

Ecodesign in mobile development with DevGreenOps

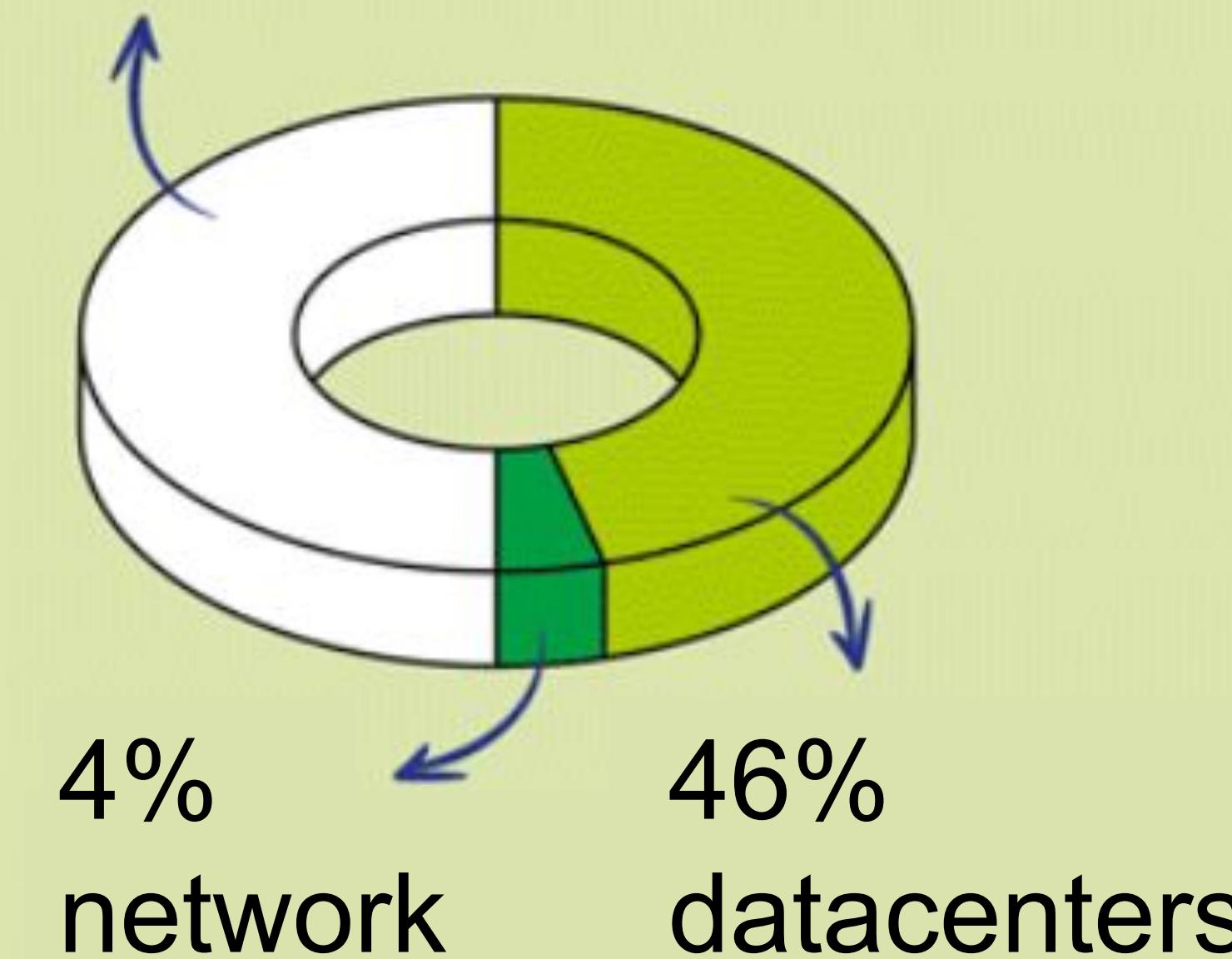


Dr. Edouard Guégain

ecoCompute 2025

Devices vs Datacenters

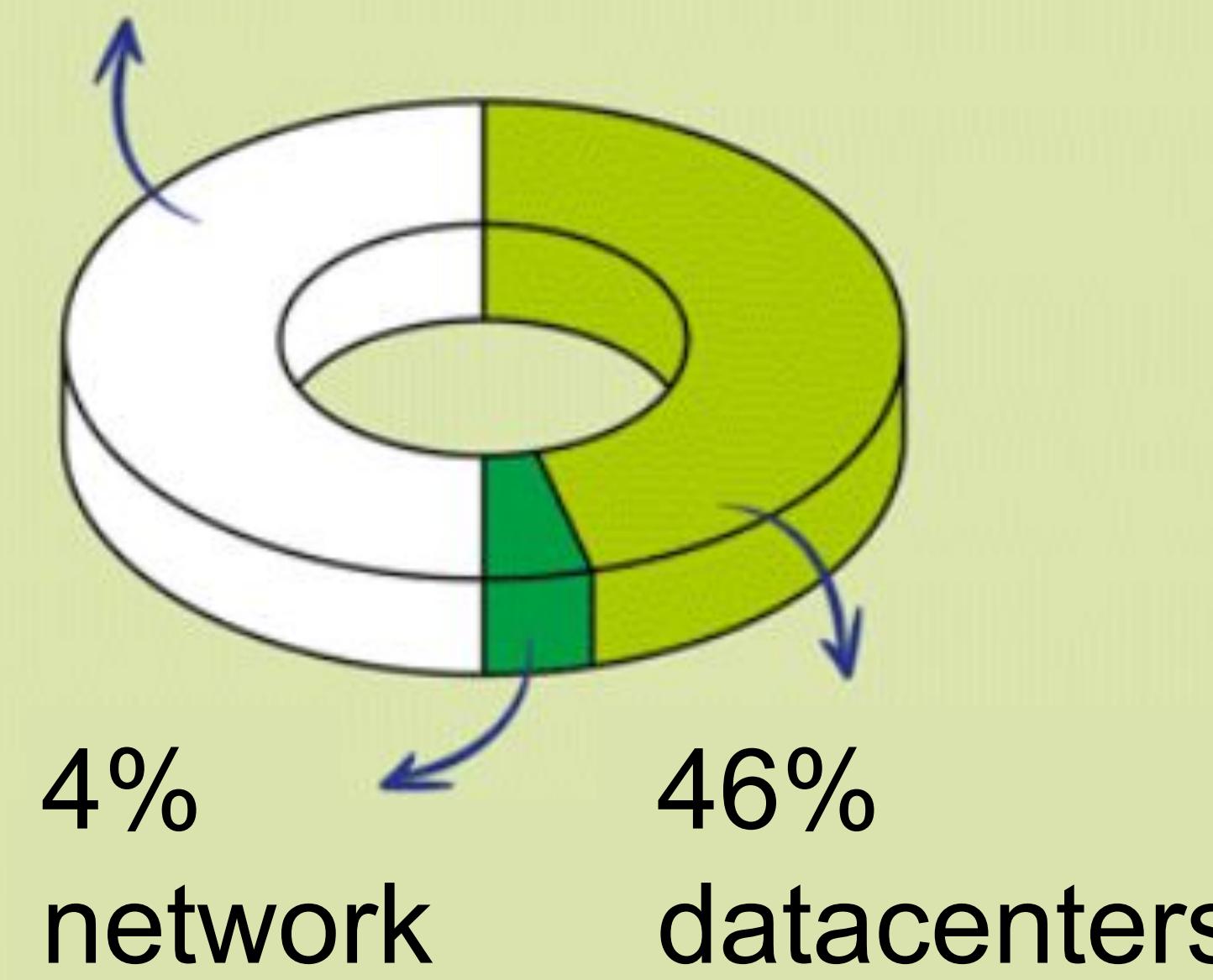
50% devices
computers, smartphones, smartTV...



Ademe, 2025 (scope: France - 50%)
GreenIT, 2025 (scope: World - 54%)

Devices vs Datacenters

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Centralized impacts
Homogeneous hardware
↓
Centralized optimisations
Scalability

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Devices vs Datacenters

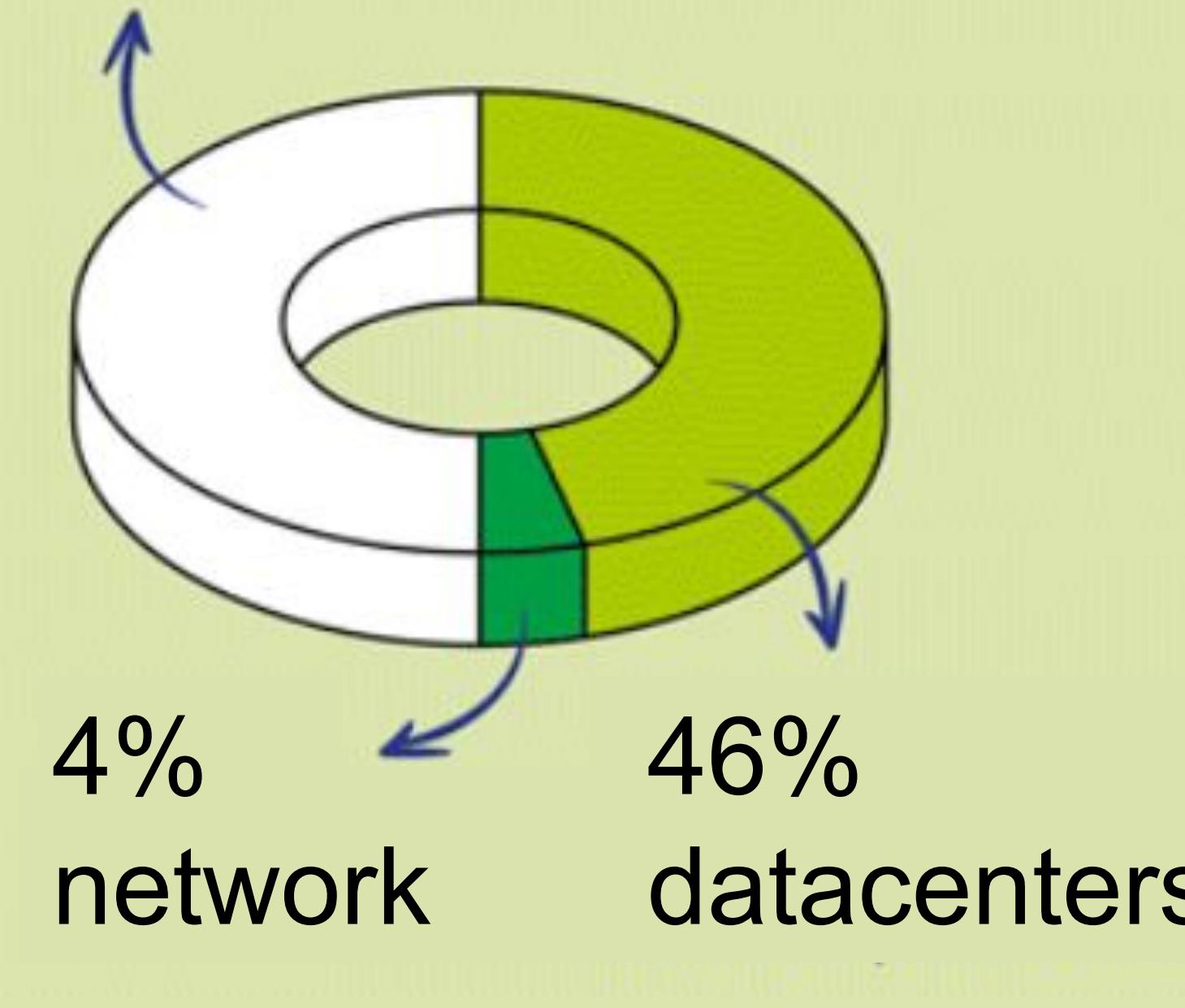
Decentralized impacts



Decentralized
optimisations

Billions of devices
Thousands of models
Millions of services

50% devices
computers, smartphones, smartTV...



Centralized impacts
Homogeneous hardware

Centralized optimisations
Scalability

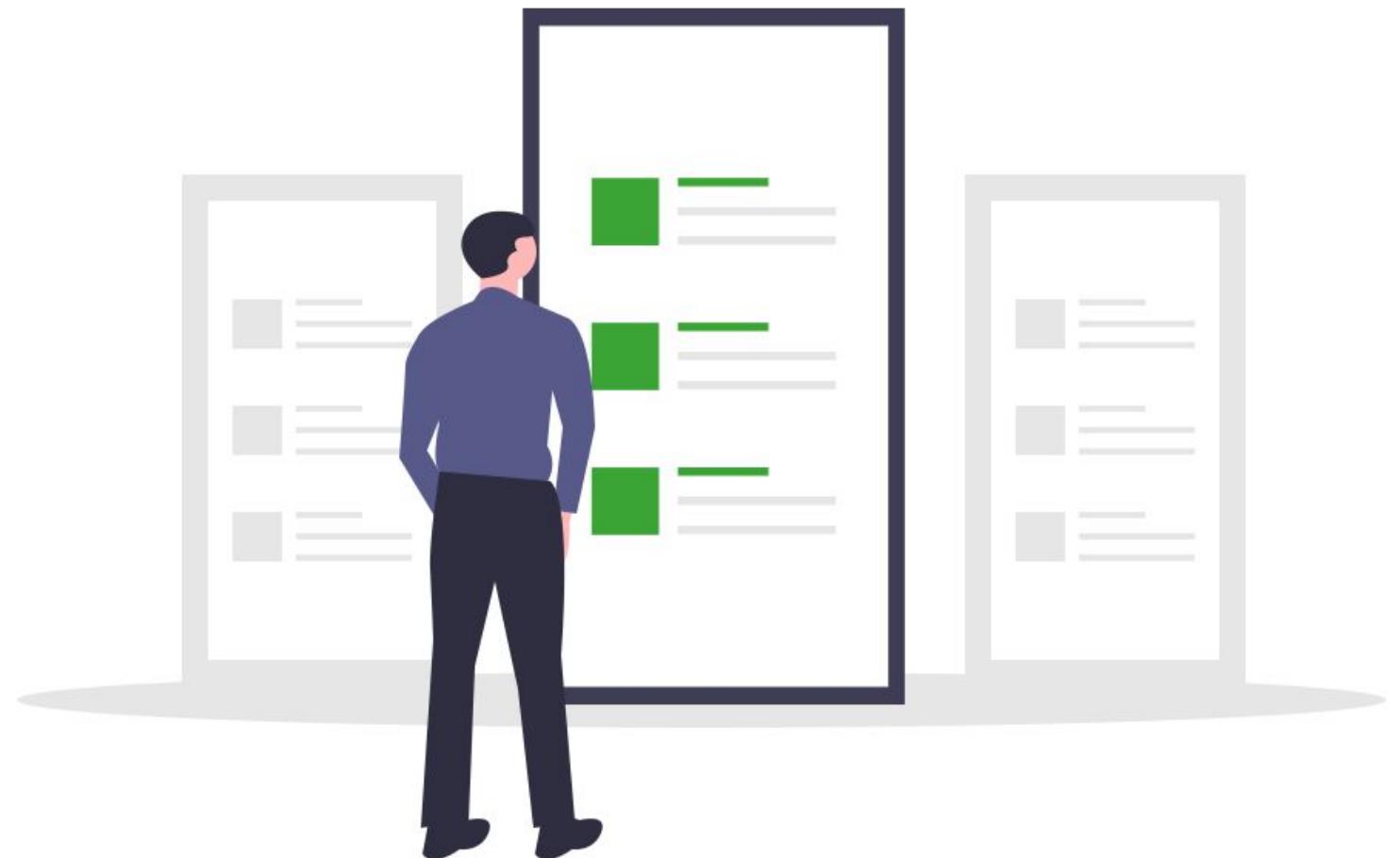
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Focus on mobile devices

Constraints of front-ends:

- Multi-features
 - Interactive
 - Diversity
-



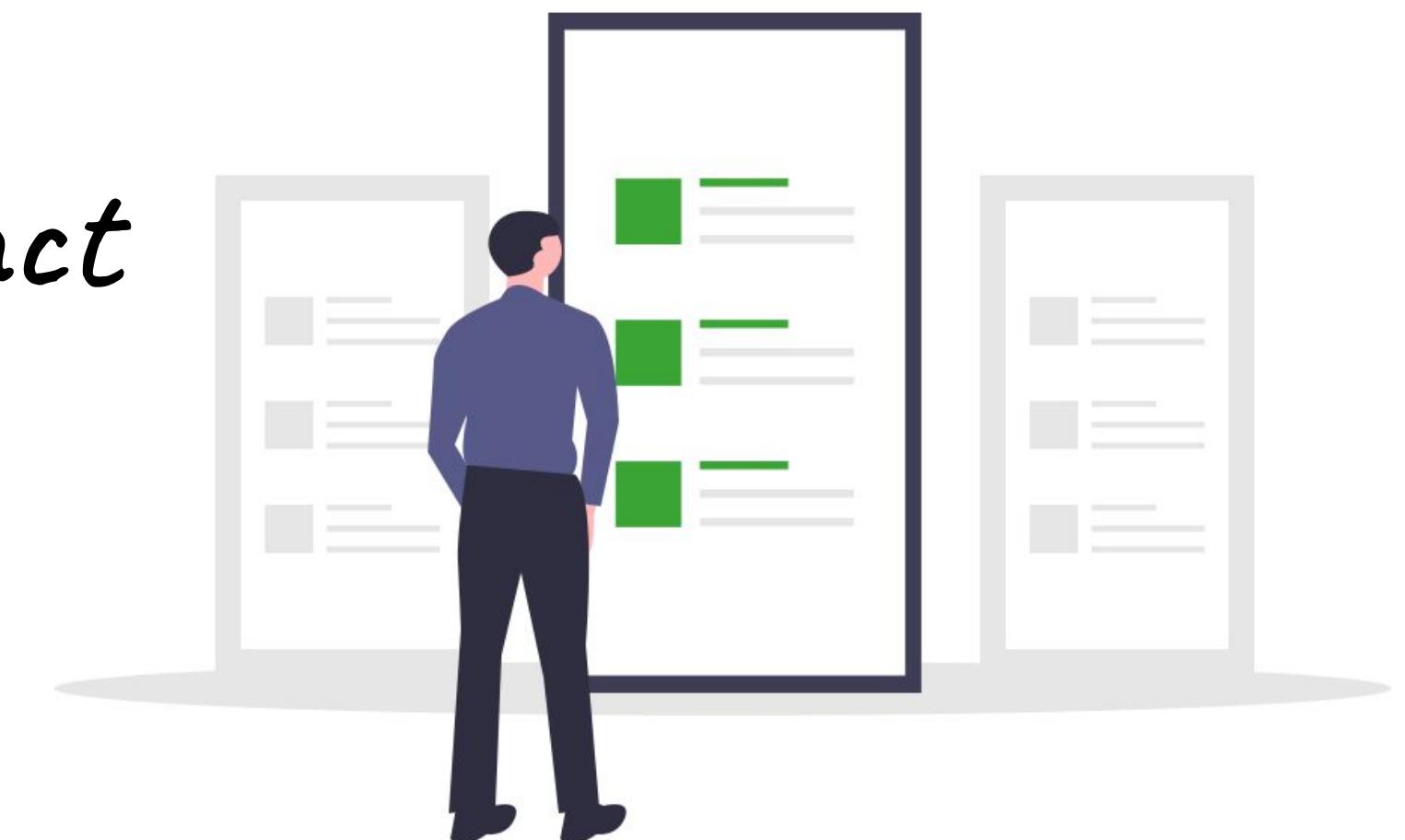
Focus on mobile devices

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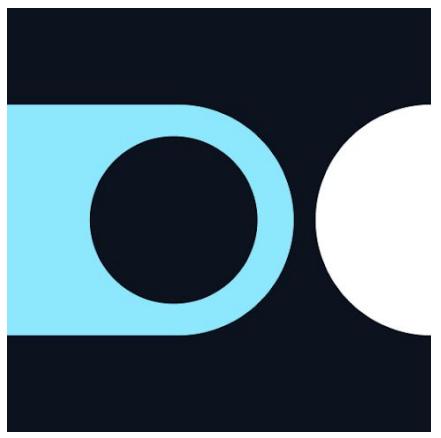
- Multi-features
- Interactive
- Diversity

Impact of software front-ends:

- Energy consumption → *20% of GHG impact*
- Hardware lifespan shortening (batteries)
- Pressure on network & backends



80%



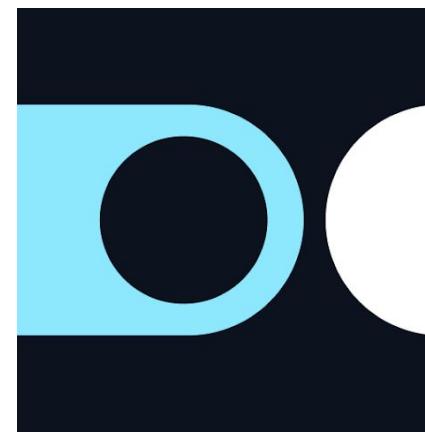
SNCF Connect

Application (Android/iOS)

30 million
yearly bookings

- -8 seconds /booking
- -300 KB /booking
 - (\approx -9TB/year)

-19% CO₂e /booking



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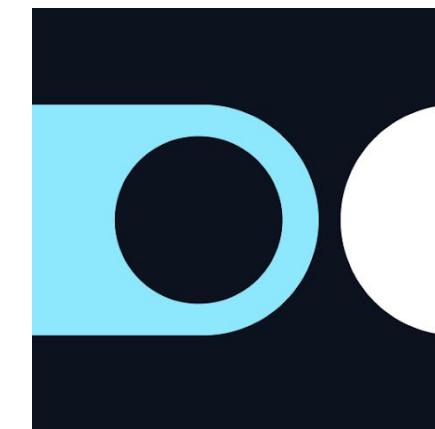
Paris 2024

Website

5 million
pages visited

- -31% battery use /page
- -43% data volume /page
- -30% net. request /page

-34% CO₂e /page
on the 20 most visited pages



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Bouygues Telecom

Application (Android)

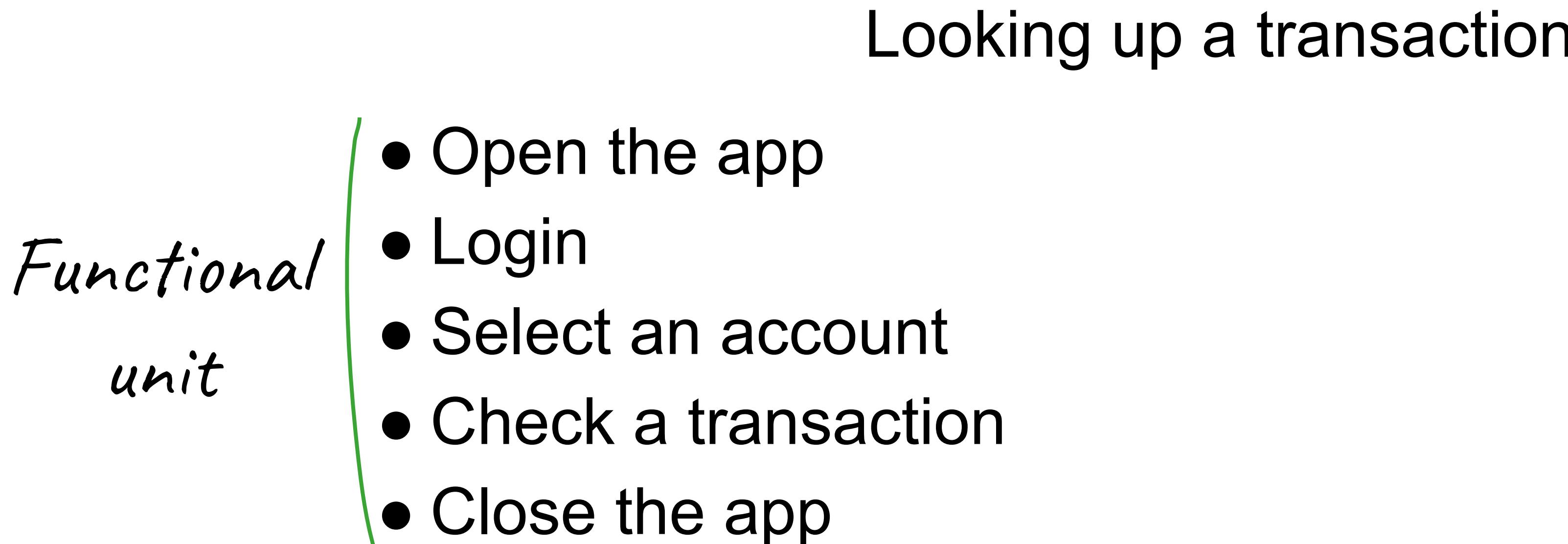
182 million
yearly journey

-36% CO2e /journey
 \approx 693 tCO2e yearly)



How to measure an interface?

Life Cycle Assessment (ISO 14044) → functional units



How to measure an interface?

Life Cycle Assessment (ISO 14044) → functional units

Looking up a transaction	
Functional unit	• Open the app Click on app icon, wait for [criteria]
	• Login Type password after 2s
	• Select an account Click on account after 2s
	• Check a transaction 2 swipes/s until [criteria]
	• Close the app Close the app after 5s
network: Wifi, brightness: 50%	

Automation and replicability

User journey:

Step 1:

Open the app

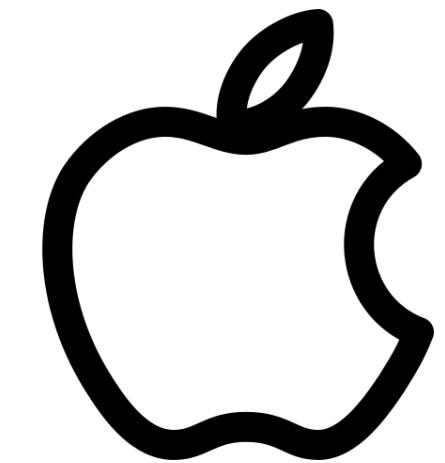
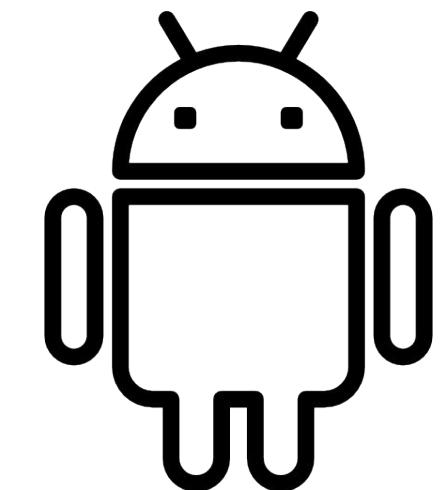
Step 2:

Pause on Home

Step 3:

Navigation

```
1 measureStart, LOAD_home  
2 applicationStart, com.myapp  
3 waitUntilText, Hello  
4 pause, ${PAUSEAFTERLOAD}  
5 measureStop  
6  
7 measureStart, PAUSE_home  
8 pause, ${PAUSEDURATION}  
9 measureStop  
10  
11 measureStart, LOAD_addEntry  
12 clickByTextExact, Add  
13 waitUntilText, Enter new name  
14 pause, ${PAUSEAFTERLOAD}  
15 measureStop  
...  
... applicationCloseAll
```





Measure protocol

Test environment:

- **Physical devices** only
- Stable activity / idle power usage
- Battery within safe range





Measure protocol

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Monitoring:

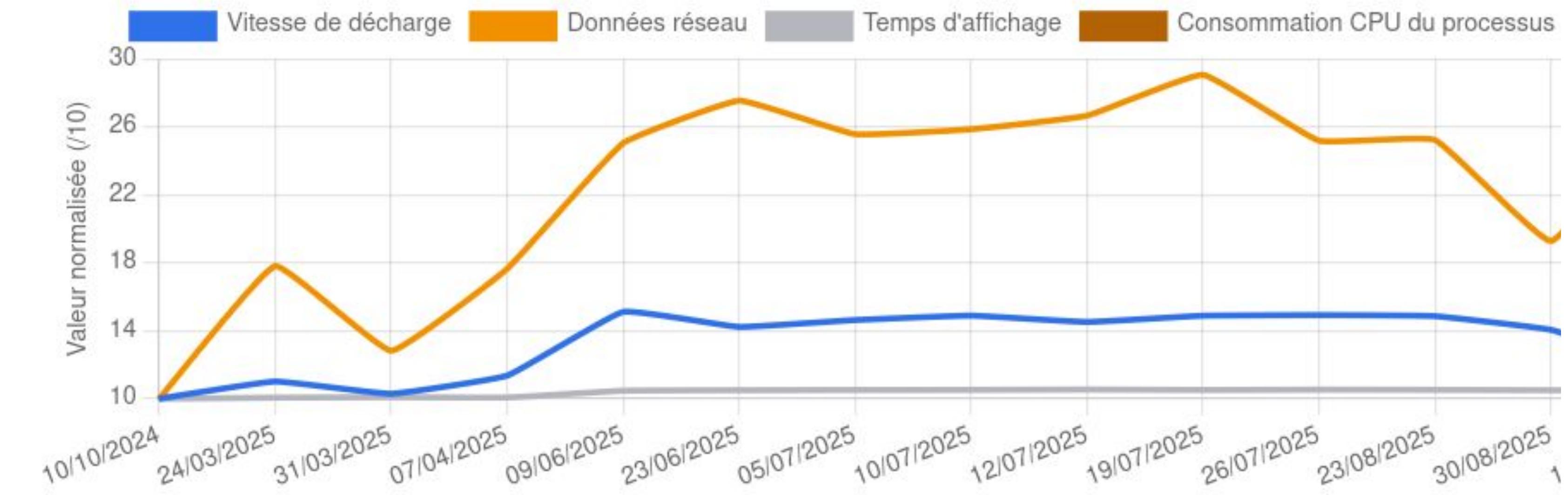
- **Battery** discharge (mAh)
- Temperature
- Data usage
- All available metrics (CPU, RAM, ...)



Results aggregation



Raw data



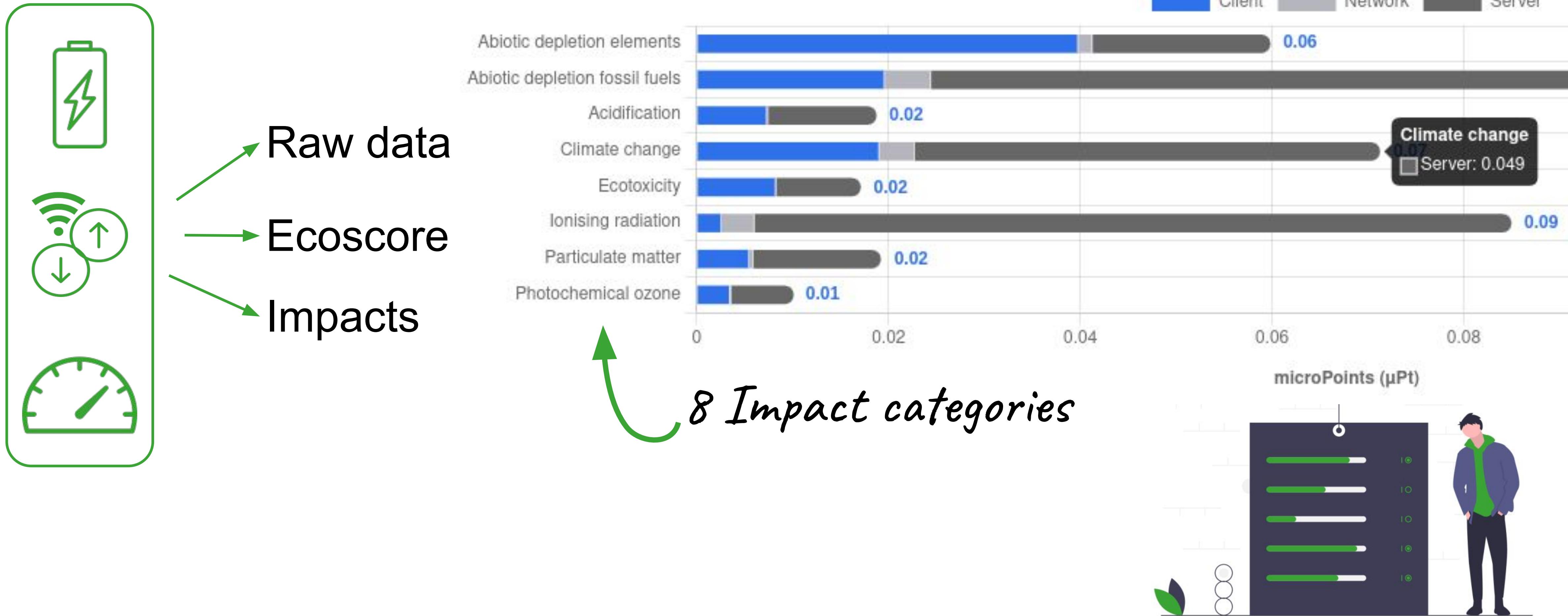
Over versions and within versions



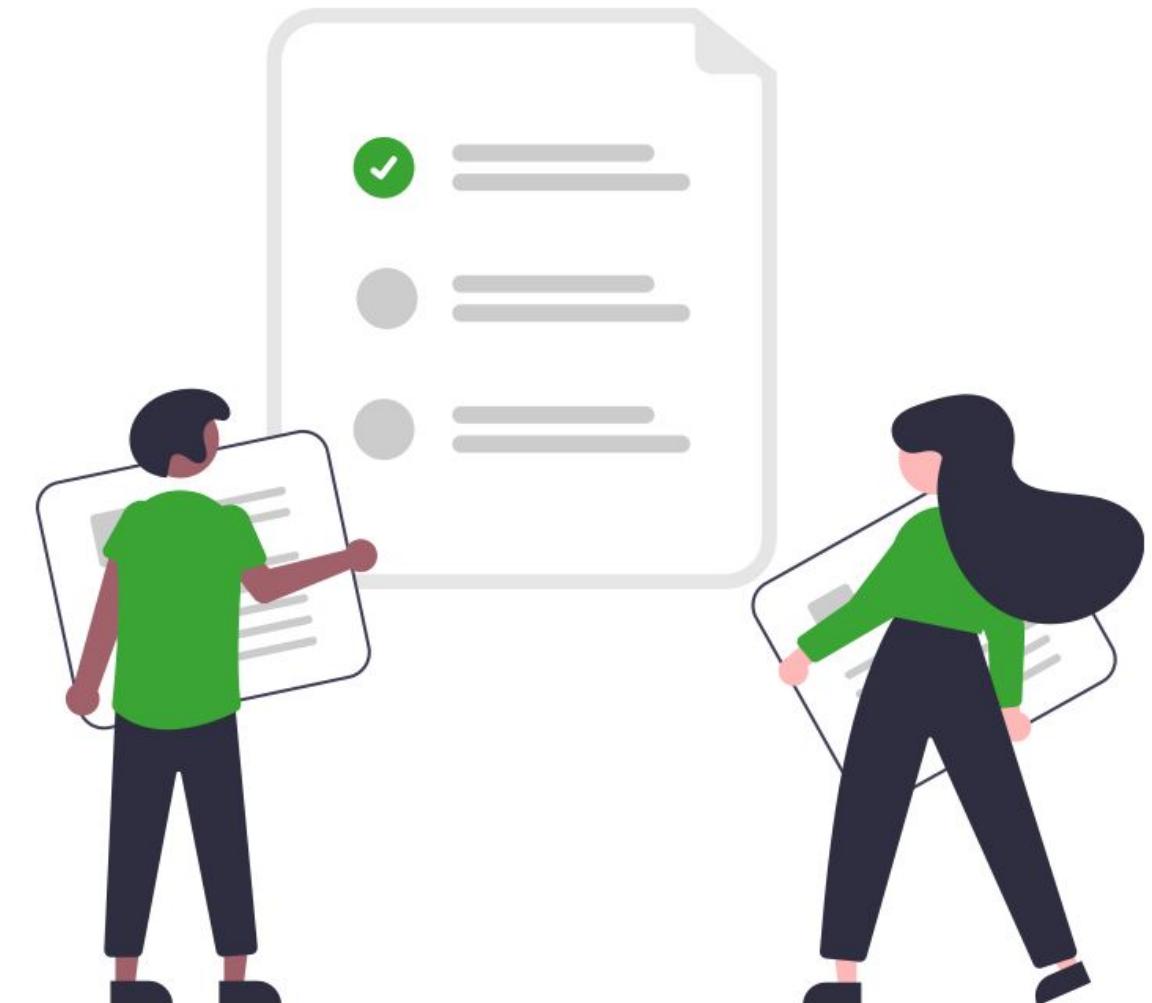
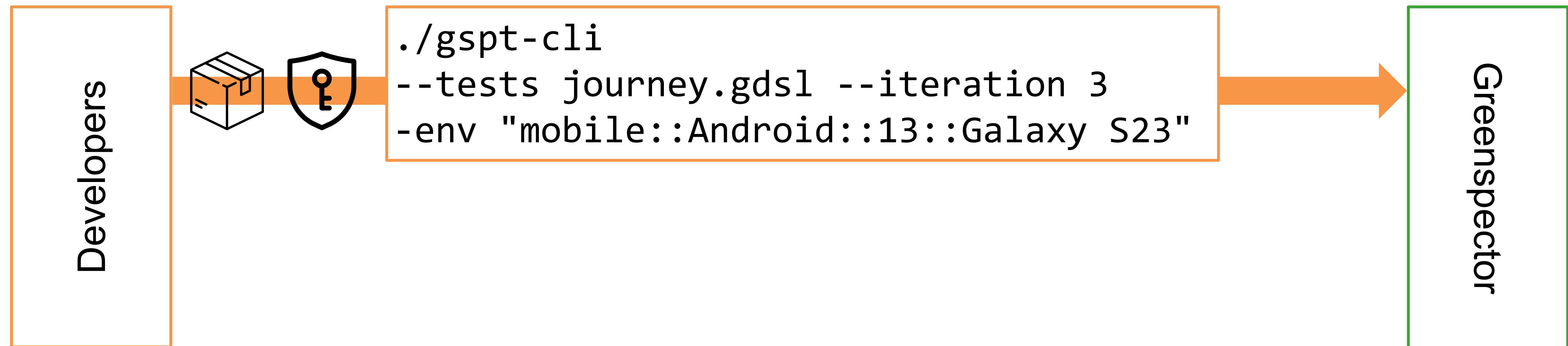
Results aggregation



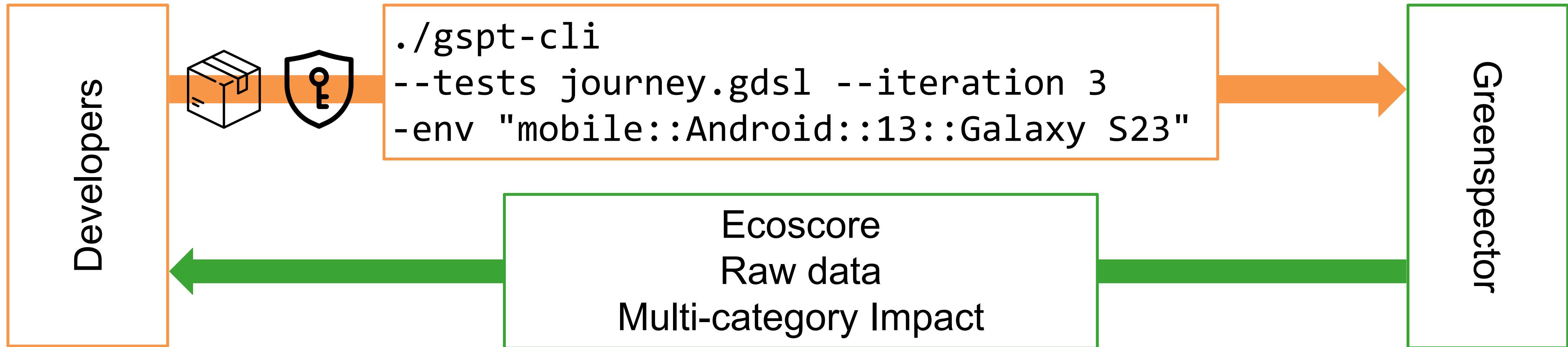
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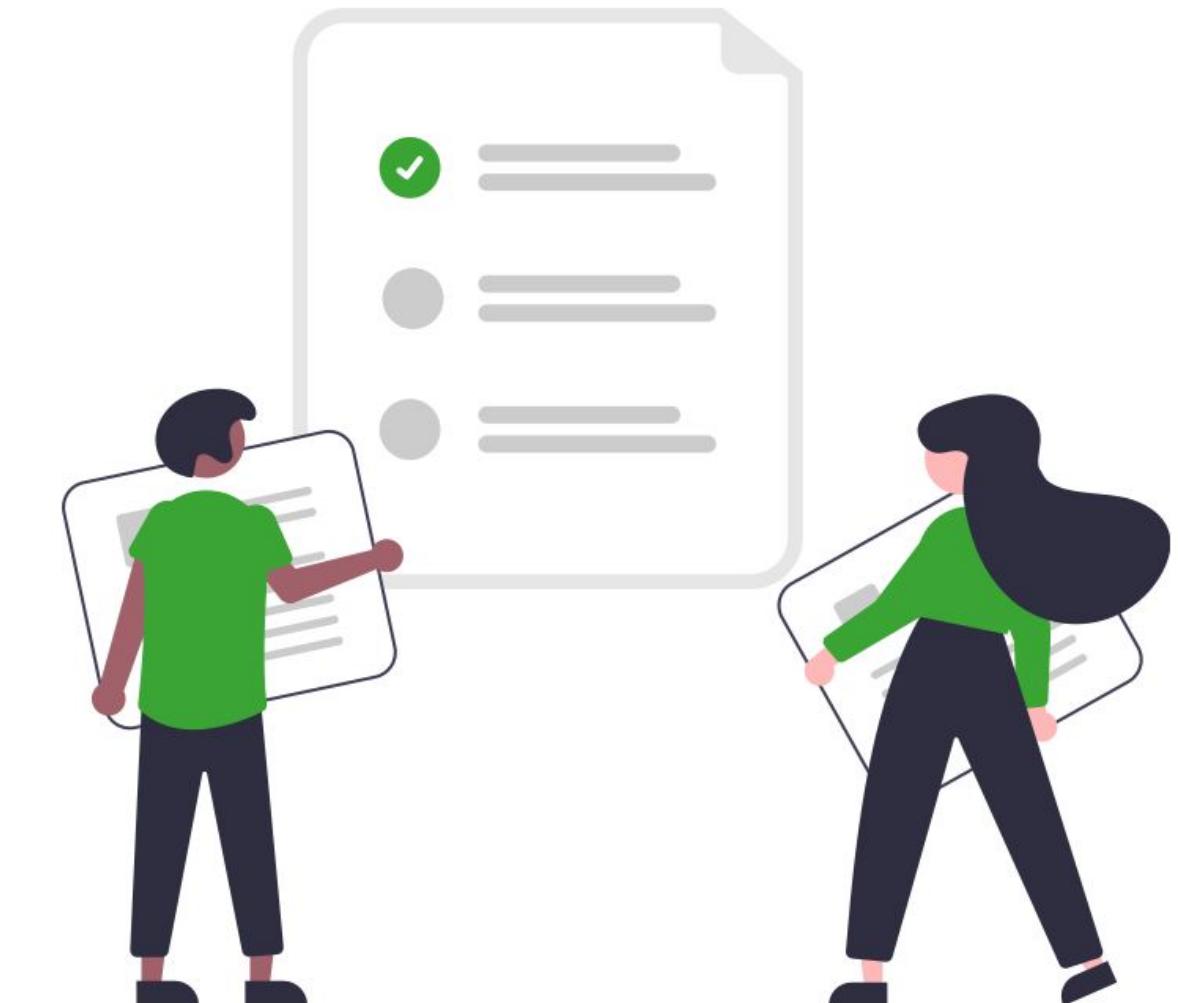
Integration: toward DevGreenOps



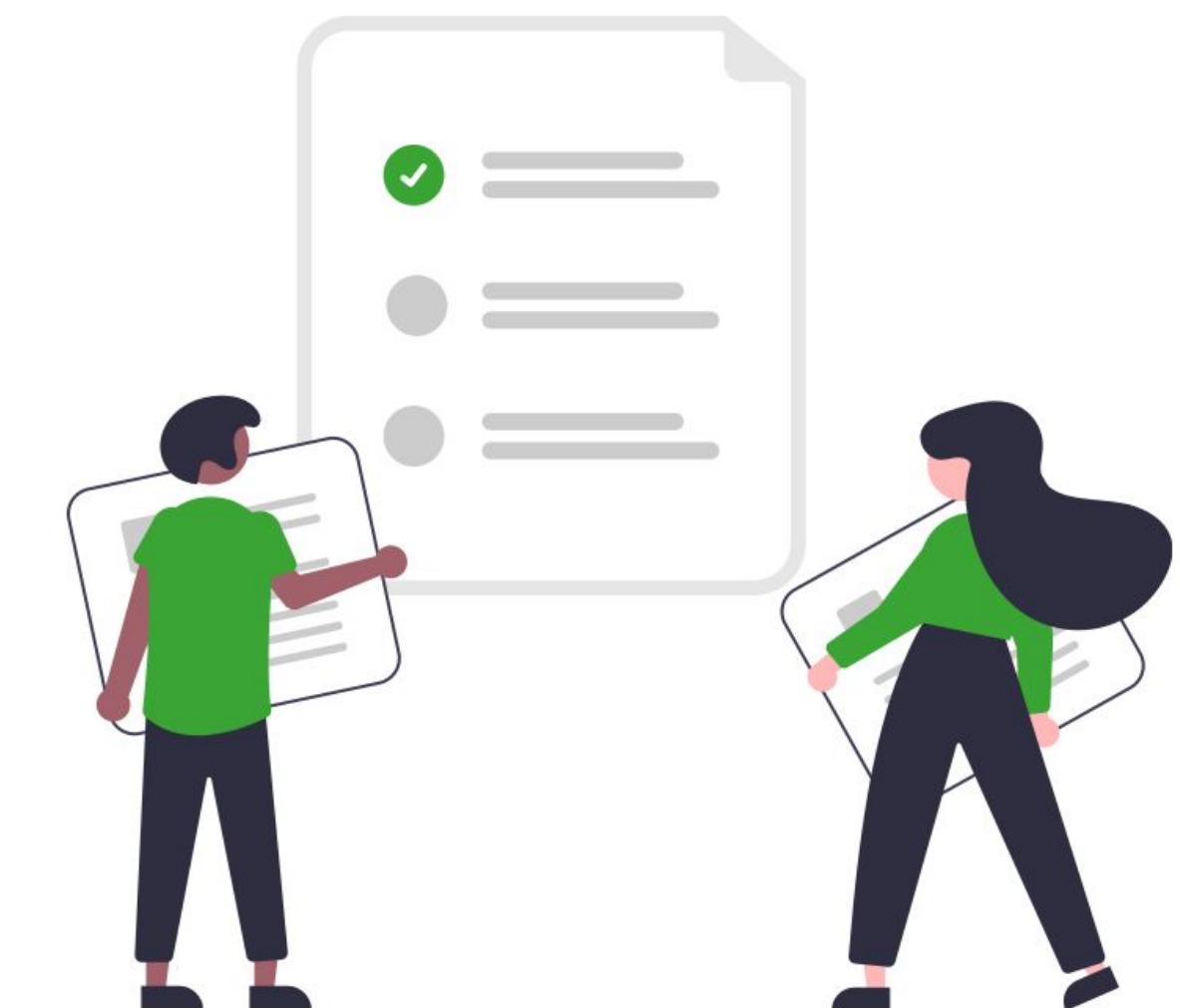
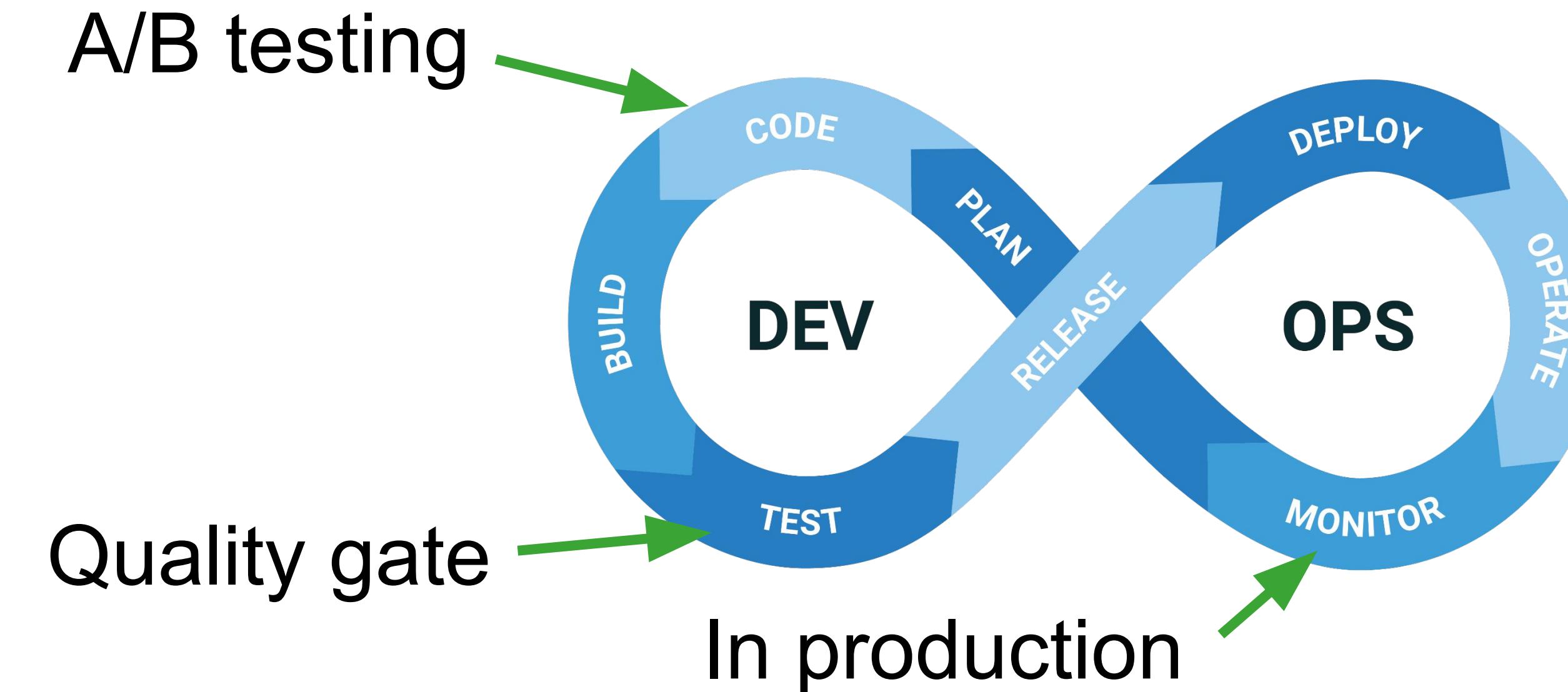
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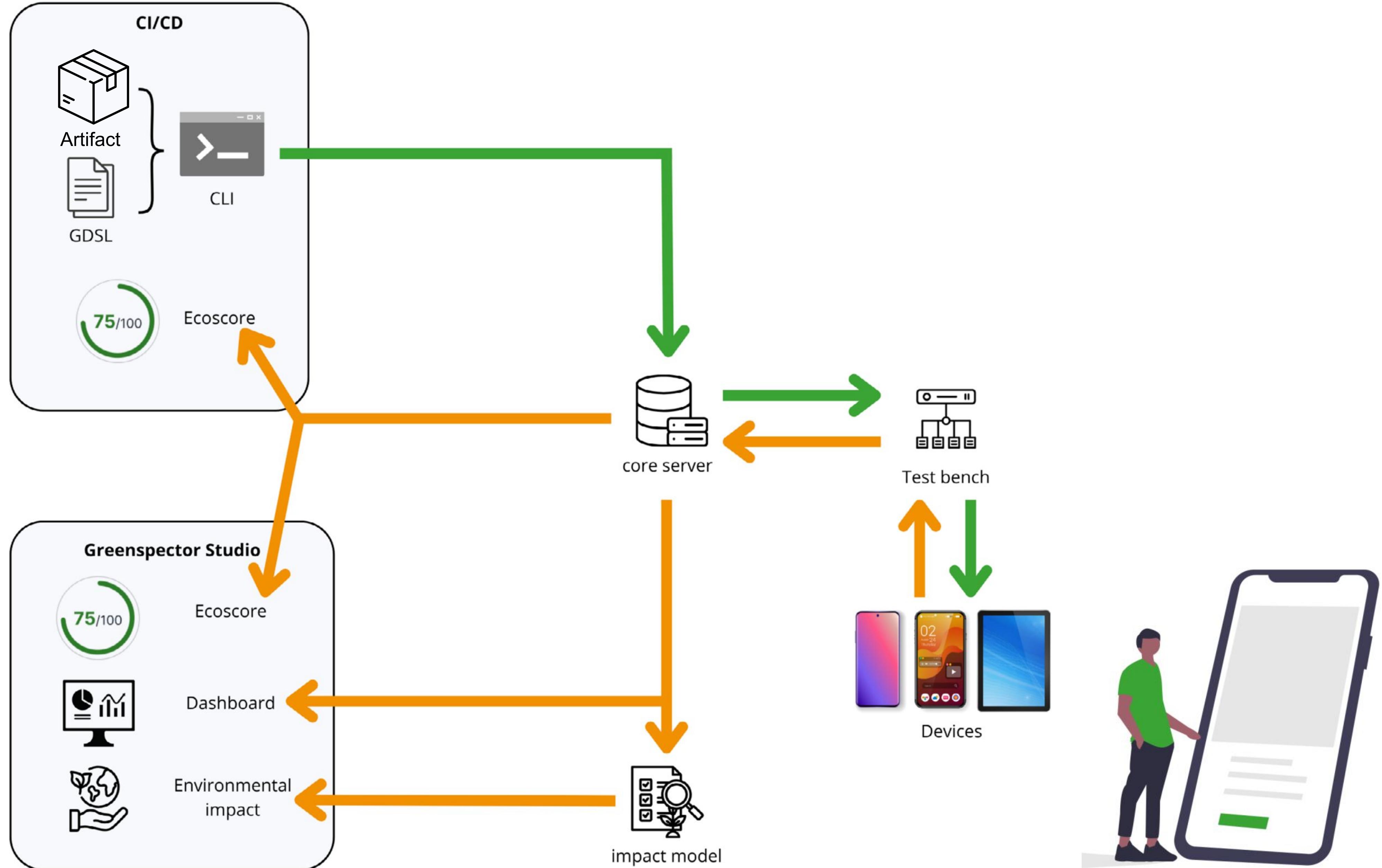


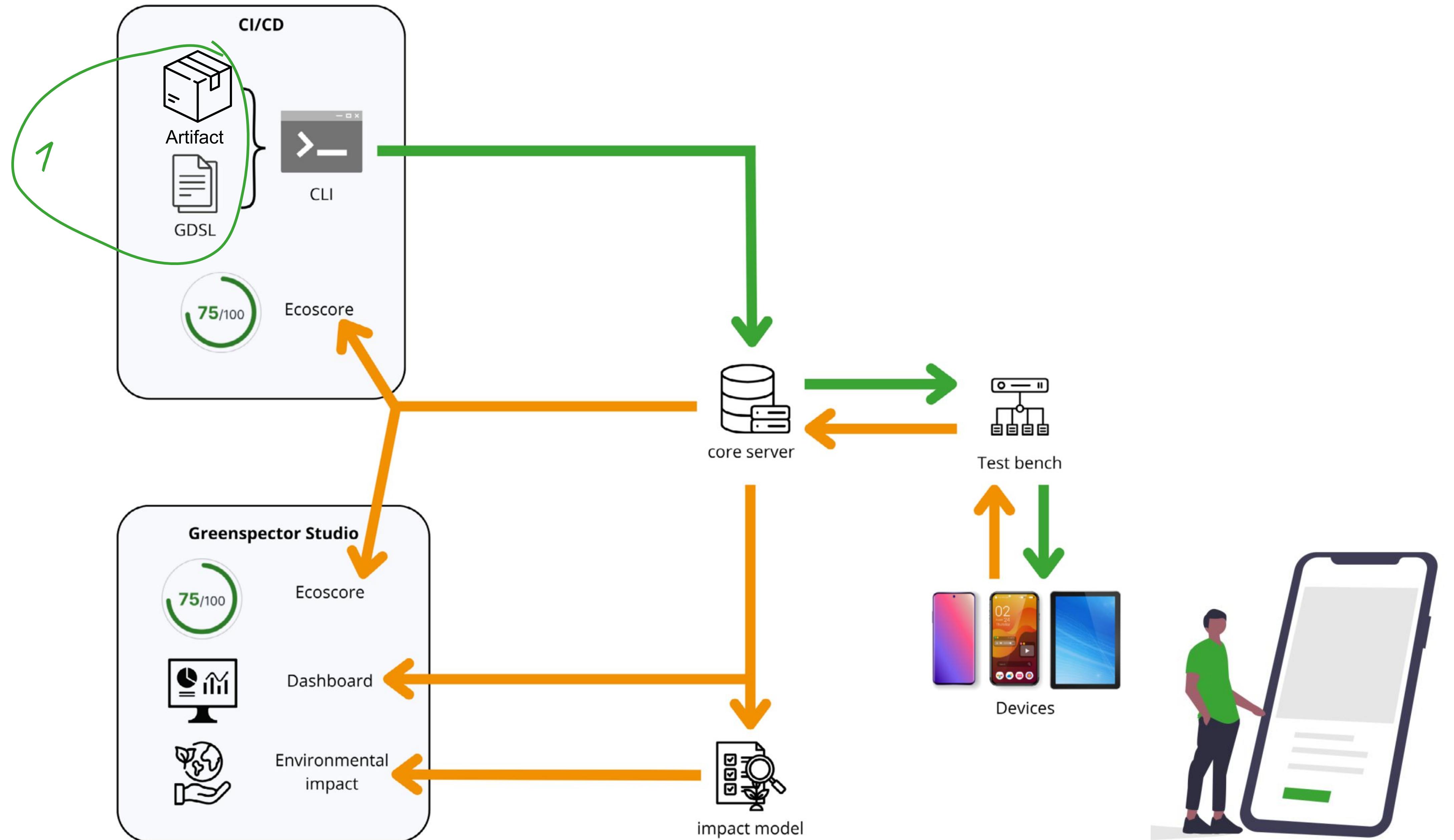
Web UI & API

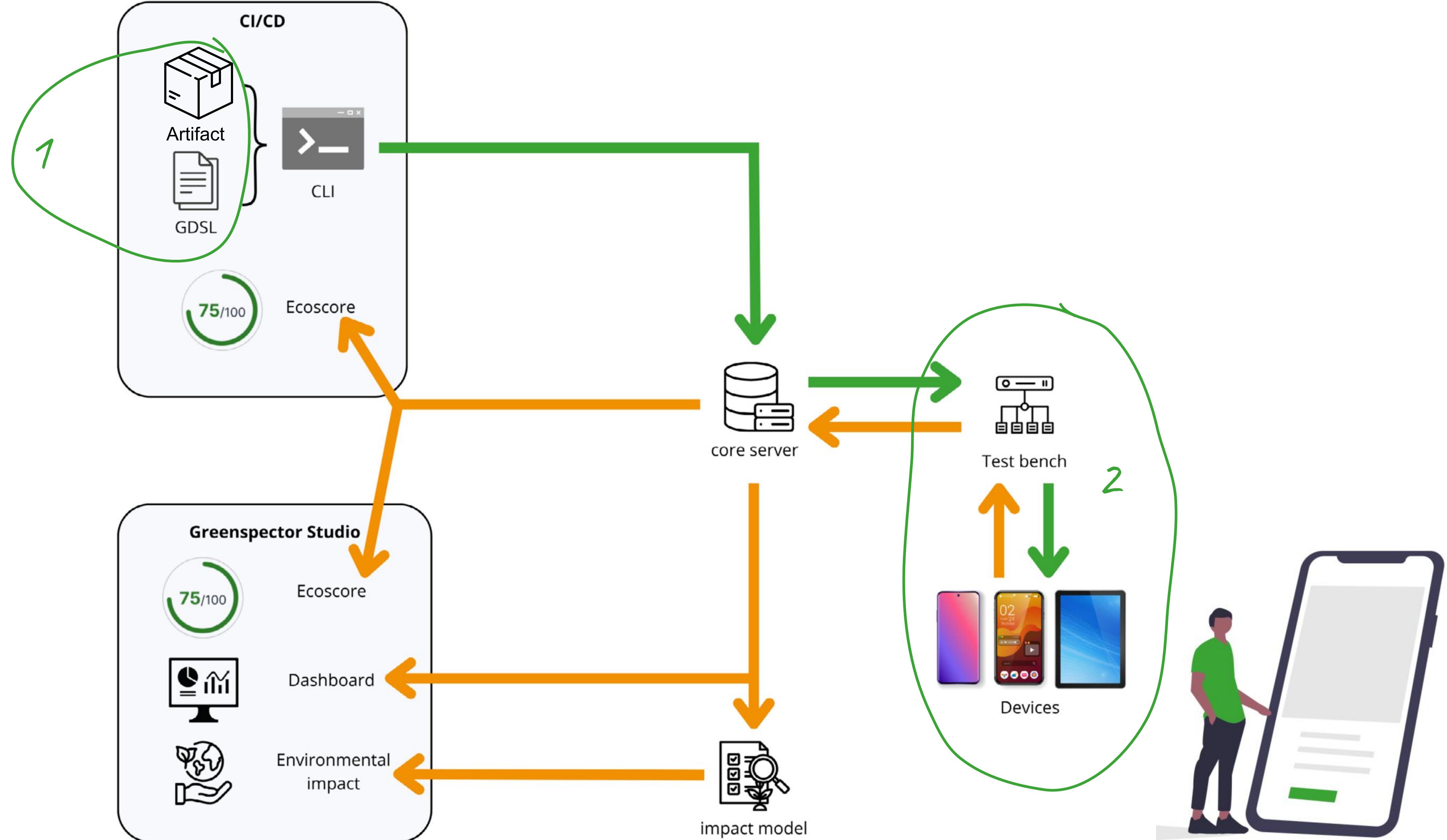


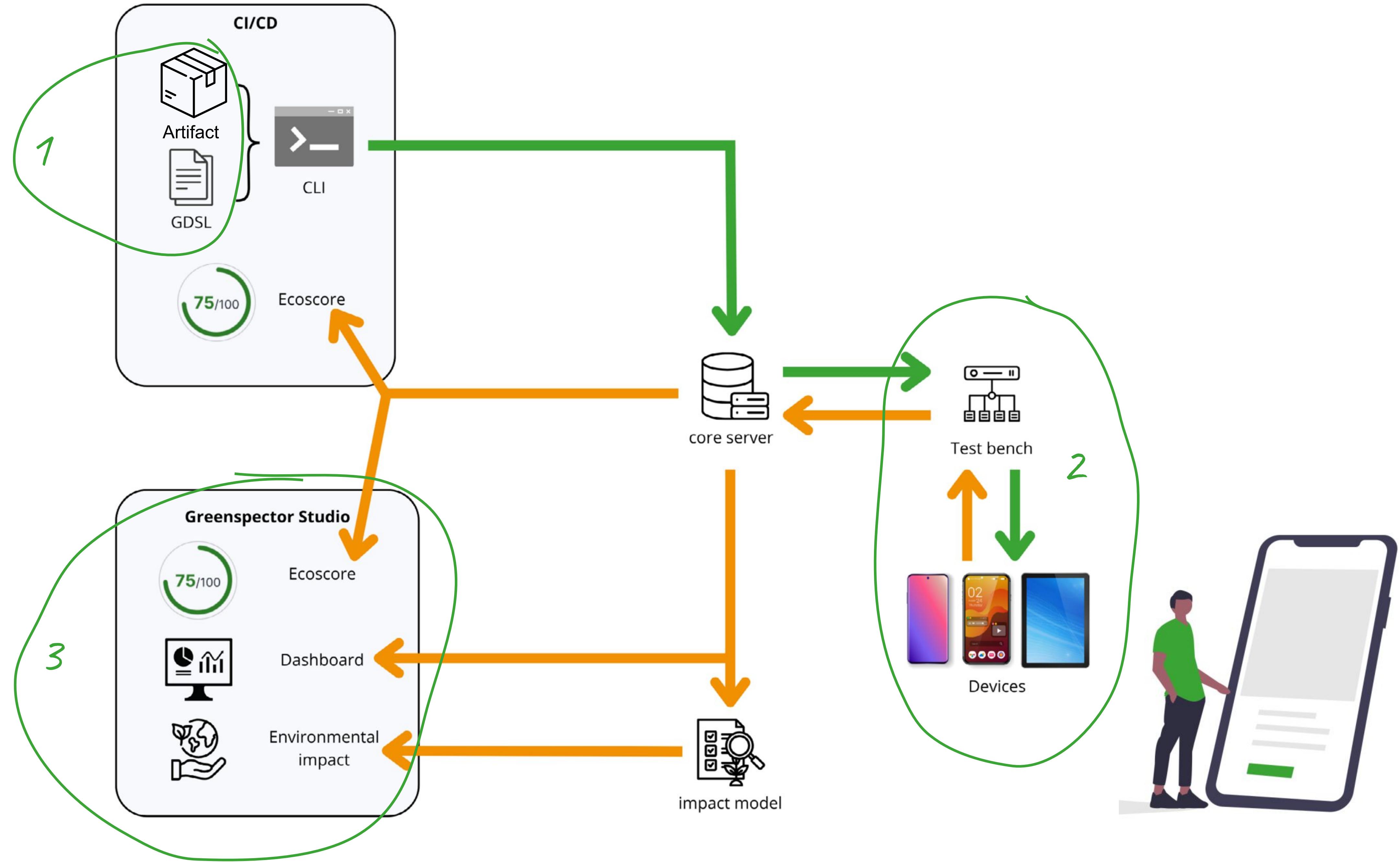
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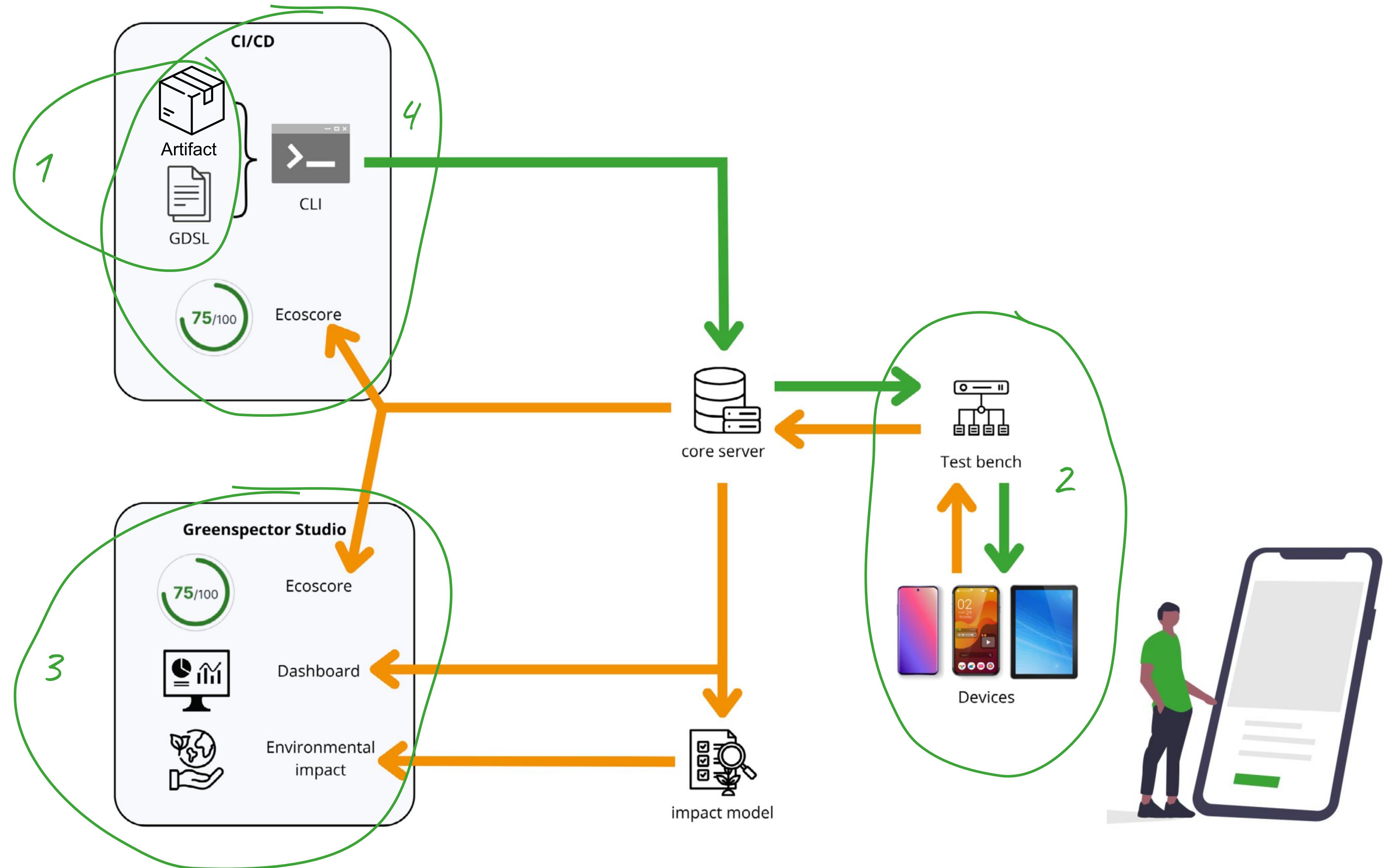














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Sobriété and performance de vos services numériques

Contact 

Edouard Guégain

eguegain@greenspector.com

+33 9 51 44 55 79

6 rue Rose Dieng-Kuntz

CS90729 – 44307 Nantes Cedex 3

www.greenspector.com