GreenIT and Eco design Principles

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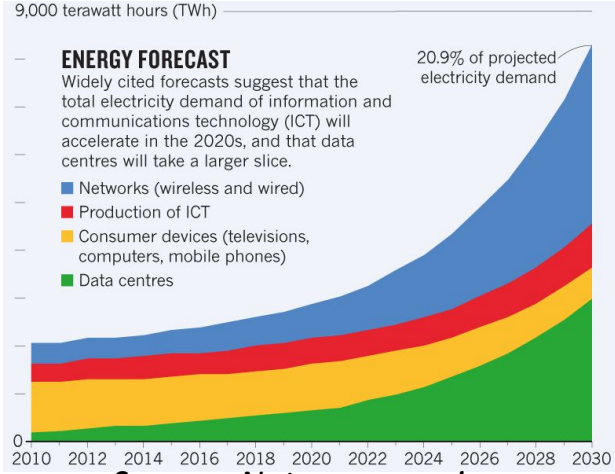
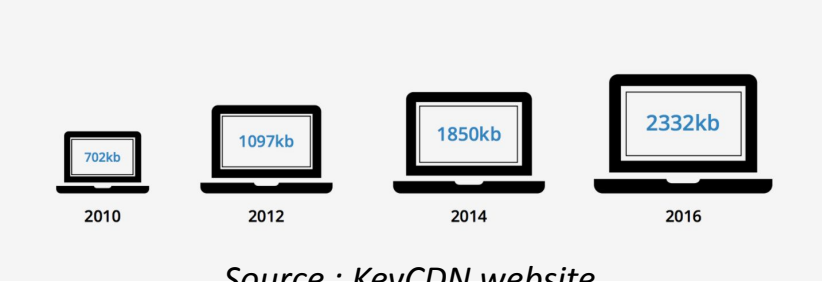
Can the digital world become sustainable ?

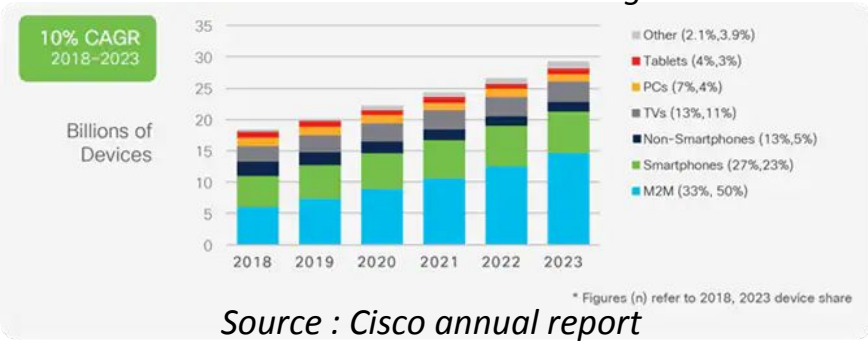
- **Digital technology** : 4% of the global greenhouse gases emissions (*Ademe report*)
- Who pollute most : servers, data centres or devices ?
  = devices (manufacturing) !
- Why ? The growth of **webpage sizes & devices manufactured**
- To hold this back : **eco-design**
- Without forgetting **accessibility** !



Source : Nature magazine



Source : KeyCDN website



Source : Cisco annual report

Why do we need to change our design and development methods?

To what extent digital eco-design could offer us a viable future from an environmental and a social point of view ?

Project : implementation of 2 websites : standard / eco-friendly

Compare : architecture, design, functionalities, consumption, accessibility, ethic

Summary

Introduction

I. Standard website
   A. Technical choices
   B. Design choices
   C. Live demo
II. Eco-friendly website
   A. Eco-design rules
   B. Technical choices
   C. Live demo
III. Comparison between both websites
IV. Conclusion
V. Team organization and management

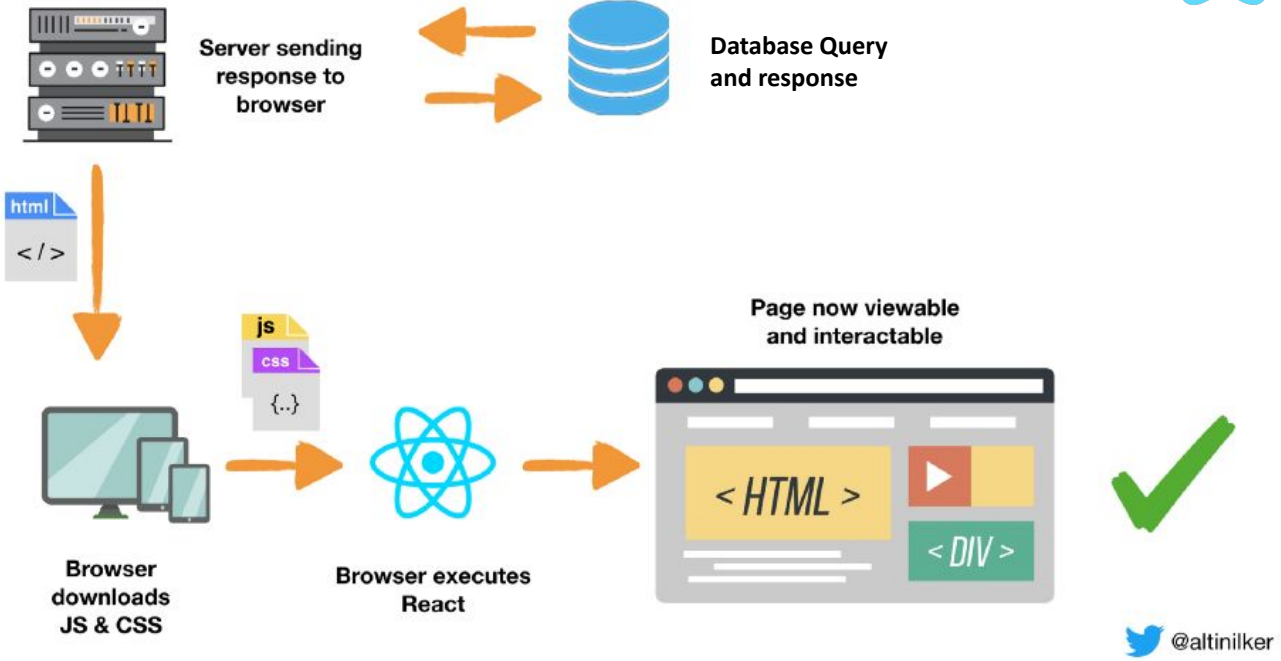
Business description

- Why a streaming website ?
- Functionalities ?
  - watch films
  - responsive
  - details on films
  - customisable

Standard website

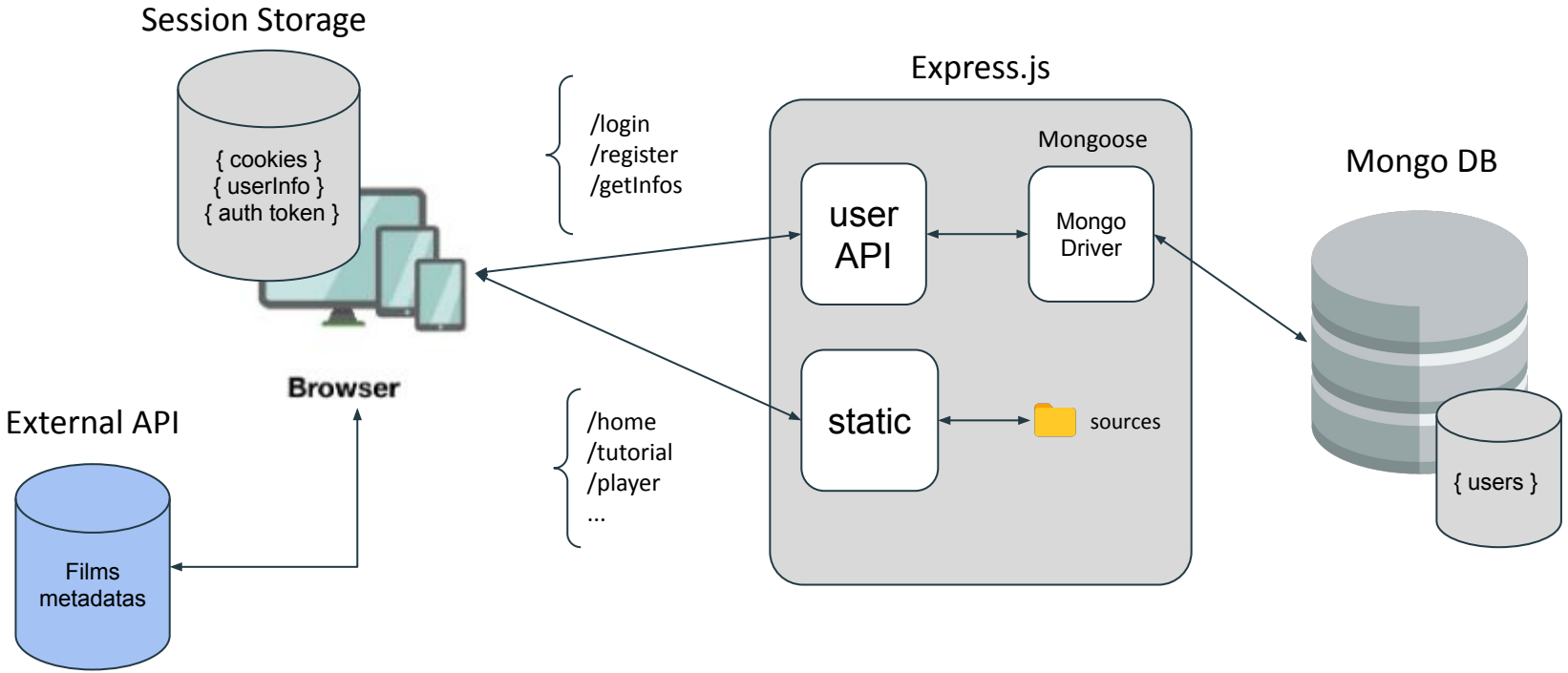
I. Standard website - technical choices

Client-side rendering with REACT



https://laptrinhx.com/server-side-rendering-with-react-redux-and-react-router-2707766442/

Backend solutions



Design choices

- Abusing template libraries
- Useless background processes
- Unethical cookie policy
- Storing personal informations
- No *lazy-loading*
- Abuse Images and ressources

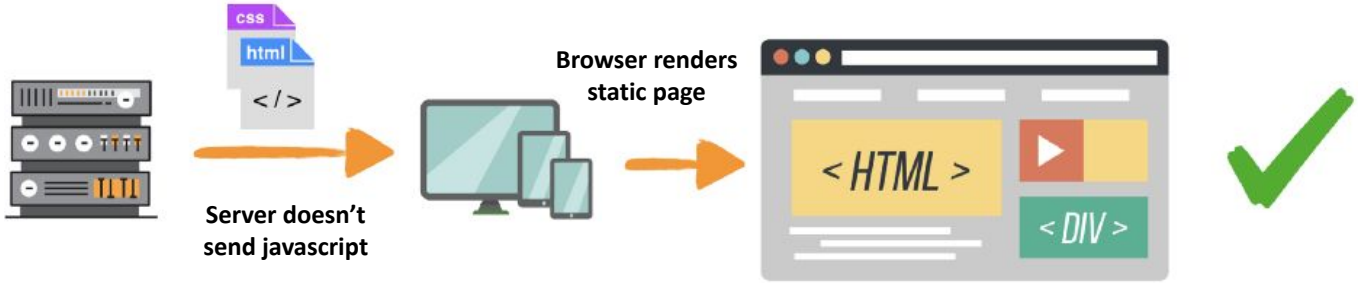
Live demo

Eco-friendly website

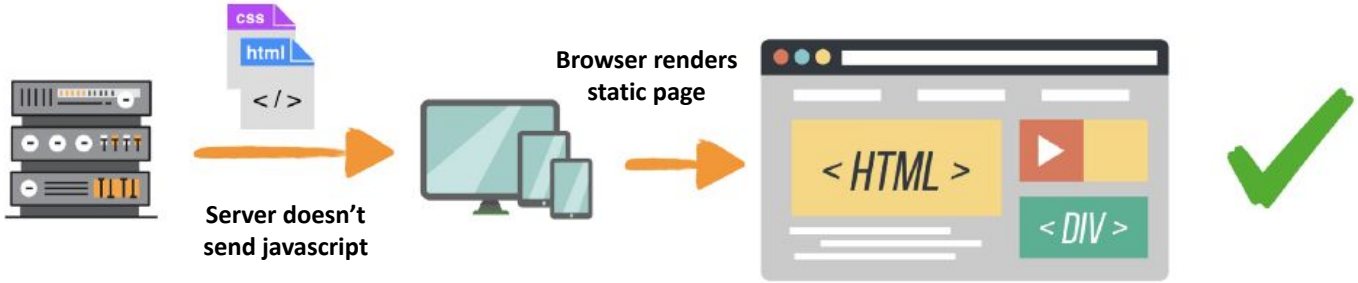
Eco-design rules

	Eco-friendly website	Standard website
Add eco-design criteria in overall architecture	Static & hosted on a Raspberry Pi	Dynamic & hosted on a PC
Functional frugality	✔	❌
Adjust design to minimize impact on physical equipments	Single color background & 20 movies on homepage	500 movies on homepage
Accessibility & ethics	Captions on movies & high contrast and font-size mode	Personal data & cookies stored
Embed metrics to ease sustainability monitoring	Measurement tools = *Lighthouse* & *EcoIndex*	

Static *as-much-as-possible*

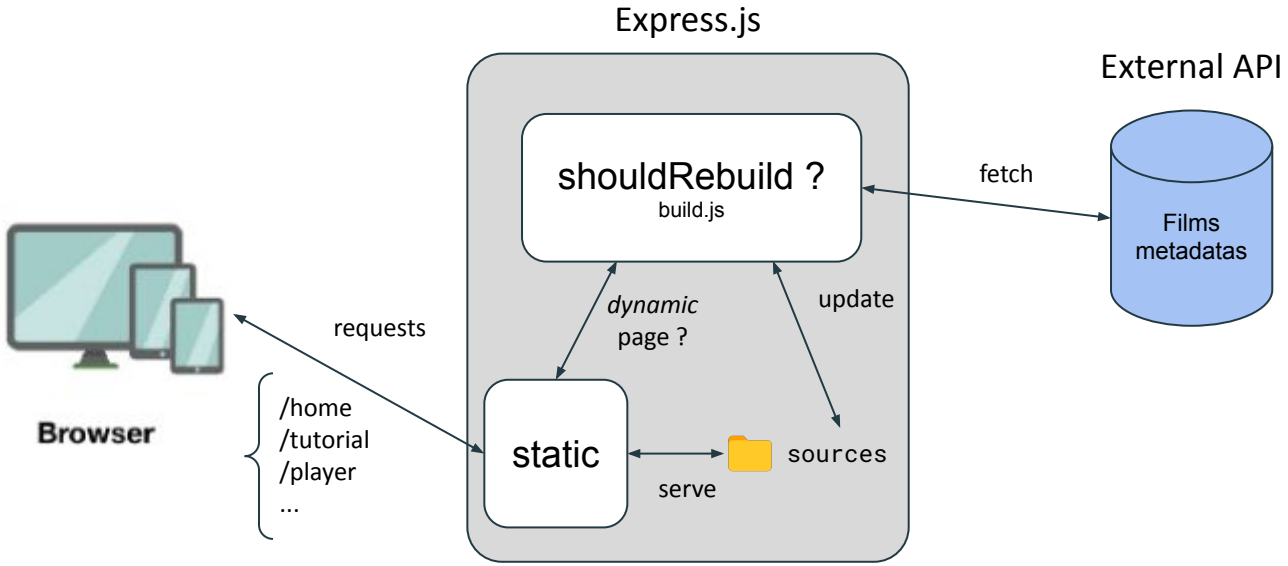


Static as much as possible

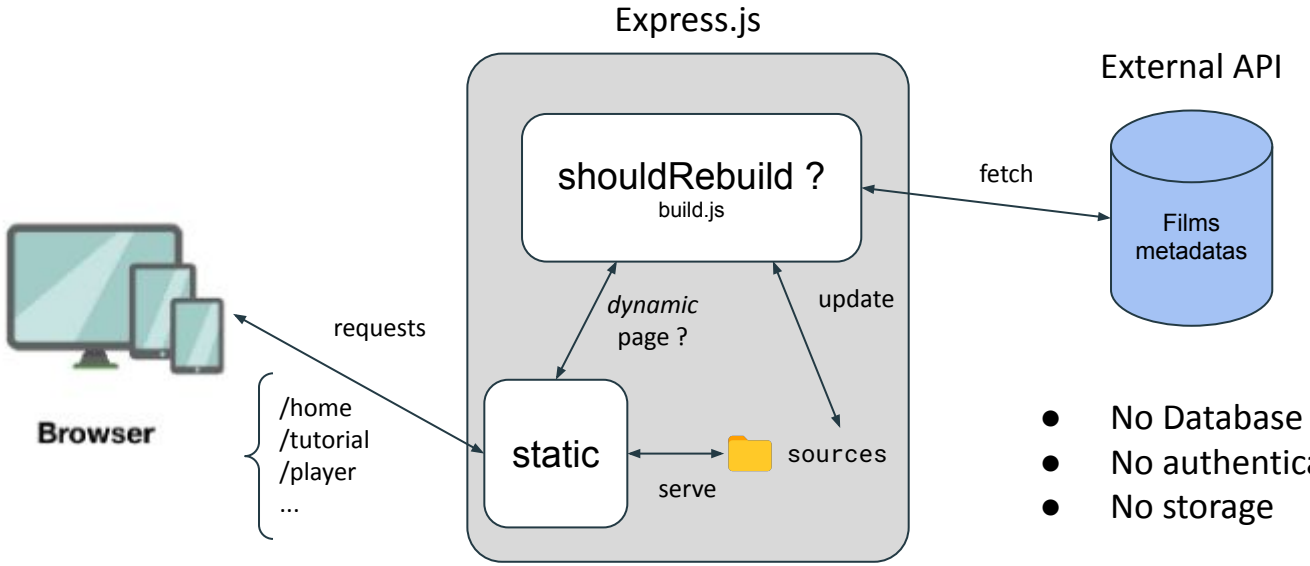


- How to render dynamic content ?

Backend solutions



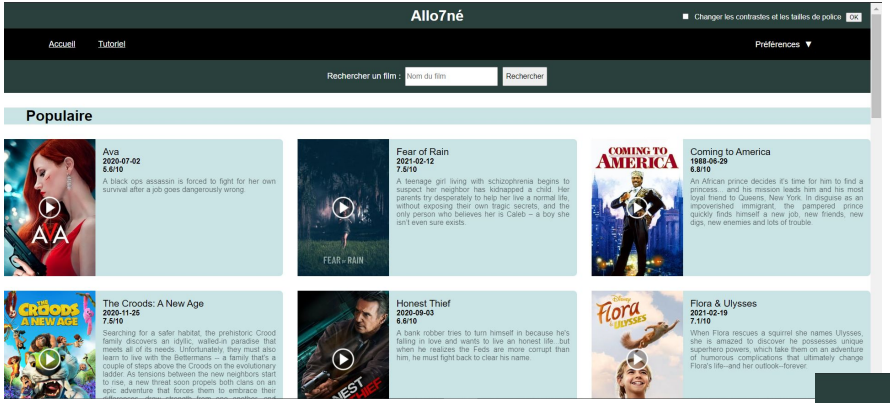
Backend solutions



- No Database
- No authentication
- No storage

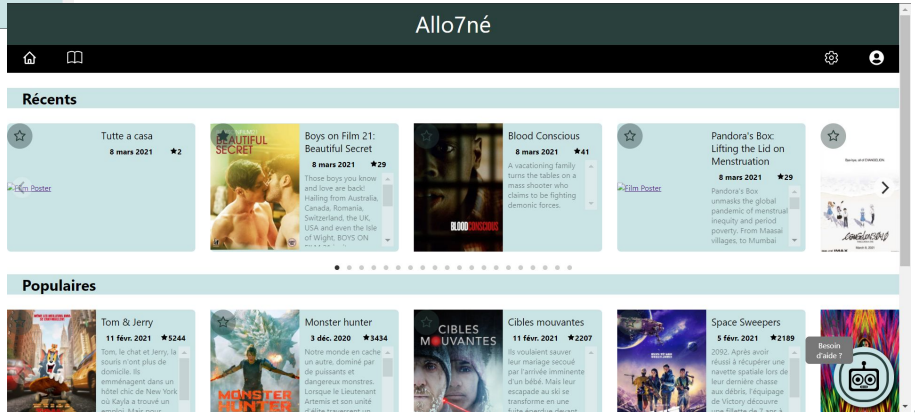
Live demo

III. Visual comparative.

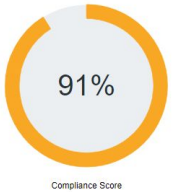
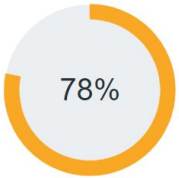


1. Lowtech website.

2. High-tech website.



III. Comparison : Accessibility (Lighthouse)

Eco-friendly website	Standard website
	
• High contrast and font-size mode • Simple webpages = screen readers read them properly • Captions on movies • Tab navigation possible 	**ARIA** — These are opportunities to improve the usage of ARIA in your application which may enhance the experience for users of assistive technology, like a screen reader. ▲ `[aria-hidden="true"]` elements contain focusable descendents **Names and labels** — These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive technology, like a screen reader. ▲ Buttons do not have an accessible name ▲ Links do not have a discernible name **Navigation** — These are opportunities to improve keyboard navigation in your application. ▲ The page does not contain a heading, skip link, or landmark region **Contrast** — These are opportunities to improve the legibility of your content. ▲ Background and foreground colors have a sufficient contrast ratio — Error! 

III. Comparison : Ecology (EcoIndex)

Eco-friendly website

EcoIndex A

EcoIndex	Water Consumption (cl)	Greenhouse Gases Emission (gCO2e)
77	2.19	1.46

Request number	Page Size (KB)	Dom Size
19	246 (21)	281

Best practices

Add expires or cache-control headers (>= 95%)	✓ 100% resources cached
Compress ressources (>= 95%)	✓ 100% resources compressed
Limit the number of domains (<3)	✗ 3 domain(s) found .....
Don't resize image in browser	✓ 0 image(s) resized in browser found
Avoid empty src tag	✓ No empty src tags found
Externalize css	✓ No inline stylesheet found
Externalize js	✓ No inline JavaScript
Avoid HTTP request errors	✗ 1 HTTP error(s) .....
Limit the number of HTTP requests (<27)	✓ 19 HTTP request(s) .....
Do not download unecessary image	✓ 0 image(s) downloaded but not displayed
Validate js	✓ Javascript validate
Max cookies length(<512 Bytes)	✓ No cookies
Minified css (>= 95%)	✓ 100% minified stylesheet
Minified js (>= 95%)	✓ No js found
No cookie for static ressources	✓ No cookie
Avoid redirect	✓ 0 redirect
Optimize bitmap images	✗ 8 image(s)shoud probably be optimize, minimum gain estimated: 41 KB .....
Optimize svg images	✓ No svg to optimize
Do not use plugins	✓ No plugin found
Provide print stylesheet	✓ 1 print StyleSheet(s) found

Standard website

EcoIndex F

EcoIndex	Water Consumption (cl)	Greenhouse Gases Emission (gCO2e)
7	4.29	2.86

Request number	Page Size (KB)	Dom Size
127	8491 (8454)	2791

Best practices

Add expires or cache-control headers (>= 95%)	✓ 99.9% resources cached .....
Compress ressources (>= 95%)	✓ 95.7% resources compressed .....
Limit the number of domains (<3)	✗ 3 domain(s) found .....
Don't resize image in browser	✗ 115 image(s) resized in browser found .....
Avoid empty src tag	✓ No empty src tags found
Externalize css	✗ 5 inline stylesheet(s) found
Externalize js	✓ 1 inline javascripts found
Avoid HTTP request errors	✗ 1 HTTP error(s) .....
Limit the number of HTTP requests (<27)	✗ 127 HTTP request(s) .....
Do not download unecessary image	✓ 0 image(s) downloaded but not displayed
Validate js	✓ Javascript validate
Max cookies length(<512 Bytes)	✓ No cookies
Minified css (>= 95%)	✓ 100% minified stylesheet
Minified js (>= 95%)	✓ 100% minified javascript
No cookie for static ressources	✓ No cookie
Avoid redirect	✓ 0 redirect
Optimize bitmap images	✗ 46 image(s)shoud probably be optimize, minimum gain estimated: 1135 KB .....
Optimize svg images	✓ No svg to optimize
Do not use plugins	✓ No plugin found
Provide print stylesheet	✗ No print stylesheet found

IV. Conclusion

- **Two different architectures**
- **Same user experiences**

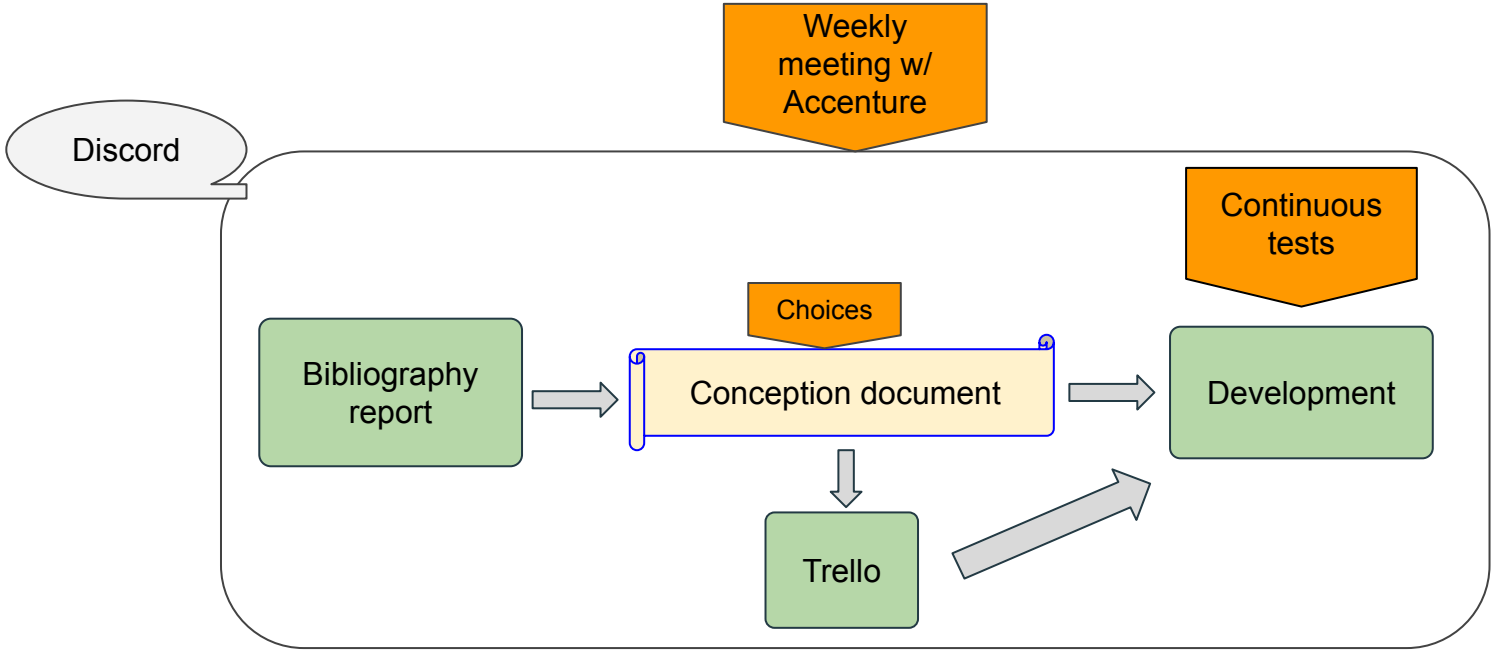
- **Gap** between eco-friendly / standard websites
- **Eco-friendly** website is **far better**
  - Performance, Accessibility, Consumption (water 2.19cl / co2 1.46g, double for standard), Ethic

BUT:

- ➢ Advanced prototypes (simple design, light database, no public)
- ➢ No serious issues (economic)

Eco-design = makes mentalities and practices evolve to digital sobriety

Work process



Experience evaluation

- **Skills inequality** in web programming between members
- **Good time management**
  - Main features done
  - 80% tasks done (Trello)
- **Good cooperation with Accenture**
  - Management
  - Technical help
  - Ideas

Suggested improvements, *to move further*

- advising
- criticises
- recommandations
- management

Special thanks to...

Carole Davies-Filleur

Gautier Triffault

Accenture