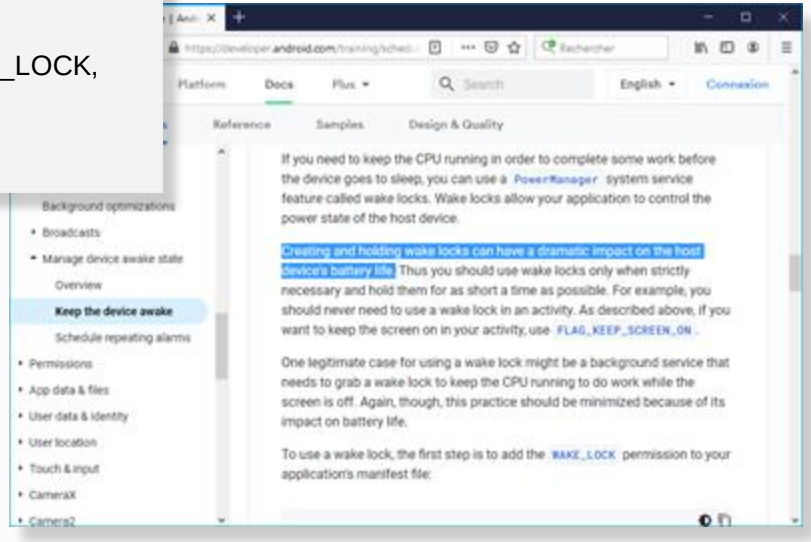
	Android	iOS	
✅ **Available rules**	30	10	40
🚧 **In progress**			0
🚀 **Rules catalog**	43	10	53
⏳ **Awaiting specifications rules**	2		2

Last update : 14/03/2024

Energy Code Smell by example

Keep CPU On

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



Energy Code Smell by example

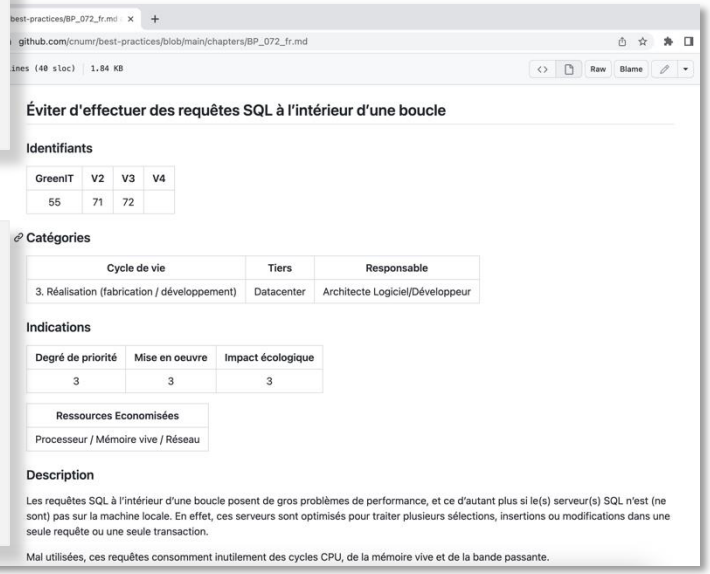
SQL queries inside a loop

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);
```



github.com/cnumr/best-practices/blob/main/chapters/BP_072_fr.md

Raw Blame

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.

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A tool for developers

Computer-Aided Software Engineering (CASE)

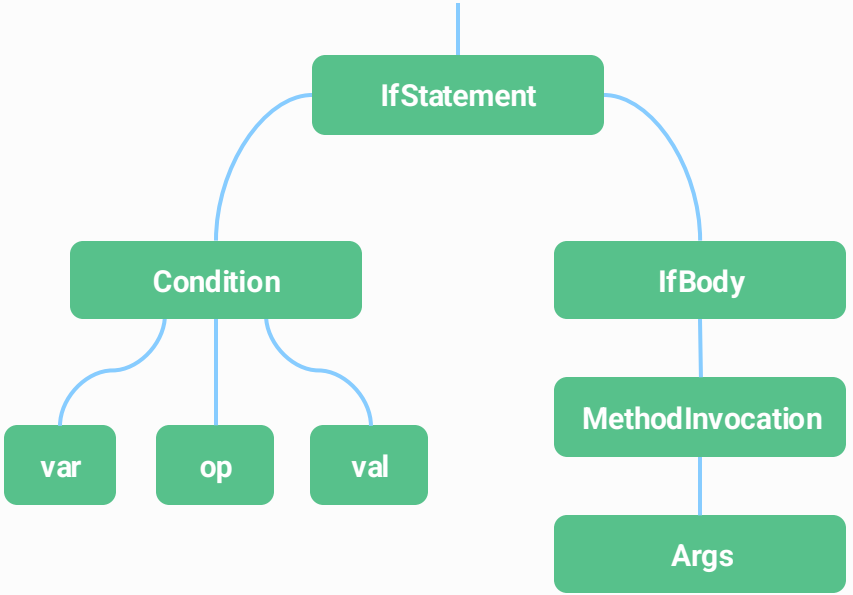
Abstract Syntax Tree (AST)

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

if (wakeLock  != null) {

    wakeLock.acquire();

}
```



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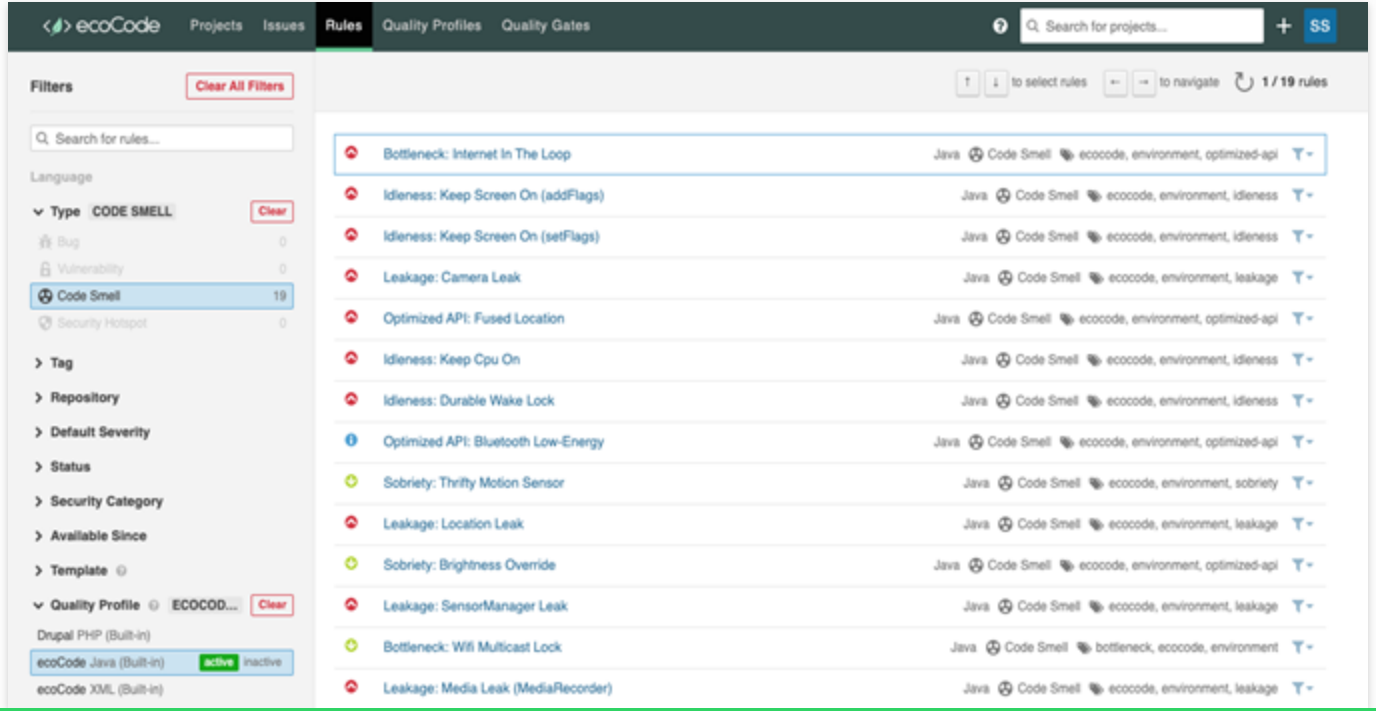
A collection of SonarQube plugins

- 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



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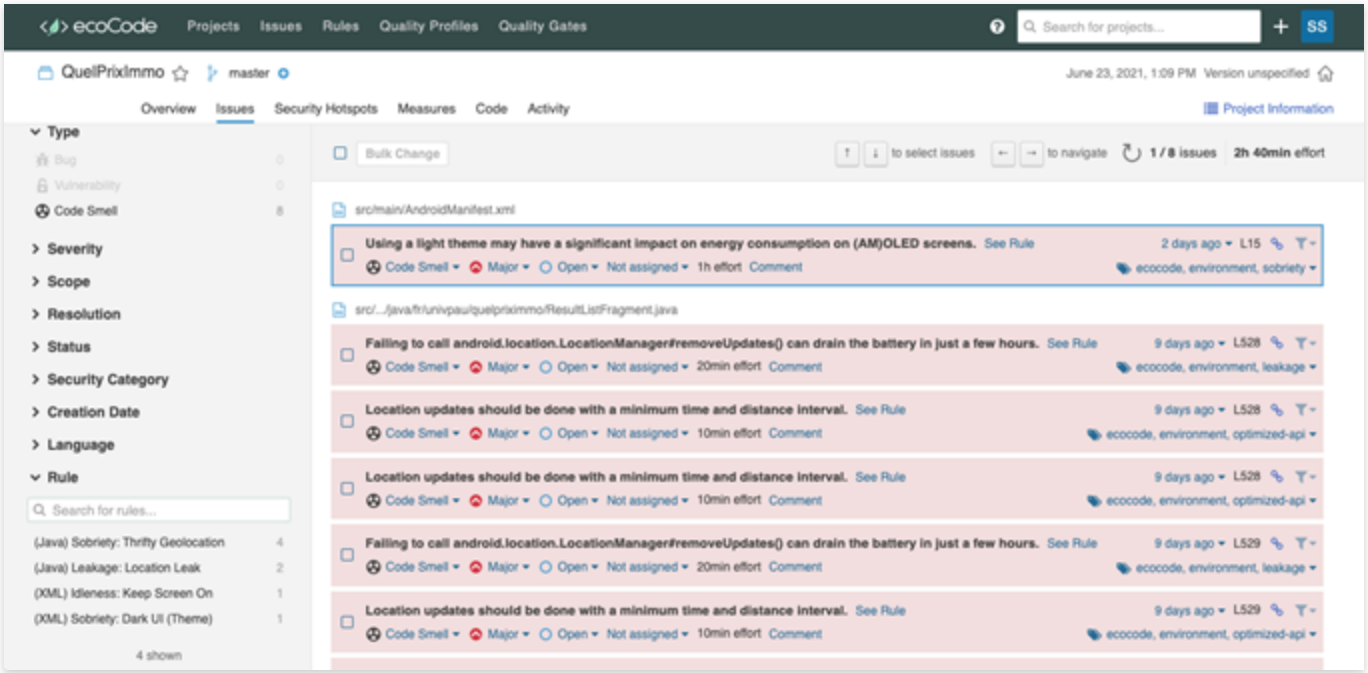
Problems detected



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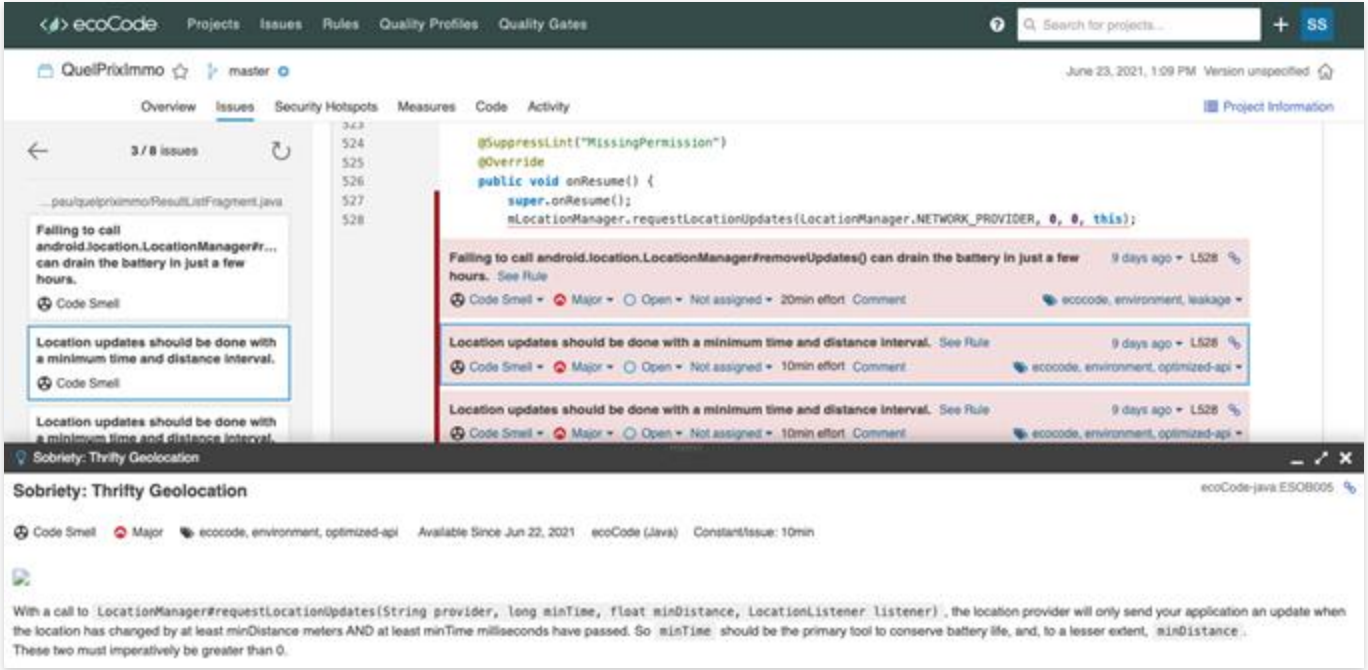
Problem detail



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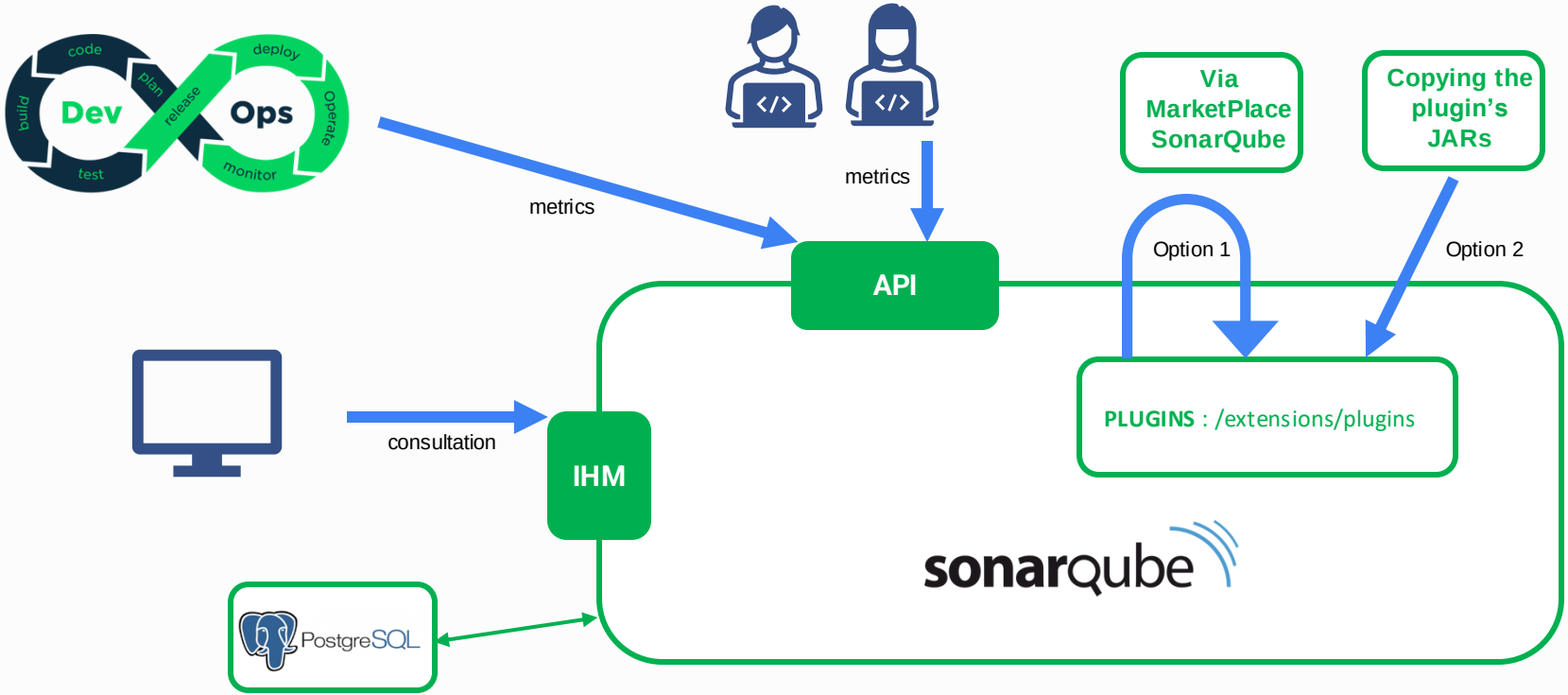
Architecture Diagram (PROD)



The collective behind the project

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

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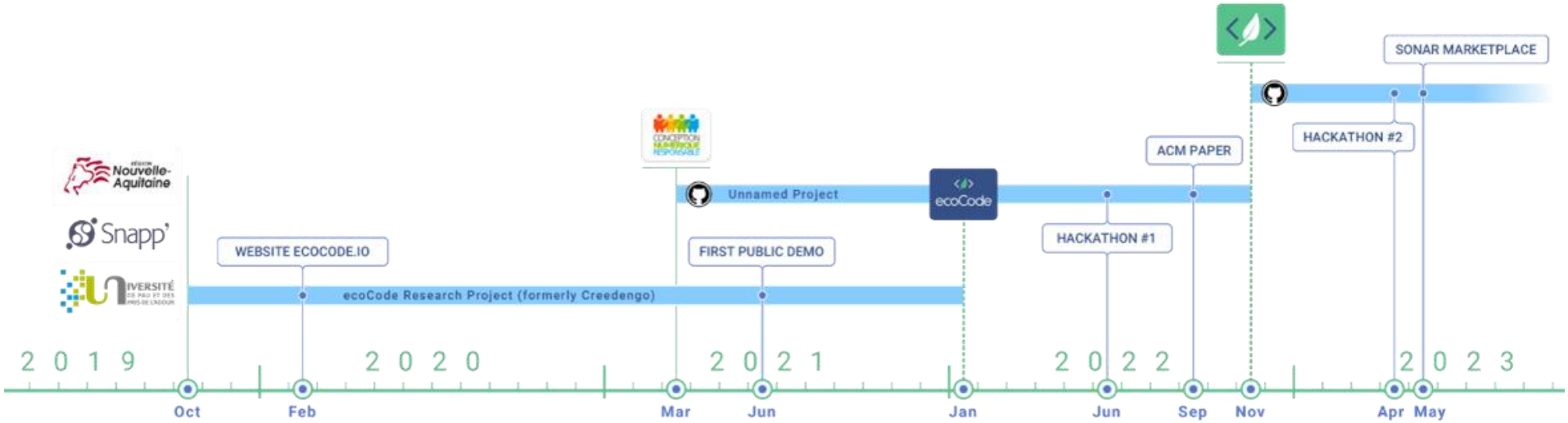
Our Timeline



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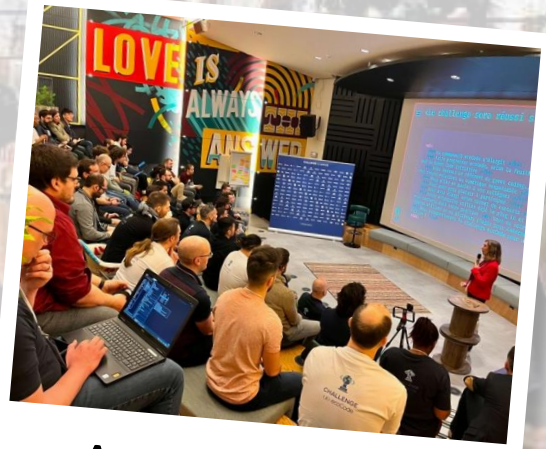
3 Hackathons

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

Main contributors

Johanna DUIGOU
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

And + 200 other contributors or commiters active on the project

A large network of partners

2024 Partners

CGI

Banque de France
Eurosystème

Enedis

Région Nouvelle-Aquitaine

Crédit Agricole

Université de Pau et des Pays de l'Adour

solocal
PagesJaunes

Davidson

inside|app

Capgemini

orange Business

C2S Bouygues

webwag

accenture

sonar

aubay
anticiper l'innovation

TOSIT
The Open Source I Trust

2024 Sponsor

Crédit Agricole

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A user club

Expand use

Facilitate adoption

Engaging teams

Promoting exchanges

Share the problems encountered

Best practices

Report needs to the Green Code Initiative

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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	Langages	Frameworks	Infrastructure
Android	Java	Spring Boot	Kubernetes
iOS	PHP	Angular	Terraform
	C#	React	Ansible
	JS	VueJS	
	Python		
	Kotlin (android)		
	Swift		
	HTML		
	Rust		

Theme already covered

Topic not yet addressed

Available on the SonarQube marketplace

Available on IDE

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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

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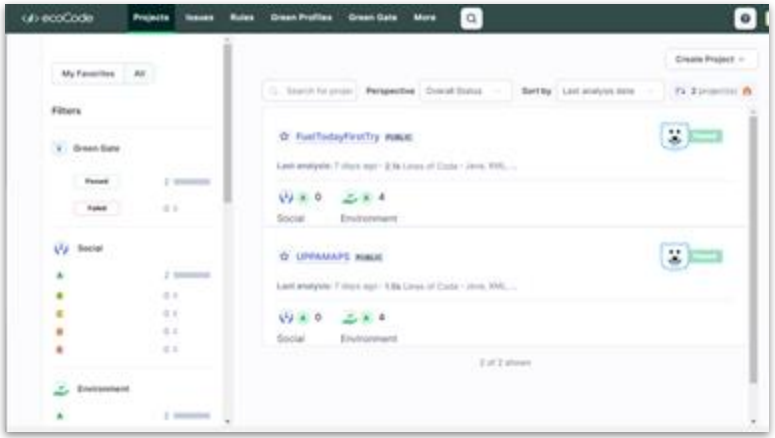
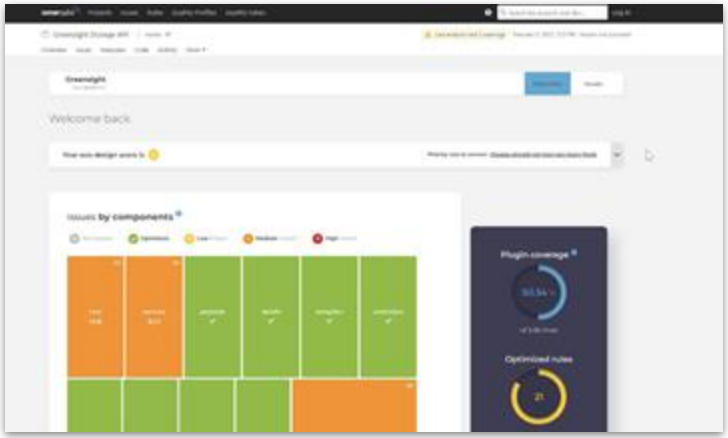
Green Look ’n’ Feel



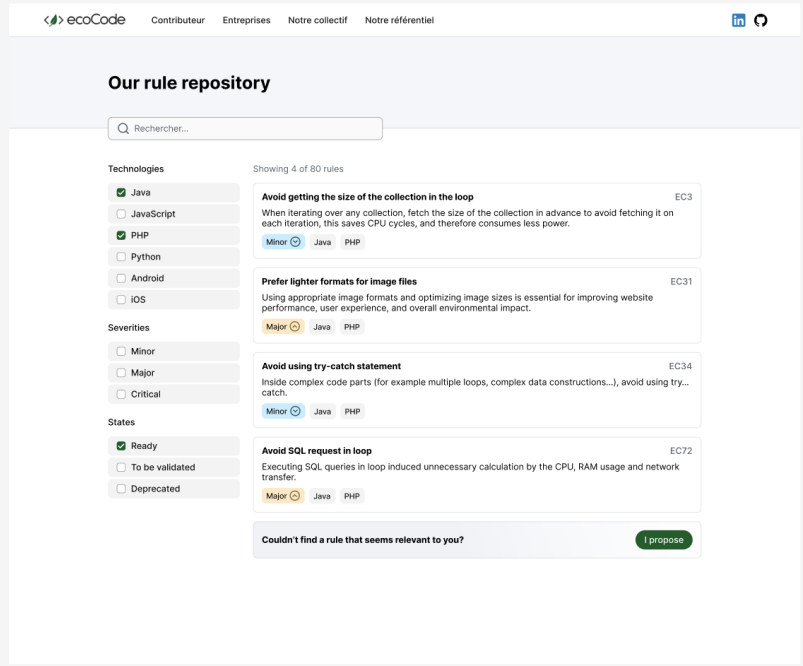
PoC Creedengo (Android)

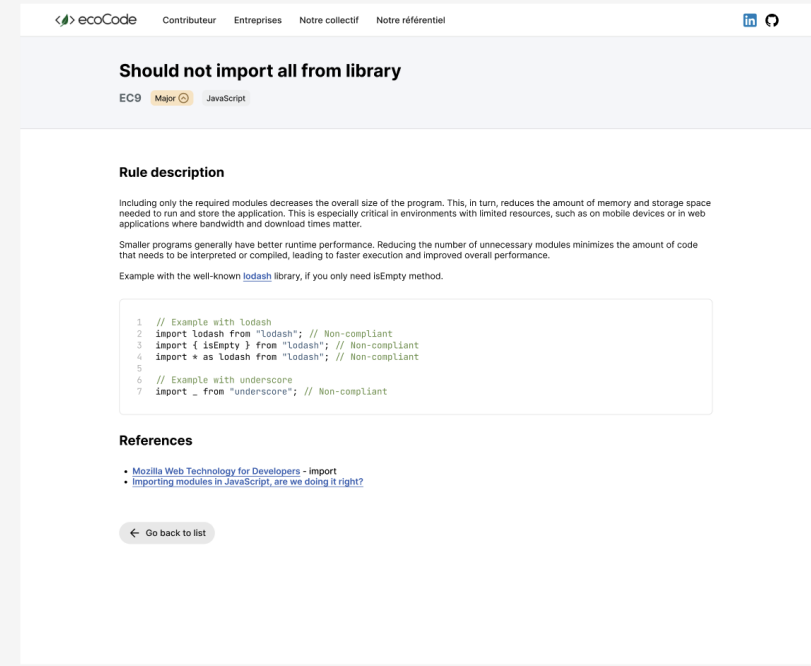


PoC GREENSIGHT Sonar By Capgemini

Creedengo

Rules repository





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The measure

fruggr

digital better

ETSDiff / VJoule

DAVIDSON

Scaphandre

Hubblo

Joular

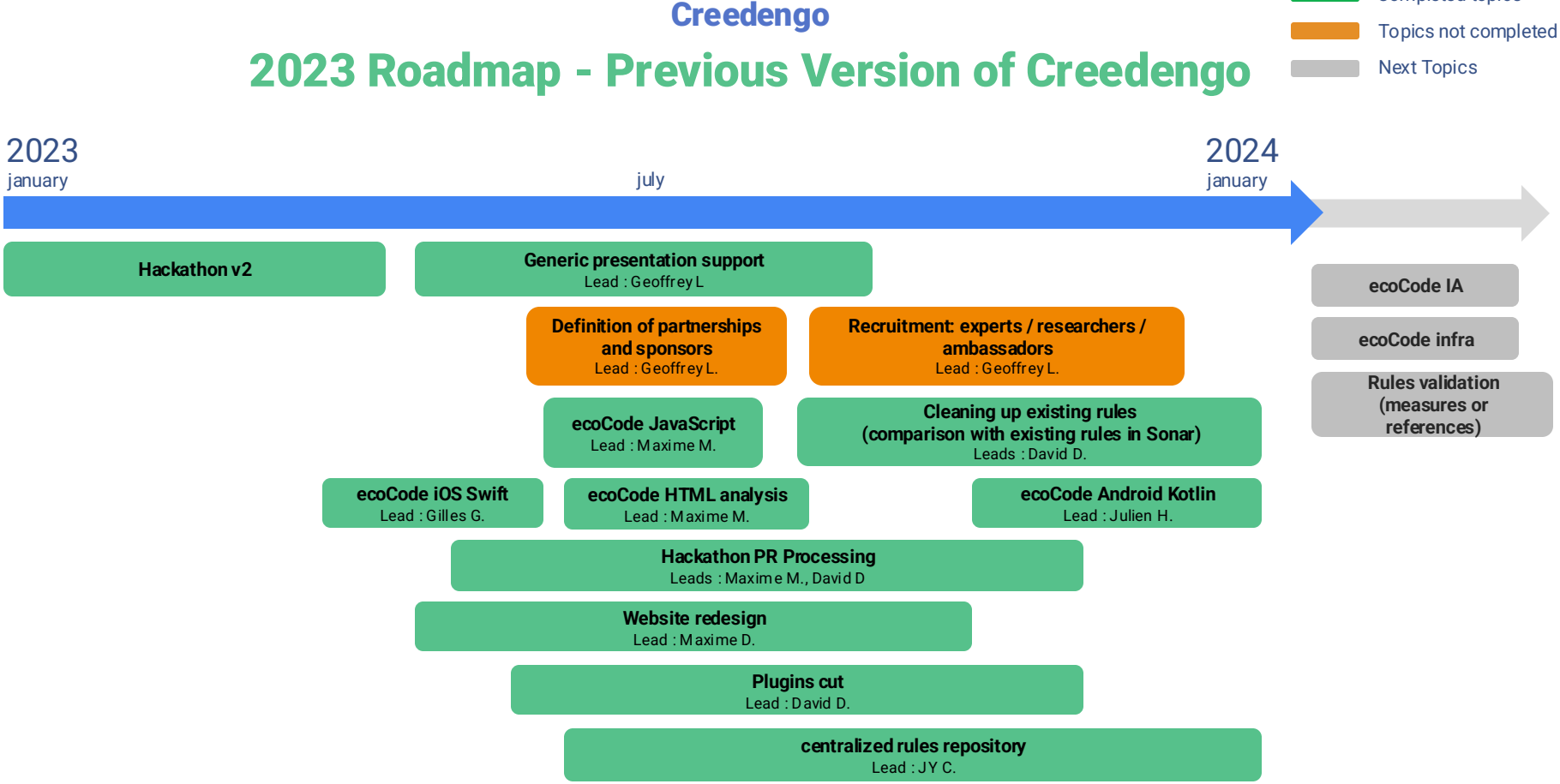
PowerJoular

JoularJX

PowDroid

Creedengo

2023 Roadmap - Previous Version of Creedengo



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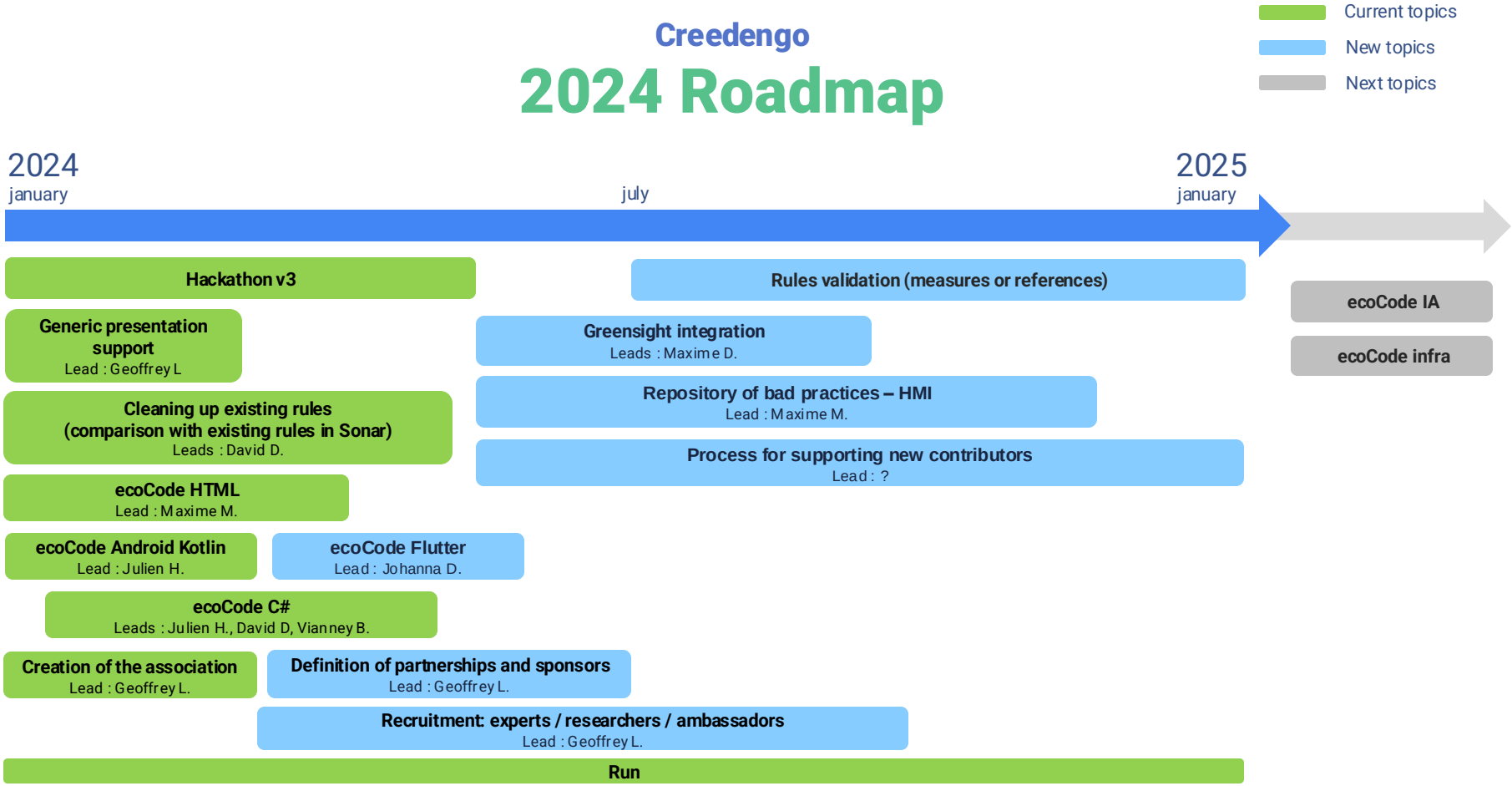
2024 Roadmap



Green Code Initiative

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR

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

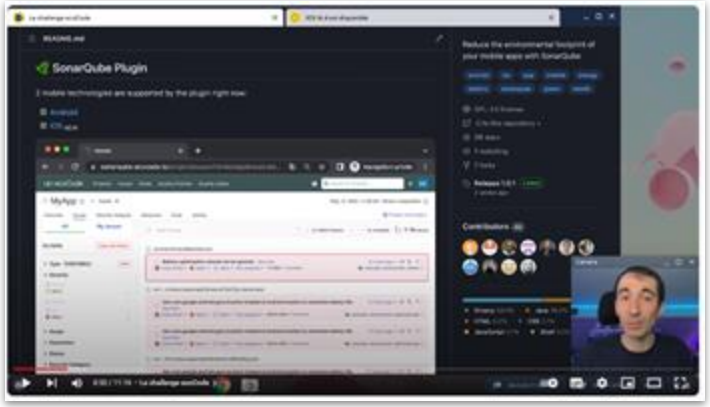
They talk about our project

Specialized press

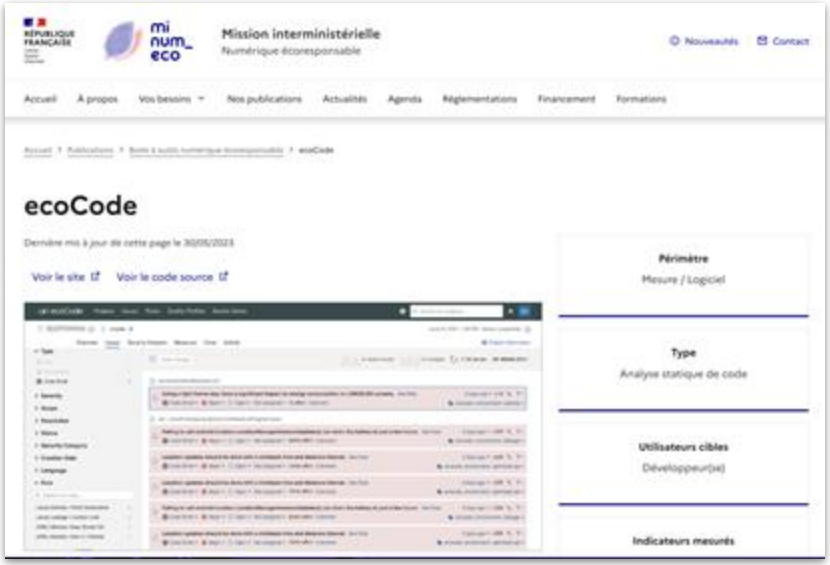
☚ « ***programmez! » Magazine* #257**

ecoCode: Reduce your apps' environmental debt!

« Dev Café » channel ☛
Episode of 28/03



French Government Websites



Conferences

Call for participation

- **Software developer** beginner or advanced, in any language
- **Designer** UX / UI
- **Project manager**
- **Community manager**
- **researcher**
- **Communication p**rofessionnal
- Conf **ambassadors**, school relations, forums, fairs

- Partner **Companies** or sponsors
- **Entrepreneurs**
- **Individuals**

See you soon !

Stay Green, Stay Lean