Analysis: Eco-design & web homepages

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Summary report

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Belgian Institute for Sustainable IT (ISIT-BE) asbl/vzw

Scope & purpose of the analysis

Browsing a website, watching a video, exchanging e-mails… People often fail to consider the environmental, social and ethical impact of these actions. It is important for organisations to understand the challenges induced by the digital behaviours they generate and the digital services they produce, in order to adopt a more responsible, ethical and inclusive digitalisation.

To create awareness among organisations about the need to make their digital services more sustainable, the non-profit association Belgian Institute for Sustainable IT (ISIT-BE) launched a study to analyse the homepages of several Belgian organisations' websites. These analyses were conducted on 3 areas: **digital accessibility**, **data privacy** and **eco-design**.

This study, carried out by Emile Pion - e-business student at HEPL and intern at ISIT-BE in 2022 -, clearly shows that there is room for improvement in all 3 topics analysed. With this summary and the full report, the Belgian Institute for Sustainable IT wishes to raise awareness about the gains organisations could realise by adopting eco-design best practices, as all websites can and should be improved to reduce their environmental footprint, ensure accessibility for all and manage individuals' data in a proper and ethical way.

The homepages analysed include both those of members of the ISIT-BE and the ones of non-member organisations, across different domains of activity (banks, media, NGOs, education institutions…), to have a sufficiently broad base to analyse. However, the results presented in this study are not representative of the situation in Belgium: (i) only a limited number of homepages were analysed, which is not statistically representative of the thousands of Belgian websites, (ii) this study was done with the help of tools and manual actions by an e-business student, while a thorough audit would require extensive technical skills and an important budget to analyse comprehensively all the pages of the websites selected. It is also important to note that the analyses were performed between 22 February 2022 and 15 April 2022, which means that any updates to the homepages since then have not been included in the present analysis.

The Belgian Institute for Sustainable IT would like to warmly thank Emile Pion for his substantial work, along with Pascal Courtois from Jeudi.Matin who provided a valuable guidance to Emile and great support in this work.

To know more about Sustainable IT, the various ways your organisation can take action and the benefits it can bring to you, feel free to visit our website isit-be.org and to contact us at contact@isit-be.org.

Digital accessibility

Digital accessibility allows everyone, including people with a disability, full access to digital content. It is based on 4 principles: all content must be Perceivable, Operable, Understandable and Robust (source: techtarget).

In addition to its primary function – namely, the provision of content for all audiences, without discrimination – digital accessibility has many distinct advantages, which represent just as many opportunities for companies and organisations, beyond a legal obligation: increase user satisfaction, increase the number of potential customers/visitors, enable effective navigation and access to information, fight digital divide, improve SEO, and more. To better understand the impact of some handicaps (visually impairment, blindness, hearing impairment, motor disability, colour blindness), feel free to visit Atalan.fr.

Some features of digital accessibility:

✓ **Image alt text**: For an image to be accessible, it must be given an alternative text, also called *alt text*. This text is not visible when the image is displayed, but it is seen by assistive technologies and search engines (source: AnySurfer). The images could be decorative images: in this case, they must have an empty text alternative. This tells assistive technologies that they can ignore these images and avoid reading out loud an image name like "5426zbxd.jpeg".

✓ **Contrast**: For text to be readable, there must be sufficient contrast between the text and the background. If the contrast is poor, a visually impaired person may not be able to read the text. It will also be more difficult for everyone to read when the light is too bright (e.g. outdoors) or when reading on a small screen like a smartphone (source: AnySurfer).

✓ **Mobile version**: It is important to optimise for mobile phones to provide a better user experience. Users who visit a mobile-optimised site on their phone or tablet will be able to access the same content and functionality as on a site viewed on desktop.

✓ **Keyboard navigation**: A disabled person may use a keyboard to navigate instead of a mouse. A website should be completely accessible via keyboard using tabs to move between sections, menus, across form fields and links and to other content areas in a predictable, logical manner.

What are the results of the study? The analysis showed that many websites in this study can still be improved. Some highlights:

❖ 76% of websites analysed lack enough **contrast** on certain areas. To ensure correct contrast, the tool "contrast checker" can be used by your teams.

❖ **alt texts** were present in 70% of the images we found, but this doesn't mean that the text was appropriate for tools used by visually impaired people. Also, don't forget to

correctly manage alt text to improve your SEO in order to increase your visibility in the search engines.

❖ To assess the overall accessibility of each homepage, we used the tool "Google Lighthouse", which provides an **accessibility score** (this is an indicative measure that must still be taken with caution, see the full report for more details). We were happy to observe that the homepages analysed have scores slightly above the average from an analysis of 2020 made over 6.8 million websites. This may be explained by the fact that the Belgian Institute for Sustainable IT counts among its members around 40% of public bodies, which were all included in this analysis and for which web accessibility is mandatory since 2016 (see below).

❖ 78% of the homepages analysed lack an **accessibility statement page**. Having an accessibility statement is important because it (1) shows your users that you care about accessibility, (2) provides them with information about the accessibility of your content and (3) demonstrates commitment to accessibility and to social responsibility

❖ Although Belgium is almost integrally covered by 4G, we decided to simulate a slow connection (3G, which is around 1.6mb/s at most). Why? Because people can find themselves with **slow connection issues** (due to older devices, poor network coverage, thick walls, crowded Wi-Fi, etc.). We saw that most homepages take between 10 and 20 seconds to load on a slow connection, with 3 homepages over 2 minutes! Longer load times make websites less accessible, which has a direct effect on business: according to Google, 53% of mobile site visitors leave a page that takes longer than three seconds to load.

Are there any standards? The World Wide Web Consortium (W3C) created an international and official recommendation: the Web Content Accessibility Guidelines (WCAG), to make web content accessible to the largest possible number of users. A simplified version of the WCAG has been proposed by WebAIM in the form of a checklist.
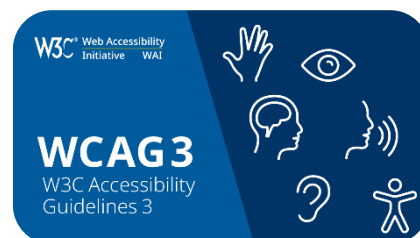
In Belgium, AnySurfer is one of the leading actors towards a more accessible internet. AnySurfer offers advice, auditing, training, documentation, and a label on digital accessibility. You can also visit the website of "Belgian Web Accessibility", dedicated to public services.

What does the law mention? The European Directive on the accessibility requirements for products and services (Directive (EU) 2019/882) came into force in December 2016 for websites & apps of public bodies. This Directive will become mandatory for the private sector in July 2025, as part of the European Accessibility Act. This means that companies will need to be compliant to WCAG 2.1 when it comes to digital accessibility (including operating systems, websites, mobile apps, e-books, etc.), with an exception for micro-companies. Getting ready is a must do, and companies should start thinking about this now, as this could be a heavy process, similar to some of the challenges posed when GDPR became mandatory. As the deadline approaches, demand (and prices) for such expertise will likely increase.

Data privacy

Respecting the privacy of internet users is a central element of Sustainable IT. Since 2018, the main legislative framework that applies to this is the **General Data Protection Regulation**, more commonly known as the European GDPR. It strengthens the obligations of actors involved in the processing of personal data and applies to any processing, whether automated or not.

The use of the data must be transparent to the data subjects. The data controllers must therefore adopt adequate personal data protection compliance statements. If you wish to assess your GDPR compliance, you can refer to the EU GDPR checklist for data controllers.

What did we analyse? We selected 4 criteria's to assess the respect -or not- of the visitor's data privacy:

- ✓ **The presence and compliance of the GDPR banner**: The regulation require each site that places cookies on an Internet user's device to clearly and simply explain what these cookies do and why they are placed on it. In addition, the site must obtain the user's consent in the same way. The Data Protection Authority thus imposes these rules:

  - ➢ *(1) Inform about the collect of user's data;*
  - ➢ *(2) Obtain the consent before the collect;*
  - ➢ *(3) Getting a consent for a well-defined data processing;*
  - ➢ *(4) The possibility to accept or refuse cookies, without constraint, pressure or any external influence;*
  - ➢ *(5) The possibility to withdraw, at any moment, the consent as easily as it was given*

- ✓ **The presence of cookies**: Cookies are defined by the Data Protection Authority as "small files" that can be placed on the user's device connect to Internet to collect information on the digital behaviour of the user. We observe 3 types of cookies, that are distinguished by their purpose:

  - ➢ *Essential cookies for functioning, like user's language, font manager etc.*
  - ➢ *Statistics cookies to measure audience, like Google Analytics*
  - ➢ *Advertising cookies for marketing purposes*

✓ **The type of statistical tool used**: Being the most widely used statistical tool in the world, Google Analytics was found on 76% of the homepages (followed by Facebook Connect (46%), Hotjar (28%) et LinkedIn Analytics (21%)). The use of Google Analytics - unless specifically configured - requires the free and informed consent of the user to the collection of their data through an acceptance banner, as it collects numerous information by default, allowing to trace users from websites to websites (by default: number of users, session statistics, approximate geolocalisation, browser & device information). Still, it has been found that "the data of Internet users is thus transferred to the United States in violation of Articles 44 et seq. of the GDPR"[1], with Google measures defined as "not sufficient to exclude the accessibility of this data for US intelligence services". As a result, the tool was [judged illegal in EU by CNIL](#).
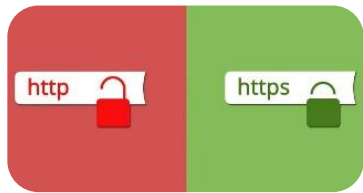
✓ **The activation of the HTTPS protocol**: HTTPS (HyperText Transfer Protocol Secure) is an Internet communication protocol that protects the integrity and confidentiality of data transferred between the user's computer and the website. HTTPS secures the user information, such as address, credit card information, and others. A secure website improves the confidence of its users, and HTTPS is a must have for any website.

What did we learn from the study?
Surprisingly, we observed that the GPDR is not fully applied by organisations, as some issues remains:

❖ 86% of the homepages analysed display a **GDPR banner** in a proper way, but only 13% fully take into account the user's preferences. For the others, the partial or complete rejection of cookies is impossible (19%) or not taken into account (54%).

❖ For the user's consent request, often the boxes for accepting the use of cookies are already ticked: a **pre-ticked box** by default where the user must untick or reject the consent is judged **non-valid**.

❖ A choice "**accept all VS reject all**" is not sufficient: 45% of the website analysed do not give the option to parameter according to the cookies purposes.

❖ Only 31% of the homepages analysed allow to refuse non-essential cookies in one click; this is the perfect example of a "**dark pattern**", as the users will more easily and quickly be able to accept cookies rather than reject them. This method is used to force users to accept cookies. In a worst-case scenario, users will have to reject all cookies one by one.

❖ 60% of the websites analysed don't give to users the possibility to modify their choices as easily as the GDPR advocates it.

❖ The concept of "**essential cookies**" remains unclear and can be misleading for internet users, as essential cookies include tag managers, which have marketing purposes. This

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[1] https://www.cnil.fr/en/use-google-analytics-and-data-transfers-united-states-cnil-orders-website-manageroperator-comply

violates the GDPR rule n°2 mentioned earlier.

❖ The **legal notices** must be found on a website. 76% of the websites consulted have a page dedicated to legal notices. Legal notices are often accessible under this name, but also general terms and conditions, privacy, transparency, GDPR, privacy policy, credits or conditions and disclaimer. Ideally, a mandatory name for the legal notices page should be established for all sites to make this page more easily accessible to users. Note that some legal mentions are often accessible via a small link, which doesn't facilitate its access. Legal notice must contain (1) the name of the organisation, (2) the address, (3) contact information and (4) VAT / company registration number.

In short, we can conclude that there is still room for improvement on GDPR compliance.

Eco-design (Green IT)

Eco-design is a continuous improvement approach that aims to limit the IT and energy resources required at the user terminal, network, and data centre levels. By limiting the use of these resources, the environmental impact is reduced.

On the one hand, it reduces the need for computer equipment and delays its obsolescence, thus avoiding the manufacturing of new equipment. On the other hand, energy consumption is reduced as well as the associated GHG emissions. The topic of eco-design of digital services is becoming one of the key challenges in digital technology, particularly in the public domain.

In France, for example, Article 55 of the 2020 AGEC law requires public services to promote the use of software whose design limits the energy consumption associated with its use. More recently, the "REEN" law was enacted in november 2021 with fives objectives: (1) raising awarness on the environmental impact of IT, (2) limiting the renewal of equipment, (3) favouring vertuous digital usages & services, (4) promoting sober networks & data centres and (5) deploying Sustainable IT strategies within the regions.

Belgium does not have such a law yet, but this shows that eco-design is increasingly being taken into account by some legislative powers. And, similarly to GDPR or the future European Accessibility Act mentioned earlier, it is to be expected that digital services will soon be regulated to become more eco-responsible throughout Europe. In fact, the European Commission has adopted the Green Deal with, among other things, eco-design rules for products, including electronic and computer equipment. Digital services could therefore follow.

As of today, eco-design is still poorly taken into account, and the maturity on this topic is still low. Numerous tools appeared (EcoIndex, Website Carbon Calculator, Ecometer, Greenspector App scan, Carbonalyser etc.), but they will all vary on certain aspects and give different answers depending on their calculation methodology and scope. Therefore, these tools can be used to give an order of magnitude, but one shouldn't compare the results of one tool for one website with the results of another tool for another website: when comparing websites, a single tool should be used to give relevant indications. Tools to assess the overall footprint of digital services and usages are not perfect and must be taken with caution. Still, an analysis will help you to spot issues and find ways to improve for the better.

What about EcoIndex, used in this study? EcoIndex is developed by GreenIT.fr and analyses websites with 3 criteria's:

➢ *The weight of the pages (in Mb or Kb) ;*
➢ *The number of requests made (http request), which is the main technical element that the tools uses to quantify, with more or less precision, the quantity of physical servers required to support the website;*
➢ *The size of the DOM, which gives an approximation of the webpage complexity.*

Each criteria has a different weight in the score computation. The size of the DOM and the number of requests respectively weight 3 and 2 times more than the weight of the page, a heavy website can therefore still get a good score (more info in the full report of the study).

What are the main takeaways from the EcoIndex analysis?

❖ **Weight of the pages :** Of all the elements that make up web pages, pictures are still the major factor, and the arrival of video has only accentuated this increase. A lighter website will reduce load time and thus increase users' satisfaction (and, to some extent, avoid future network congestion or reduce the necessity to increase the network infrastructure). This requires in particular to design a site that is as simple as possible (but still attractive); it is therefore necessary to determine the right requirements and ensure that the site content meets them, without superfluous functionality. The aim is to reduce the need for resources and to limit technical or perceived obsolescence (see Wirth's law)**.** One point mentioned in the accessibility section (as it influences load time, contributing to digital divide for people with limited mobile contracts) is the Autoplay of videos, which accentuate the global consumption of data. In our study, we witnessed an average value of 4.7mb per homepage, with the lowest value at 0.7mb and the highest at 33.7mb (note that the slow connection test for the heaviest homepage was exceeding 2 minutes of load time).

❖ **Size of the DOM:** An excessive DOM size means that the page is too complex, a browser will therefore need more time to render the page. Ever more complex websites will call for more powerful devices, increasing the turnover of users' devices, meaning faster obsolescence. A high DOM size can be explained by (1) a webpage with a lot of information, (2) a complex page design and/or (3) a poorly coded website. Google recommends that pages contain less than 1500 DOM nodes in total and Lighthouse warns us when we exceed 800. The average value of our study is 1141, with a median value at 877. Only 26 homepages out of the 66 analysed had a DOM under 800, this can be partially explained by the fact that homepages are usually more complex and furnished than other pages. Still, we observed similar websites in appearance with DOM varying with a factor of 4.

❖ **HTTP requests:** the median value for the http archive study[2] was of 73 requests, the median value in our study was of 70 requests, with an average value of 77. The more requests are made, the more servers are potentially needed to retrieve all the elements to be displayed, indirectly increasing load time to render the full page. Cookies are also transferred via HTTP requests, reducing the number of cookies is thus a way to reduce the impact of your website.

❖ **Approximative GHG emissions & EcoIndex score:** first thing first, let's remind us that the objective of the GHG computation is to give an order of magnitude, plus the ability to compare websites on a common ground. The minimal value observed is 1.46g CO_2e and the maximum at 2.96g, with an average of 2.32g per homepage. EcoIndex starts with an average value, which is then nuanced with respect to the general level of eco-design for each page analysed. The overall level of eco-design is also expressed with a score from A to G. A to C scoring means that the eco-design is pretty good and that efforts should be put elsewhere, possibly on SEO, ethics, or accessibility. Scoring between D & G clearly means there is room for improvement. Limitation: pay attention that a heavy, but well-designed website can have a good score although its contents can still be reduced in size with a great impact.

❖ **Water consumption** (really approximate – shouldn't be taken for granted/at face value) : EcoIndex also tries to approximate the consumption of water, by taking into account the environmental cost of the **whole ecosystem production** (terminals, network & data center equipment) with a formula that allocates a proportion of the global cost of their usage (based on an average lifespan) with respect to the time spent on the service (here the website). The hompages are thus not physically and directly accountable for the water consumption. As of today, there is no system that allows us to calculate the real water consumption induced by our browsing.

What are the tools to use ? Here is a non-exhaustive shortlist of resources for more sober websites :

✓ The ISIT Toolbox holds numerous tools for Sustainable IT, including tools dedicated to various aspects of eco-design.
✓ The handbook of sustainable design of digital services (GR491), produced by the INR/ISIT, is a thorough set of guidelines, providing recommendations on all the aspects of eco-design with respect to the complete lifecycle of the design of digital services. To ease your reporting and apprehend which challenges you can act upon, recommendations can be filtered according to the Sustainable Development Goals.
✓ https://kastor.green/ helps you assess your compliance with this handbook.
✓ GTmetrix allows you to test and monitor your website's performance, it also gives you the size of each type of elements, allowing you to appreciate the total page size with respect to images, videos, fonts, code and others.
✓ Tools exist to reduce the size of contents, such as handbrake for videos or imagify.io for pictures.
✓ The "115 best practices" of the French CNumR.
✓ The ecodesign guide of Designers Ethiques

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[2] https://httparchive.org/reports/page-weight?start=2017_07_01&end=latest&view=list