PLAEX: Website

Design Project

Group 18

Tudor Nechiti - s2268655
Victor Melinceanu - s2459809
Matei Bucur - s2626381
Nicu Savin - s2523450
Kalin Doychev - s2535645
Andrei Rarenco - s2489414

Supervisor: dr. ir. Randy Klaassen

Department of Technical Computer Science
Faculty of Electrical Engineering, Mathematics and Computer Science

UNIVERSITY OF TWENTE.

Contents

1. Introduction

As our world becomes increasingly populated and industrialized, waste management and sustainability have become important concerns for the health of our planet and future generations. Daily, we generate enormous amounts of waste, much of which ends up in landfills and pollutes our environment (Laner et al., 2012). This not only poses a risk to public health (Künzli et al., 2000) and the ecosystem, but also contributes to climate change and other environmental problems (Bose, 2010). Due to the limited natural resources and a finite capacity for waste, it is essential that people adopt effective waste management strategies that promote sustainability and reduce the impact on the environment.

PLAEX is an IT Services company based in Enschede which is dedicated to creating innovative solutions that address environmental challenges. Their vision involves incorporating innovative solutions and responsible waste management practices, in order to work towards a cleaner, greener, and more sustainable future for all. With a focus on smart waste management, the company has developed trash bins that can automatically sort and separate recyclable materials from solid waste at the point of disposal. They manage to achieve this with the help of Artificial Intelligence, and waste identification technologies that provide consumers with waste insights. This technology not only helps reduce the amount of waste that ends up in landfills, but also makes a significant positive impact on the planet. However, since at the current moment, they are too busy working on further improving their products, they needed someone to help in rebranding their website. Our goal is to create a website that perfectly balances a modern and futuristic look with a professional and polished feel. This new design will need to align with their product offerings and company culture, which prioritizes innovation.

2. Planning

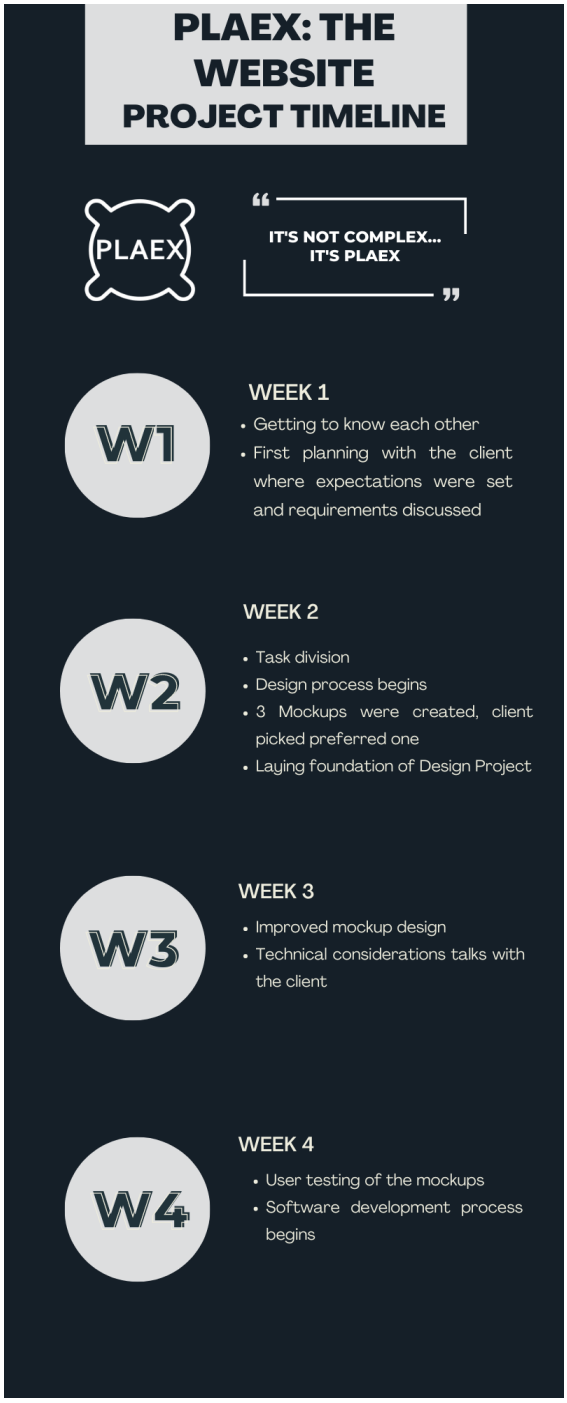
2.1. Project Objectives

We were tasked with designing, implementing, and deploying a website for a client. The client wanted to redesign their website with a new modern feel. The goal for the website is to educate the user upon landing on the main page, about the problem the company is trying to solve, the company's solution, and what the client can do to help. In order to do this, the client should be able to easily contact the company. While looking through their website we noticed a few problems with it. Initially, we thought that improving the aesthetic feel of the website is enough to satisfy the client's needs, but, after a more in-depth analysis, we realized that a technical redesign is also required, since their loading times were very slow. To confirm that we used "Lighthouse" - a built-in Chrome tool that shows the performance of a website. After running it we found that the accessibility of the website is not up to standards. This analysis also confirmed our suspicions that the website is slow. The tool reported that over 70% of the website took over 7 seconds to load. This is slow for today's standards.

Based on that our main goals are as follows:

- Improve loading performance of the website
- Improve accessibility of the website
- Make the website more modern - for this we need the client's approval of our design. If the client is satisfied with the look and feel of the website then we would consider this as completed.
- Design the website in a way that reflects the client's vision and increases the chance of a visitor taking interest in some of the products.

2.2. Project Timeline



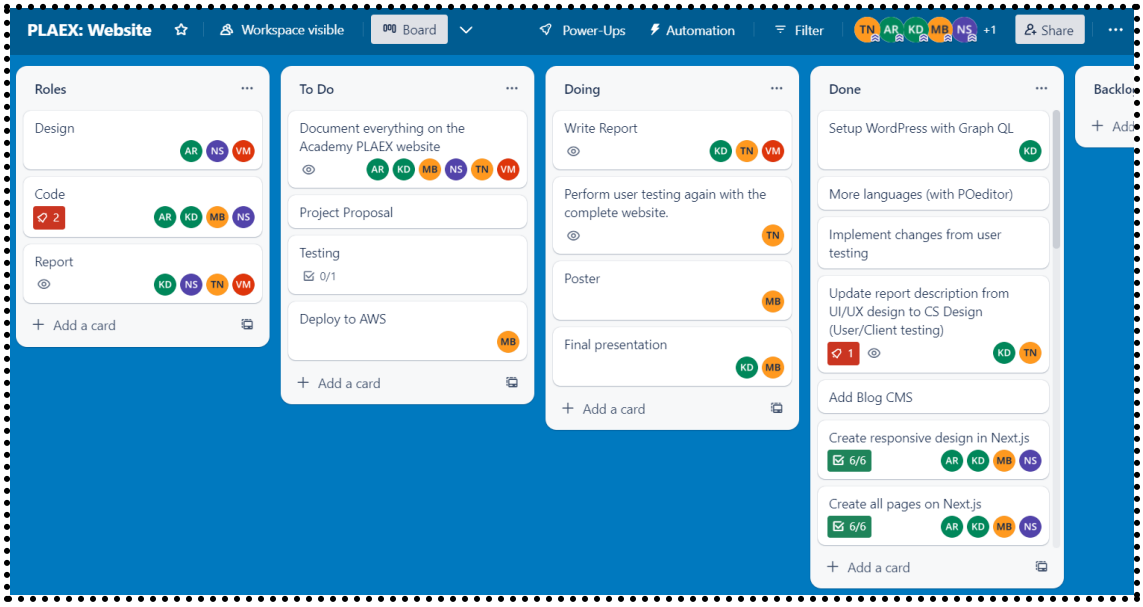
The timeline depicted above showcases our progress throughout the 10 weeks required to work on the project. On a weekly basis, we met with our client to discuss progress, issues, if any and decide on upcoming milestones and whether they are achievable or not. The meetings took place online, since our client is not in the Netherlands at the moment. We would take notes during every meeting and would always make together with the client a list of feasible requirements / goals that have to be completed before the next meeting. Moreover, any extra information that needs to be communicated urgently, was conveyed through a WhatsApp group.

2.3. Team roles and responsibilities

The internal division of tasks and responsibilities within our team was made with careful consideration since it is crucial for the project's success. Being a group with 6 people, it was quite difficult at first to provide a fair distribution, having members specializing in front-end and others in back-end development. Having a clear division of responsibilities, the team can work more collaboratively and efficiently, this division allowing for more specialization and deeper knowledge in specific areas. Nevertheless, in order to ensure proper flow of information and to avoid bottlenecks, each team member was kept up to date with how the other team members were doing in their specific tasks.

- Matei - User testing / Deployment
- Tudor - User testing / Report
- Victor - UI
- Andrei - Front-end / UI
- Nicu - Front-end /UI
- Kalin - UI / Report

2.4. Project Management Tool



We decided to use Trello as our project management tool for several reasons. First, Trello's visual interface made it easy for our team to understand and use. The drag-and-drop functionality of boards, lists, and cards allowed us to quickly and easily organize and prioritize tasks, without getting lost in complex details. Moreover, Trello's flexibility allowed us to customize our boards, lists, and cards to meet our specific needs, and the tool's features helped us stay on top of our tasks and deadlines. After our initial meetings with the client, from which we got more insights regarding what is expected of us, we populated the backlog with numerous tasks that were afterwards grouped based on their priority, thus offering us a better view and understanding of our overall progress. Trello also helped us with task assignments as it provides functionality for assigning tasks to one or more people. This way we were able to see everyone’s contributions and progress throughout the module.

3. Requirements

3.1. Requirements specification

3.1.1. Functional requirements

The functional requirements were established through discussions with the client in order to form a basis of what is expected to be delivered. The first meeting paved the way for the project, by gaining some initial understanding of the client's desires and requirements, which will be translated into functional requirements. In the following meetings, these requirements are to be reviewed and changed if necessary.

- As a user I want to be able to log in to my Dashboard.
- As a user I want to be able to see more information regarding improper waste management and its consequences.
- As a user I want to be able to find more information about the company's products and their features.
- As a user I want to be able to subscribe to the newsletter that the company provides.
- As a user I want to be able to read the blog posts that the company publishes.
- As a user I want to be able to easily find the contact details of the company in order to learn more about their products.
- As a user I want to be able to check the company's other social media accounts.
- As a user I want to be able to view a page within 3 seconds of redirecting to a page.
- As a user I want to be able to view the company's website on any device that I want.
- As a user I want to be able to select the theme of the website.
- As a client I want to be able to maintain the project after the current team is done with development. This requires good documentation on a specific documentation website.
- As a client I want to be able to update website styles by .
- As a client I want to be able to easily update website content.
- As a client I want to be able to create blog articles with the help of a Content Management System (CMS).

3.1.2. Non-functional requirements

The current website has some loading time issues as it was developed using Wordpress. To assure quality we want the loading time to be as short as possible. In order to measure it properly, we require that loading time is less than 1 second.

3.1.3. MoSCoW Prioritization

In order to properly manage our requirements, we made use of the MoSCoW prioritization. We prioritized the tasks while discussing with the client what tasks are the most important and what are good to have. For example, it is really important for the client that users are able to contact them so that they can expand their business. Based on that we agreed that this is a MUST requirement. The client also asked if it would be possible to change the theme of the website. After some discussion we concluded that this requirement is not necessary nor important so we put it as a WILL NOT requirement. MoSCoW is a known project management technique that categorizes the requirements into 4 groups, based on their urgency and importance. *Must have* requirements are indispensable for the application to operate, thus they must be incorporated. *Should have* requirements are significant, but if they cannot be included due to time constraints, the application should still be functional. *Could have* requirements that are desirable, but not essential, and will be considered if time allows. *Will not* requirements are of low priority, may be considered in the future, but will not be included in the current application delivery.

- The user **MUST** be able to log in to their Dashboard.
- The client **MUST** be able to maintain the project after the current team is done with development.
- The user **MUST** be able to find more information about the company's products and their features.
- The user **MUST** be able to get in contact with the company.
- The user **MUST** be able to view a page within 3 seconds of redirecting to it.
- The client **MUST** be able to update website content.
- The user **SHOULD** be able to read the blog posts that the company publishes.
- The user **SHOULD** be able to view the company's website on any device.
- The client **SHOULD** be able to easily update website styles.
- The user **COULD** see more information regarding improper waste management and its consequences.
- The user **COULD** subscribe to the newsletter that the company provides.
- The user **COULD** check the company's other social media accounts.
- The client **COULD** create blog articles with the help of a CMS.
- The user **WON'T** be able to select the theme of the website.

3.1.4 Target audience

PLAEX strives to contribute in making the planet a more sustainable place by improving recycling at the source. Their AI is adaptable to any waste stream and waste separation system, meaning that they can deploy their products in any country. Individuals and other institutions can benefit from this, such as:

- Municipalities and local governments: may be interested in deploying smart waste sorting bins in their communities to improve waste management, reduce waste-related costs, and promote sustainability.
- Businesses: may be interested in this technology to be used in their facilities to improve waste management and reduce waste-related costs.
- Educational institutions: schools, universities, and other educational institutions can use this as a way to educate students about sustainability and proper waste management.
- Waste management companies: may opt to use this technology as part of their waste management services, as a means to optimize waste collection and increase effectiveness.

3.1.5. User experience

The client wants the users to get a futuristic and professional feel when they access the website. The landing page of the website should be like a pitch, presenting the current dire situation of improper waste management and its dreadful consequences, page which then smoothly transitions by showing the product, being the solution, followed by a call to action. This way the user can get a good explanation of the product of the company as soon as possible. Since their vision involves incorporating innovative solutions and responsible waste management practices, they also want to convey this to the user.

3.1.6. Functionality

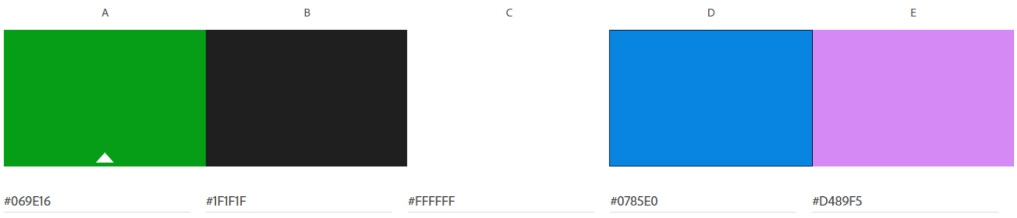
The website's function is to attract and inform potential future clients of PLAEX. This means that the website should look professional, function properly, and inform users about the company. The website also provides a dashboard for its current users through a login page. This login page should be secure for the client to access. Moreover, there will also be a blog where various articles will be posted, on topics related to sustainability, EU Mandates on certain environment policies and proper waste management practices, which can offer the reader a better understanding of the current situation.

4. Detailed design

4.1. Design choices

4.1.1 Design aesthetics

The client was unsatisfied with the overall look of the website, describing it as quite dull and a bit out of touch. A brief look of the current website and short explanations of current problems can be found in Appendix A - Current version.
It is not aesthetically suitable and does not reflect their vision. The idea is not to completely rework the whole website, but to work towards a rebranding that properly complies with their image, that of "futuristic circularity". After careful consideration and extensive discussion with the client in which we proposed various color palettes, taking into consideration the previous website design as well, we decided to go with the color scheme depicted below and a combination of the fonts Grotesk and Futura. Both of these fonts are of the sans-serif family. These kinds of fonts are used to show simplicity and modernity - values that the client wanted their website to enforce. Grotesk is used in graphic design to represent a modern look, while futura is a very geometrical font, which conveys functionality. By using these fonts, we aimed to convey a sense of simplicity, and professionalism that aligns with the client's brand values, which, combined with a carefully chosen color palette it results in a visually appealing design, which got the client's approval in the first meetings.



4.1.2. Mockups

During our first meeting, we were presented with the issue at hand and what is expected of us. Afterwards, we came up with a list of questions to be asked in the following meetings. By doing so, we gained a rough understanding of what needs to be changed with their website and gathered some starting points in order to lay the foundation for our project. From week 2 towards the end of week 5, we tinkered with Figma and, based on our client's weekly feedback, we successfully created a mockup of a website that reflects the company's vision and offers an innovative, futuristic look, which, at the same time, does not deviate too much in terms of

aesthetics and the relationship to the brand. A final look of the aforementioned mockup can be viewed in Appendix B. Moreover, since the client mentioned the need of a mobile application, we also developed a mockup for this case, which can be viewed in Appendix C.

4.2. Pages Overview

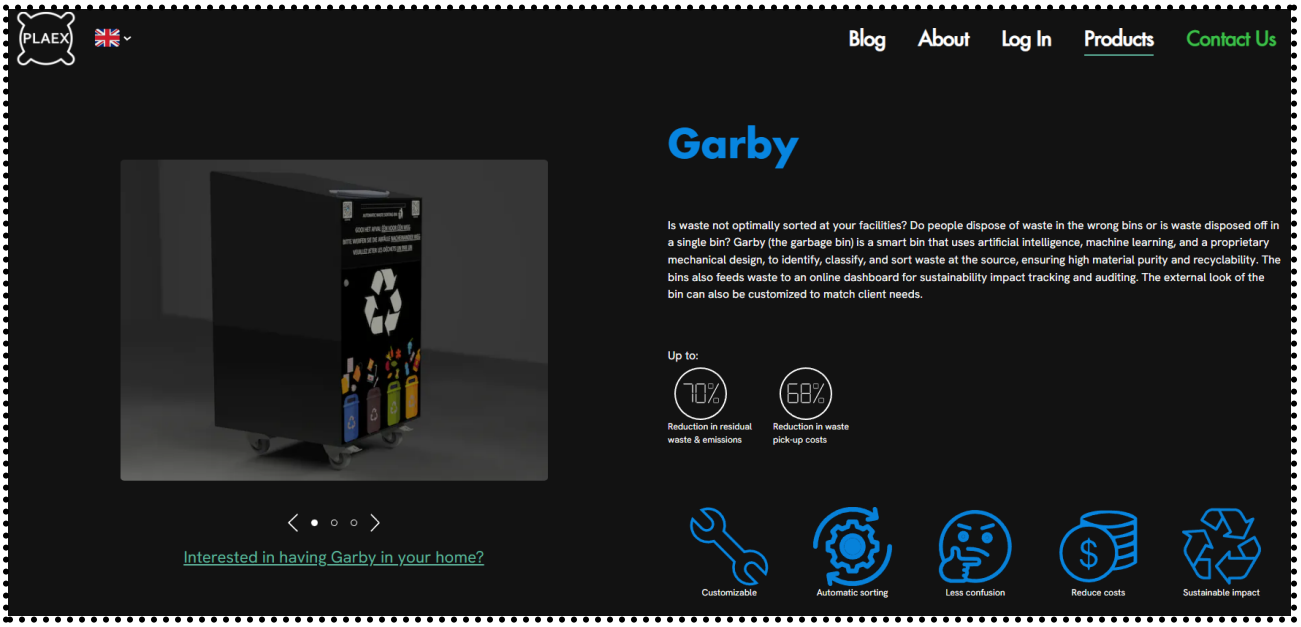
The following section displays the final look of the website. Our team tried as much as possible to create a website which is both minimalistic and aesthetically pleasing, while not deviating too much from the mockup, since it reflected what the client envisioned with regards to the design. Moreover, during the initial user testing, we received plenty of useful feedback that has been presented to the client, who either agreed or disagreed with the input received. The feedback the client was most pleased with has been implemented in the final version and a brief explanation of each page is given below. If you are interested in visiting our website, please click here.

4.2.1. Landing page

As per client request, the landing page is structured like a pitch. First of all, the first section is meant to raise awareness by presenting the user the ongoing problem improper waste management has severe repercussions for the whole world accompanied by a counter that updates in real time displays the amount of waste sent to landfills and incinerators since 2019, information fetched from the Eurostat API. By scrolling down, the user is presented with the solution: Garby and a quick summary of its benefits and mission in a more sustainable future.

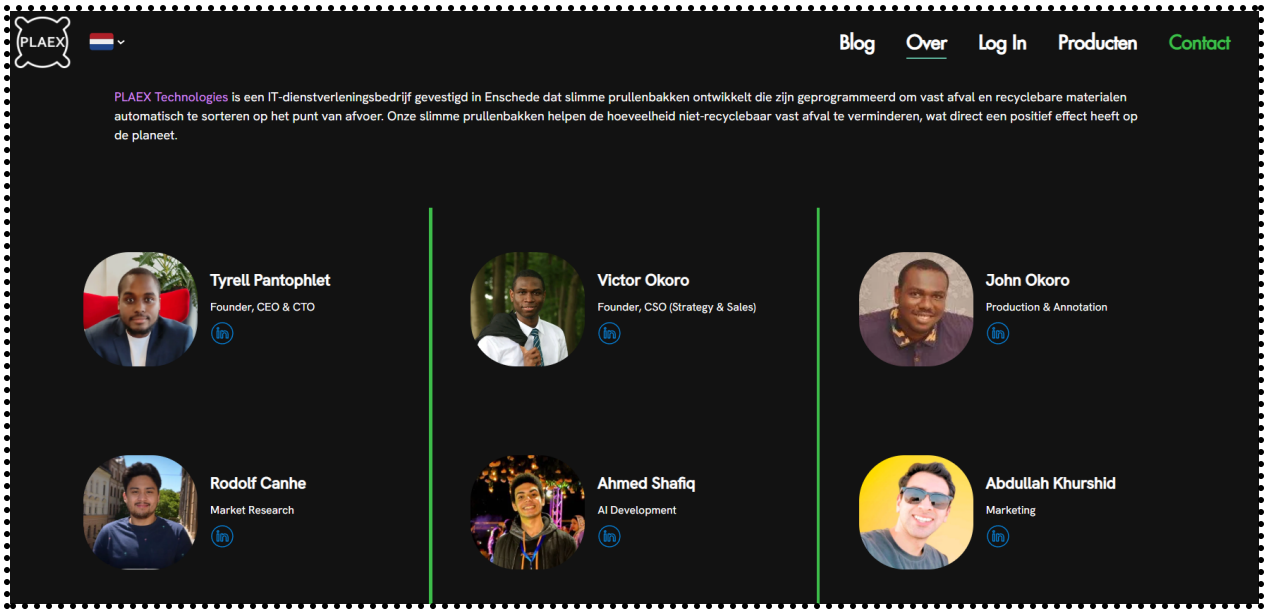
Lastly, a call to action is made. The user can click one of the links to either be redirected to the product page where he can learn more about the companies' technologies, or to get in contact with Plaex and possibly schedule a meeting. If the user is interested in receiving news about the company he can subscribe to the newsletter.

4.2.2. Products page



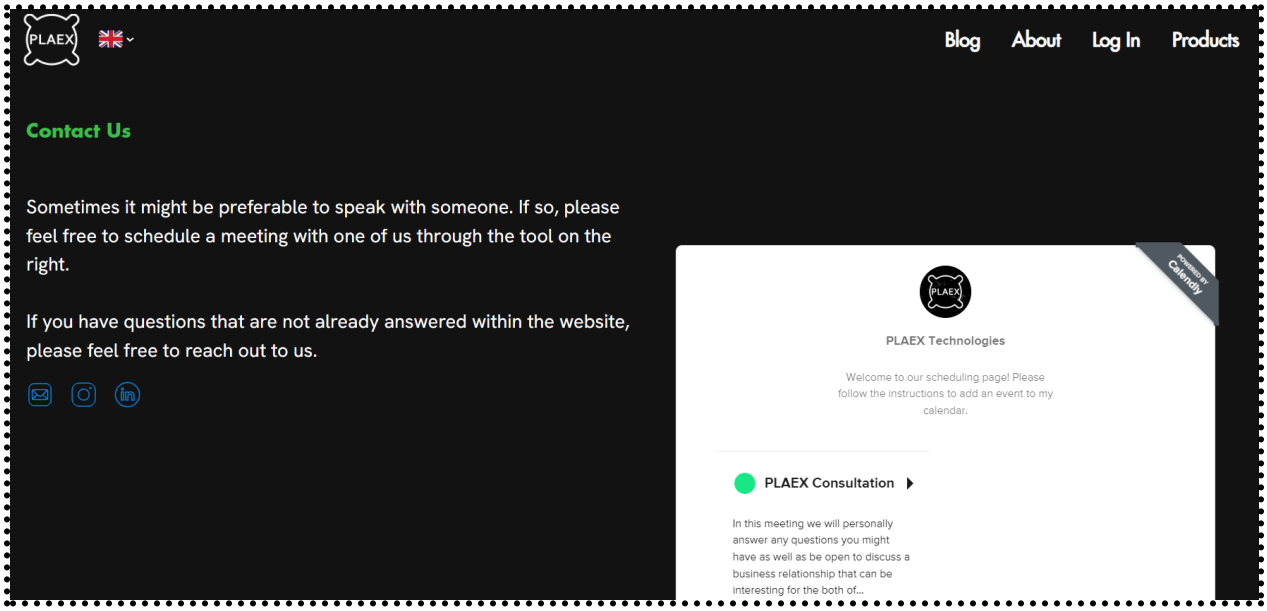
The products page displays in depth information about the company's current products. Each product has a detailed description next to a 3D representation of the design. The product's pictures change automatically every few seconds, like a slideshow, but they can also be cycled through by the user using the arrows. By hovering over the products' icons, each of the features is briefly explained, offering the viewer a better understanding of the product capabilities and what he/she can expect from it. If the user / viewer is interested in any of the products, he needs to complete an interest form and the company will get in touch with him as soon as possible. When it comes to the design choices, quite a lot of improvements have been made based on the feedback received during the user testing of the mockup. For example, we tried to improve the consistency of our color palette by getting rid of the mix of green and light purple used before, which was quite distracting. Moreover, the tooltip displayed by hovering over the icons is another useful feature we managed to implement, that reflects some of the users' feedback. Overall, a lot of attention during development has been given to this page, since its goal is to provide the reader with an overview of what Plaex has to offer with its cutting edge technology.

4.2.3. About page



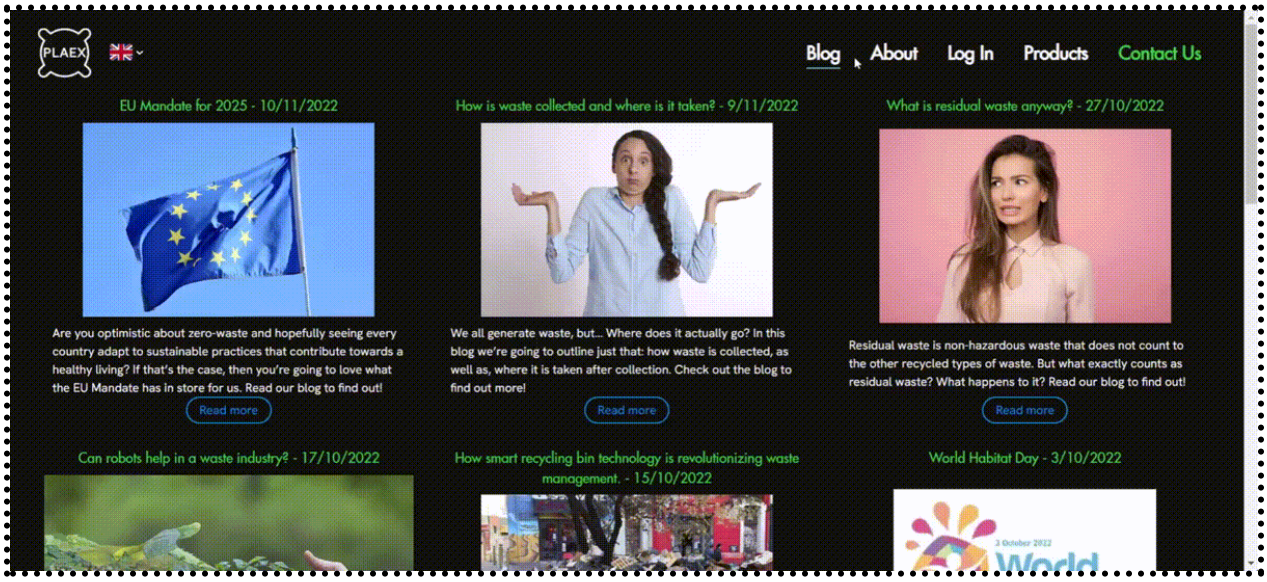
The “About Page” offers the users more information about the company and its employees. Plaex is a successful startup which earned various awards and recognition due to its products that build towards a more sustainable future and each of these aforementioned rewards are displayed in the “Awards” section of the page. At the bottom of the page, all the publications / interviews or other press-related activities the company has been involved in are showcased in the “Press” section.

4.2.4. Contact Us page



On this page, the users who are either interested in any of the company's products and services or just want to gain more information about the company and what their products entail, can easily schedule a meeting with Plaex via Calendly, which is the preferred online scheduling tool.

4.2.5. Blog page



The blog page of the website provides users with a valuable resource for learning about EU mandates regarding recycling, proper waste management, and other related topics. The articles displayed here play an important role in educating the viewer on how to recycle properly, raise awareness about the environmental impact and how technology plays a crucial role in promoting a greener planet. Regarding design, not many changes have been made when compared to the mockup, since the feedback was mostly positive for this page and its purpose quite straightforward. As explained in 5.1.2. Back-end, the necessary blog post information has been extracted from the CMS used by the company using GraphQL, but, as can be seen, there are sometimes flaws in alignment and spacing on a blog post page. Unfortunately, this proved to be out of our control and a back-end related issue, since there is almost no consistency in the client's database.

4.3. In retrospect

The design had a rough start but after some research and some trial and error the client agreed that the design satisfies their requirement for a futuristic website that aligns with their values. A bit more exploration on the design/colors in the first week could have saved us some time that was spent discussing colors with the client. Overall, too much time was spent making small changes that were not that important. A better use of our time could have been spent documenting and developing the project. Nevertheless, even if the final version of the website did not deviate that much from the mockup, which is a sign that our team did everything in its power to deliver a product that aligned with what the client envisioned, a lot of feedback gained from the user testing (6.1 Mockup testing) has been implemented. Besides the explanations given above, other important changes are represented by:

- Use of “Grotesk” font in combination with Futura instead of Helvetica, which is a paid font. Future is used for headings and navbar, while Grotesk is being used for the rest.
- Adding equal spacing / margins on all pages.
- The navbar is not changing anymore on each page which proved to be a distraction. Instead, the page the user is currently on is underlined.
- Newsletter animation removed, since it was too frequent and distracting.
- Improved color palette consistency by removing some colors.

5. Architectural design

5.1. Technology stack

For this project we decided to build the website using Next.js. We chose this framework because it allows us to control the rendering of each page separately. This is beneficial, because it can help improve the loading times of each page. The framework itself also does a lot under the hood to improve loading times. Another reason for choosing this framework is because it is built on top of React.js and it is a well-supported framework with regular updates that ensure it remains up-to-date with the latest technologies in web development. Moreover, it provides great SEO optimization and flexibility, which will help boost our client’s website visibility.
Next.js uses React.js for its front-end and Node.js for its back-end. This means that the whole technology stack uses one language - TypeScript/JavaScript, which can help us develop faster as we don’t build the different parts of the product with different programming languages.

5.1.1. Front-end

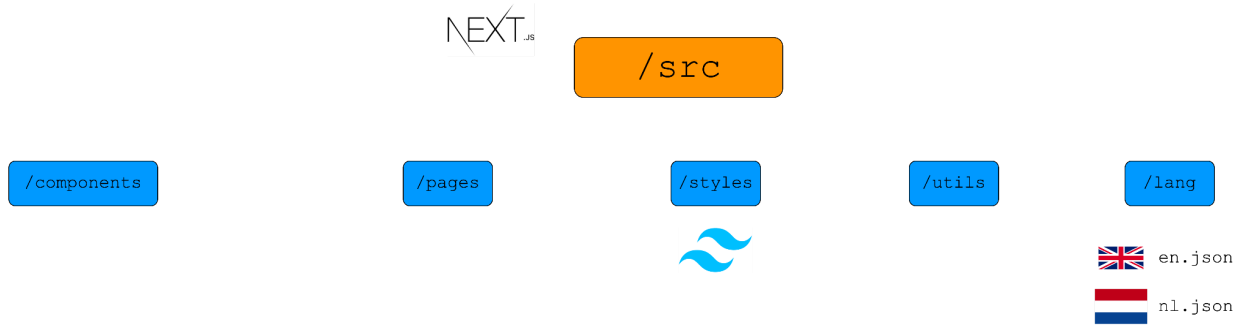
On the front-end we will also use Tailwind CSS because it can help us style the website faster and more efficiently. Since Tailwind CSS provides predefined classes for common styling tasks, you don't have to write custom CSS from scratch every time you want to style a specific element and this factor can greatly save time and effort, while ensuring that the website functions smoothly.

5.1.2. Back-end

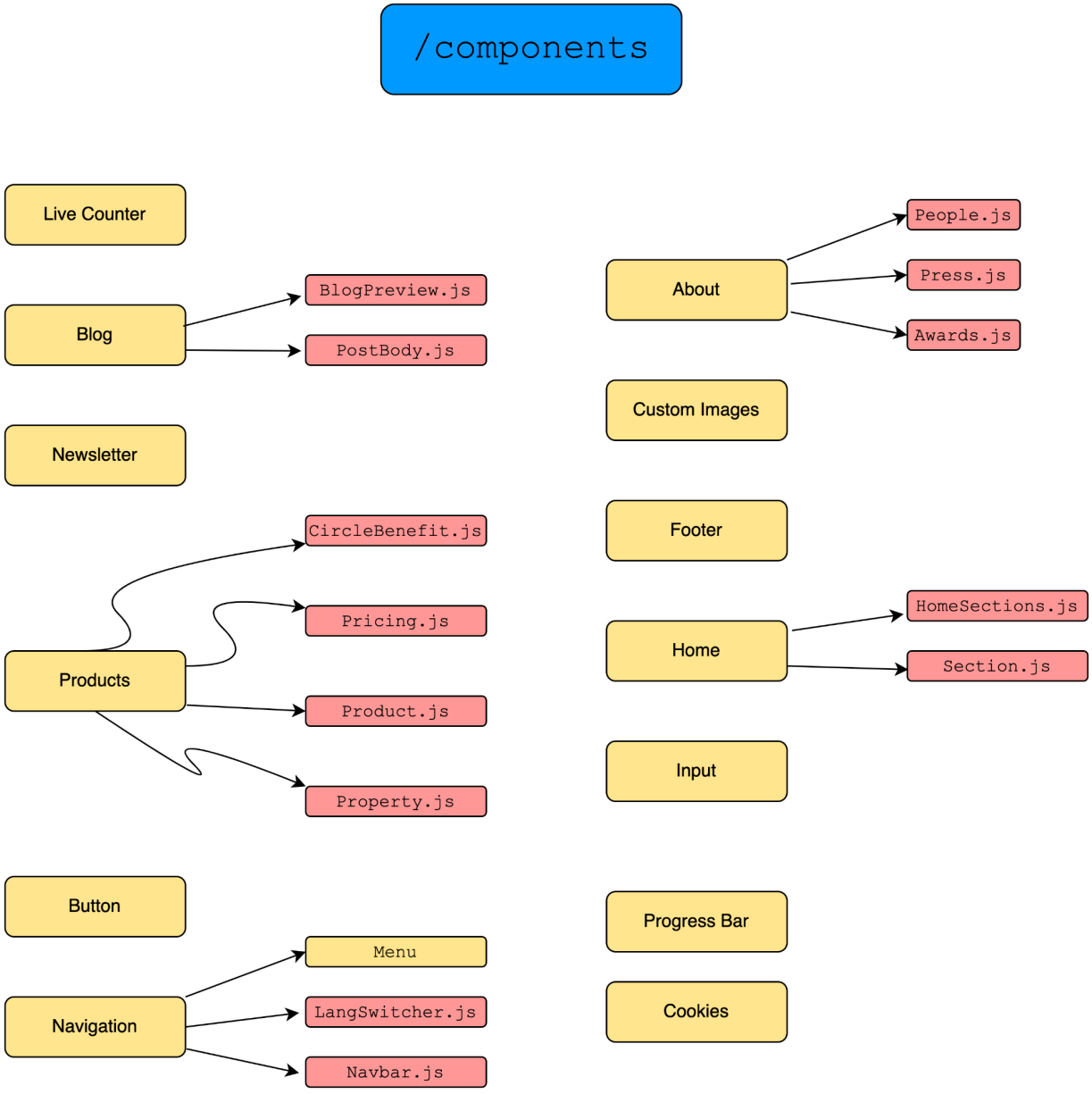
There are two back-end systems that are connected to the website. The first one was already created for the client and they wanted to keep it. This system was responsible for the dashboard and the login part of the website. We did not get to make any changes for this back-end system. The other back-end system consisted of a WordPress blog. For it we used a GraphQL endpoint to which we can connect and get necessary blog post information that we can then display on the front-end. This satisfied another requirement for the client as they wanted to have a CMS system to create their blog articles instead of having to create the pages themselves or having to learn another file format to use for blogs.

5.1.3. System components

The diagram below shows the system architecture at a high level. The first diagram depicts the high-level organization of the project files' system components. A more detailed description of specific system components can be found in the project's Readme.

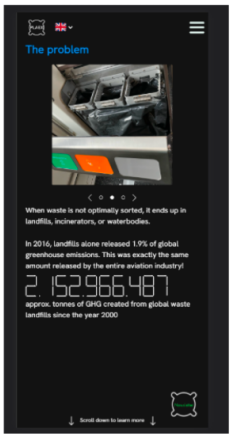


The following diagram provides a high-level overview of the frontend components used in the project. In order to provide a more modular approach to this project, the design was divided into multiple components.

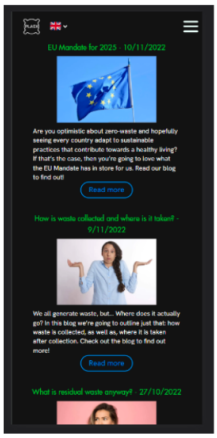


The `/pages` directory contains all the pages that are available in our application (see [Next.js documentation]). Page components are Next.js components that are rendered based on the application's route and reuse UI components from the `/components` folder.
This diagram shows all the available pages in our application and parts of UI they are reusing:

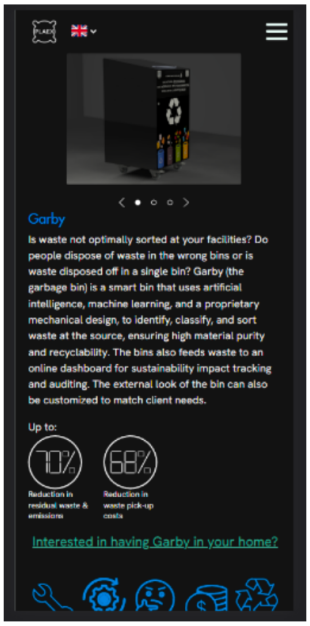
index.js



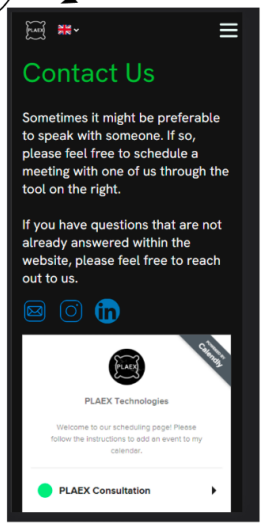
blog.js



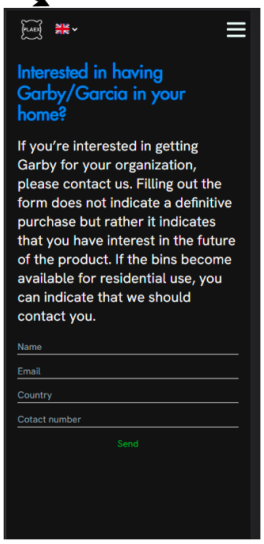
products.js



contact.js



form.js



about.js

5.2. Responsive design

Nowadays, everyone uses a phone or a tablet, due to their accessibility and portability. It goes without saying that having a responsive design is crucial for any modern website, and even more so for a company like Plaex, which values innovation and technology. The responsive design ensures that the website adapts to different devices and screen sizes, providing a seamless user experience across desktops, tablets, and mobile devices. By prioritizing responsive design in the website redesign project, Plaex can showcase its commitment to user-centered design, aligning with its values and mission, while also providing its users with distinct features. For example, besides providing users with information about their AI-powered sorting bins, how they build up to a more sustainable future and to quickly get in touch, the company also offers guidance on proper waste management. This is particularly useful when someone is unsure where to throw a product, an issue easily solvable by taking a quick glance at the mobile app. Check here to see the final look of the mobile version.

5.3. How it all works

Most of the front-end will be pre-rendered with the help of Next.js. There will be some dynamic pages such as the blog pages and each blog article's page. For that Next.js will connect to Wordpress that will be installed on the virtual machine that hosts the static pages for the website. Through GraphQL we are able to extract only the information we need for each page instead of getting all information - like through an API end-point. This also improves the requirement for a fast-loading website. Users will be able to access the website through a standard HTTP/HTTPS request.

5.4. In retrospect

By using GraphQL and by choosing a framework that is centered around faster loading times we are able to satisfy the requirements for faster access to the website. According to Stadnik and Nowak (2018) loading times can influence users on whether or not they would buy something. The research was based on e-commerce websites but we think it can apply to this website too. Creating a responsive website satisfies another requirement - users should be able to access the website on any device. This requirement does not require responsive design but it can greatly benefit from it. Having a mobile friendly design for when a person is browsing on their phone can increase the chance of the person staying on that website. Also, this way the client can be sure that the mobile version displays everything and that it still looks good. Their old website had troubles with that - text popping over the menu, missing sections of some pages, etc.

6. Testing

6.1 Mockup testing

6.1.1. Overview

The objective of this research study is to evaluate the new website design for PLAEX and identify any usability issues or concerns that participants may encounter while navigating the website. The study aims to provide recommendations for improvement to ensure that the website design aligns with the company's goals and effectively communicates information about their products and services to users.

Firstly, getting approval from an ethics committee before conducting usability testing is important because it ensures that the study is conducted in an ethical and responsible manner. To ensure that, we completed the web form offered by the faculty of EEMCS which is responsible for the Ethics Committee Computer & Information Science (EC-CIS) - request no. 230157.

6.1.2. Methodology

- Research Goals: The research goals for this testing are to evaluate the visual design, user experience, and ease of use of the new website.
- User Group: The user group will consist of individuals (students in our case) that have been involved in website design / development and can provide valuable feedback.
- Recruitment: Participants will be recruited through email.
- Testing Environment: Testing sessions will be conducted in a quiet room with a computer and a high-speed internet connection. Participants will be asked to complete tasks related to the website design while being observed by a moderator.
- Test Script: The test script consists of several tasks that need to be performed by the participants. These tasks will include navigating through the website to learn about the products and services offered, as well as providing feedback on the visual design.
- Data Collection: Data will be collected through note-taking during the testing session.
- Analysis: The collected data will be analyzed to identify any usability issues or concerns that participants encountered while navigating through the website. The results of the usability testing will be used to make necessary improvements to the website’s design and functionality.

6.1.3. Results & conclusions

Conducting this usability test proved to be a step in the right direction due to the amount of insight gained from the participants. The test script used during the session can be found in Appendix D. The participants tested both the desktop and mobile versions of the mockup and provided useful feedback. In the subsequent meeting with the client, this information was conveyed to the client, who was pleased with some of the recommendations. After careful consideration and some discussions, the decision was to make some design changes and adapt several of the points highlighted below.

Participant 1 suggested that:

- Colors of the heading in the call to action section should be changed from blue to green (similar color to the contact us heading).. This also applies to the products page where there is a mix of light blue and purple ⇒ try to be more consistent with the colors.
- On the homepage, images from the slideshow are way too squared. Digits from the real time counter of greenhouse gasses created from municipal waste are way too thin.
- For the moment, the image of the Garby model is a bit too small, maybe for the future try to make the model 3d rotatable.
- On the products page, the smart bin(s) specified features should have a tooltip that backs up the claims / explains the processes when you hover over the icons.
- On the products page, instead of having a link to the interest form, in order to stand out, make it bigger and maybe a button instead
- Newsletter animation is nice and gets your attention
- Navigation through the pages is clear and intuitive enough
- The newsletter does not appear in the mobile mockup, but overall is pleased with the design.

Participant 2 suggested that:

- Navigation is intuitive enough, easy to understand which button leads where.
- On the homepage, there should be a link / button to the interest form rather than only having it on the products page. As an alternative, instead of redirecting to the interest page, make the form popup on the current page
- Call to action section should not include links in the text area, instead create some buttons below the text in order to make it stand out.
- On the original website there is a login button, if this functionality is added to the new website, placement of login and hyperlinks in the header should always be towards the end.
- More consistency with the colors is needed, maybe instead of using purple / blue, use different shades of green (darker or other nuances), similar to the “Contact us” color
- On the products page, instead of using the “other products” button to be redirected to Garcia, just scroll down to reach this information about the product.
- Newsletter is noticeable enough, a good improvement compared to the original website, where it just pops up in the user's face.

Participant 3 suggested that:

- Small table of content on every page to see where you are on the page and what other content is coming up, either add this on the right or left corner of the page.
- Maybe add a home button/heading in case users don't know to come back home just by pressing on the Plaex logo. This can be the case with older people, for example, who do not have too much affinity when working with technology.
- Have an explanatory video on the products page that explains how the smart bin actually works / sorts the trash.
- Even if the newsletter stands out due to its animation, which is a good factor, it could be an idea to add it in the corner of every page.
- Contact Us page’s wording is a bit ‘weird”.
- Instead of only having the contact information on the contact us page, such as social media links, maybe put those at the bottom/footer of every page.
- Current design gives a bit of an “empty” feeling, maybe making the pictures bigger. Nevertheless, the minimalistic approach is a good implementation.
- Purple colored words on the Products page should be made bold instead of changing color.

Participant 4 (DesignLab) suggested that:

- The digital numbers on the first page are hard to read and may lead to confusion. The uneven spacing between the numbers makes it look like different numbers.
- Simplify the text - too much technical jargon in some of the texts. Tooltips can help with that. "*" with a block of text with explanation at the end of the page is another option.
- The index page should start with the call to action and then introduce the problem. If we start with the problem the user is greeted with a picture of garbage.
- Text on under the images should not be bold and it should not be centered. Also, larger font than the first picture (around the size of the second picture).
- "Futura is too round of a font for a modern feel. It gives off a more friendly feel." - A sharper font might be better for a modern feel.
- Helvetica might be a paid font (license).
- Suggested the use of "Grotesk" font from Google fonts - free alternative. Has a modern feel and a "personality."
- Newsletter animation is too distracting. Make the animation happen less often.
- Add equal margin/spacing on all pages. Easier for design/development later on.
- Navbar should not change on different pages. Instead you can underline the page the user is currently on.
- Blog page is nice. Can increase the text a bit and use the spacing better. Change the wordy date to a number date and put it next to the title.
- The about page has some inconsistencies. The images of the people are different - some are circles, some just have rounded corners. Margin should be the same for all pages. Name and title were not aligned everywhere. Hover on the awards is nice - makes sense. Press logos should be the same color (ex. All white on black background/All black on white background). Maybe add a horizontally scrollable carousel for this.
- Improve color palette - too much color. Green makes sense. Leave the black and white. Use a tool for the final 4th color. Purple can be confusing as it is commonly used for "visited" links. Make the words bold instead.
- Test how it looks on different screen sizes.

6.2. Final version testing

The pre-release version of the website has been tested with a group of users, in order to gain more insight on any last-minute changes that may need to be implemented. Please refer to 6.1.1. Overview and 6.1.2. Methodology if needed, since the process, methodology and test script are quite similar to the testing done for the mockup version.

6.2.1. Results & conclusions

Quite a few changes have been made since we first tested our mockup. It was very important to see how other people perceive the website and interact with it. The participants consisted of both people who have experience in web design and those who represent the average user, with not much interest and expertise in design. Since this testing has been done in the last week of the module, the feedback received was presented to the client during our last meeting and most of the points highlighted below were implemented successfully in due time.

Participant 1 suggested that:

- The heading on the landing page is being cut out a little bit, unless the user expands the size of the screen, maybe something can be done about this.
- On the landing page, the problem section displays multiple pictures in a slideshow, while the upcoming sections the solution and call-to-action display only 1.
- There is the option to change the language of the information being displayed, but nothing happens.
- The log-in heading does nothing.
- The newsletter icon is a bit too small.
- Navigation is quite straightforward, easy to get around the website.
- Nice idea with the bar being filled up while you scroll on the index page.
- Loading times are optimal, compared to the original website.
- Hovering over the icons on the Products and About page is a nice feature that reduces the need of cramming extra text on the pages.

Participant 2 suggested that:

- A bit more spacing could be added on the About page.
- More pictures should be added on the main page.
- The login page redirects to the main page. (this will be solved by the client after the project is delivered).
- The ongoing digital clock is a good feature to raise awareness, but maybe change the color of the number shown there.
- The newsletter is somewhat visible, but can be made bigger. The modal popup may look better if it has a “solid” background, rather than transparent.
- There are multiple pricing buttons on the products page but all of them display the same thing, maybe use only one?

6.3. In retrospect

Conducting these user testing sessions was an important step in the development of our project, since the users had some good functional feedback that helped us improve the website and come up with new features. It helped tremendously, especially in the early phases where we were not sure whether we were proceeding in the right direction. Also, the client agreed and liked most of it. The client didn’t really agree with a lot of the feedback regarding the design. This is understandable as design is a more subjective matter.

7. Conclusion

All in all, over the course of these 10 weeks, we have managed to successfully design, implement, and deploy a website for PLAEX that meets their requirements and expectations. We learned how to work in a team, how to communicate with the client, how to use new technologies, and how to conduct user testing and any challenges such as time constraints, difficulties and design changes have been overcome with collaboration and perseverance. Moreover, besides the improved aesthetic feel of the website, which was our main goal, its performance (loading times) have been thoroughly improved as well, as it is highlighted in Appendix E - Website performance.

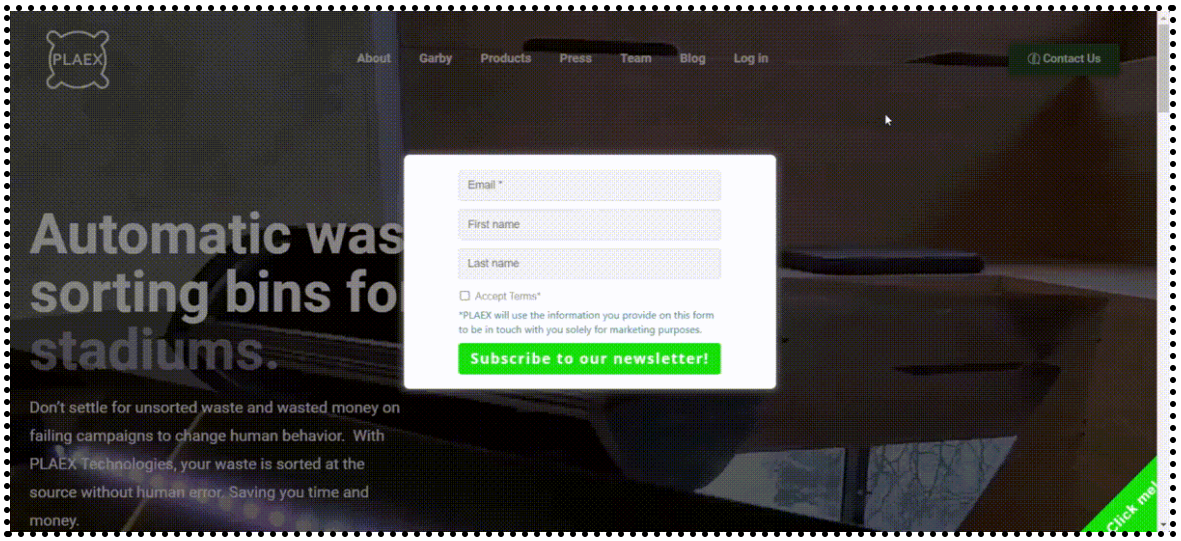
References

- Stadnik, W., Nowak, Z. (2018). The Impact of Web Pages' Load Time on the Conversion Rate of an E-Commerce Platform. In: Borzemski, L., Świątek, J., Wilimowska, Z. (eds) Information Systems Architecture and Technology: Proceedings of 38th International Conference on Information Systems Architecture and Technology – ISAT 2017. ISAT 2017. Advances in Intelligent Systems and Computing, vol 655. Springer, Cham. https://doi.org/10.1007/978-3-319-67220-5_31
- David Laner, Marion Crest, Heijo Scharff, Jeremy W.F. Morris, Morton A. Barlaz, A review of approaches for the long-term management of municipal solid waste landfills Waste Management, Volume 32, Issue 3, 2012, Pages 498-512, ISSN 0956-053X, https://doi.org/10.1016/j.wasman.2011.11.010.
- N Künzli, R Kaiser, S Medina, M Studnicka, O Chanel, P Filliger, M Herry, F Horak, V Puybonnieux-Texier, P Quénel, J Schneider, R Seethaler, J-C Vergnaud, H Sommer, Public-health impact of outdoor and traffic-related air pollution: a European assessment, The Lancet, Volume 356, Issue 9232, 2000, Pages 795-801, ISSN 0140-6736, https://doi.org/10.1016/S0140-6736(00)02653-2.
- B. K. Bose, "Global Warming: Energy, Environmental Pollution, and the Impact of Power Electronics," in IEEE Industrial Electronics Magazine, vol. 4, no. 1, pp. 6-17, March 2010, doi: 10.1109/MIE.2010.935860.

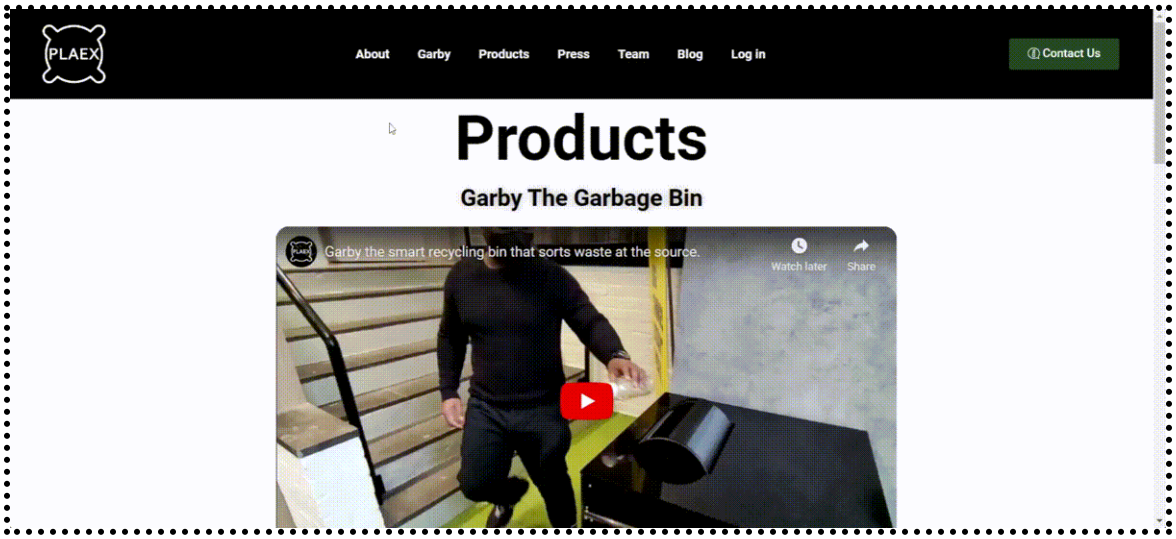
Appendices

Appendix A - Current version

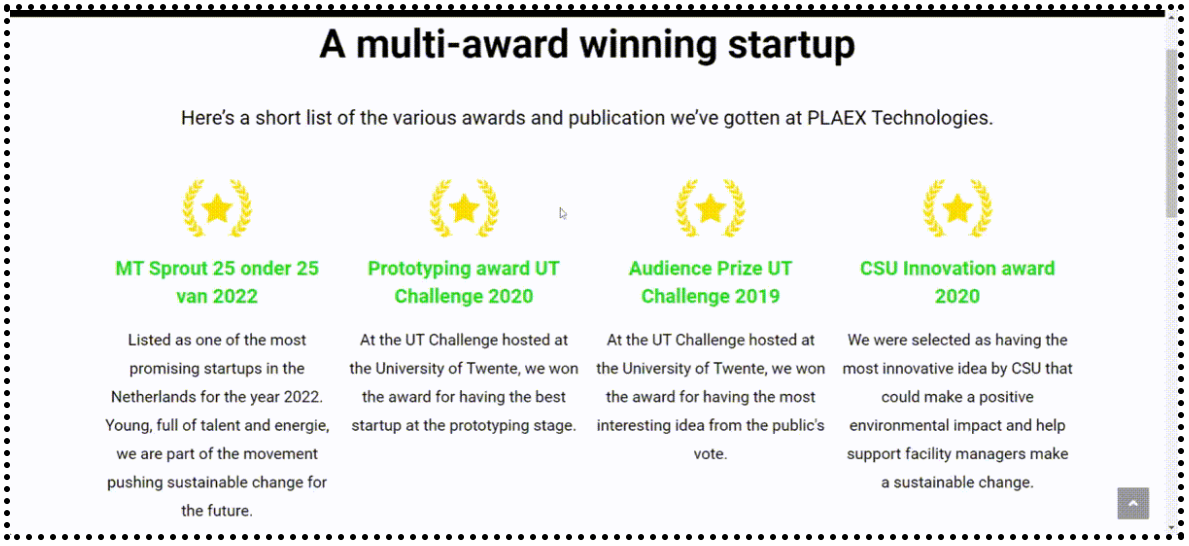
Landing page



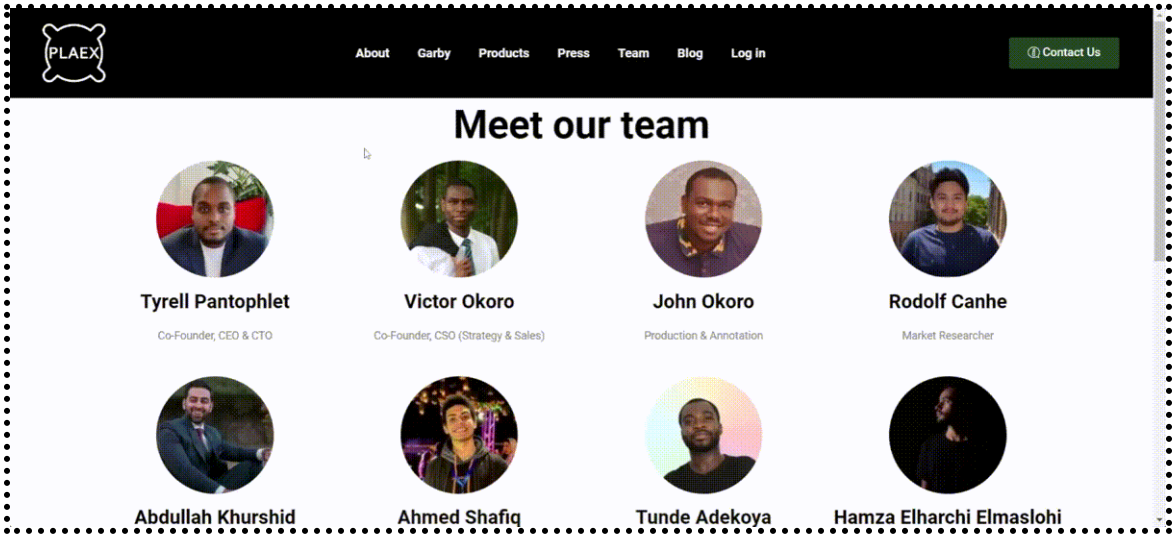
Products page



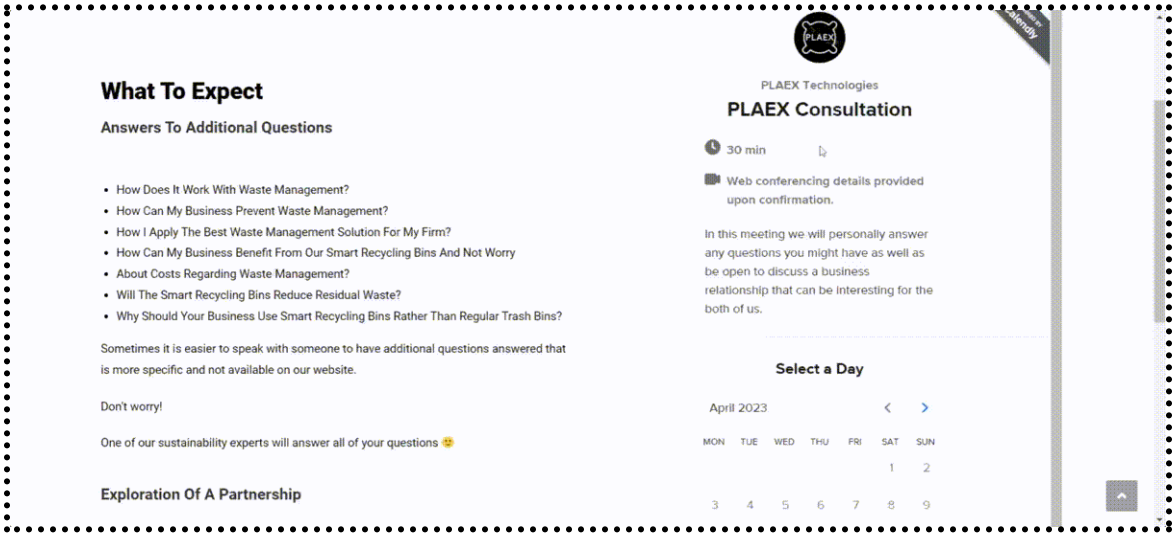
Press page



Teams page



Contact us page



The current version of Plaex's website can be visualized in the section above. For a further inspection of the depicted website pages, visit plaex.net. Even at a first glance, one of the main issues noted is the inconsistency between colors, highlighting an inconsistent color palette, especially seen on the "Press page". The mix of white, black, yellow and different shades of green on some of the website pages does not give a professional feel. As a solution, the client requested the improvement of the aesthetic feel in a way that gives more of a modern / "futuristic" look, resembling a more minimalistic view.

Besides the poor use of color palette, the way some components are placed on the page can be somehow confusing for the average user. Take for example the main page, where we have a video, followed by a white rectangle with some text presenting some of the product's features. By scrolling down, we are presented with another video that occupies the whole width of the screen, followed by the current company's partners. Having everything mixed together, presents a clear issue of usability, which is a critical aspect of web design. When a website is difficult to navigate, has confusing menus, or lacks clear calls to action, it can frustrate users and result in a poor user experience, factors that need to be taken into account during the new website implementation. As a matter of fact, a complete overhaul of the design is required also due to the current slow loading speeds. A simple design involves minimalistic elements, which can lead to faster load times for websites. The average user generally expects quick loading speeds, and a simple design which contribute to a smooth browsing experience. In contrast, the current design is quite unnecessarily complex and it results in longer load times, leading to user frustration.

Another issue with the current website is the lack of mobile responsiveness. Nowadays, everyone uses a phone or a tablet, due to their ease of use and any website that wants to attract more

clients needs to adhere to this requirement of responsive design, and even more so a company like Plaex, which values innovation and technology.

Appendix B - Website mockup

Index / Landing Page

- The client wanted the landing / index to be structured as a pitch (note: picture above is merged and content is separated in 3 sections, user has to scroll down in order to see *"the problem"* and *"what can I do"* sections). First of all, this entails presenting the user with the problem: improper waste management has severe repercussions for the whole world. In order to highlight that, a slideshow with 4-5 pictures which change every 10 seconds will showcase pictures of various cities throughout the world affected by this.

- On top of that, a counter that updates in real time will display the amount of waste sent to landfills and incinerators since a specific year. Why is this important to show? The problem with landfills is that they are a type of waste disposal method that can have negative environmental impacts. When waste is dumped in a landfill, it can decompose and produce gasses such as methane, which contributes to climate change. This information will be fetched from the Eurostat API. From a design perspective, this feature raises awareness of the current situation and may motivate the user to take part in the mission of making the planet sustainable and healthy by improving recycling at the source.

- By scrolling down, the user is presented with the solution: Garby and a quick summary of its benefits and mission in a more sustainable future.

- Lastly, a call to action is made. The user can click one of the links to either be redirected to the product page where he can learn more about the companies' technologies, or to get in contact with Plaex and possibly schedule a meeting.

- The Newsletter's icon on the bottom right side will have an animation that is going to make it stand out more. Users may choose to subscribe to the newsletter for a number of reasons. First, the newsletter may provide users with exclusive access to company news, product updates, and special offers or promotions. Second, the newsletter may offer educational resources and informative articles related to waste management and sustainability, helping users stay up-to-date on the latest trends and best practices to contribute to a greener world. This can be particularly valuable for users who are passionate about sustainability and want to learn more about how they can make a positive impact on the environment. By receiving regular updates and insights from the company, subscribers can feel more engaged and invested in the company's mission and goals, and may be more likely to continue using their products or services over time.

Products Page

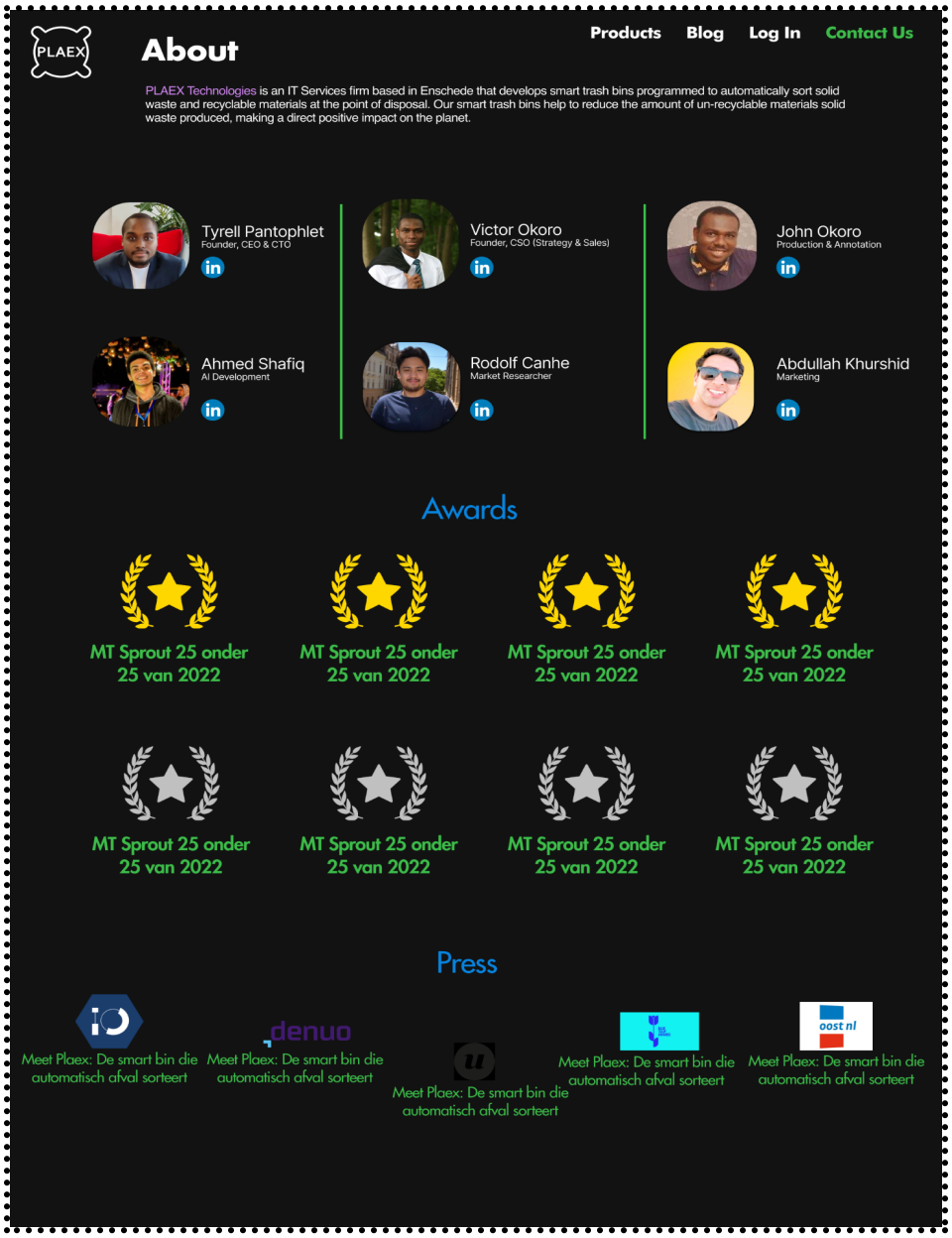
Note: Picture below is composed of 2 merged pages: Products/1 - Garby, and by scrolling down you get to Garcia

- Products page displays in depth information about the current products and their features. Hovering over the icons on the right side of the products will display a pop-up / tooltip that will back up the claims and explain how those results are achieved.

- For the end product, the plan is to make the Garby / Garcia models 3d rotatable, in order to offer a better view of the products' aesthetics.

- Visitors can express their interest by accessing the links below the product specifications. In the final version of the website, those links could be replaced by buttons that will make it easier to notice. By clicking on the buttons, an interest form will appear. Another alternative would be to make such an "I am interested" button also for the index page.

About Page

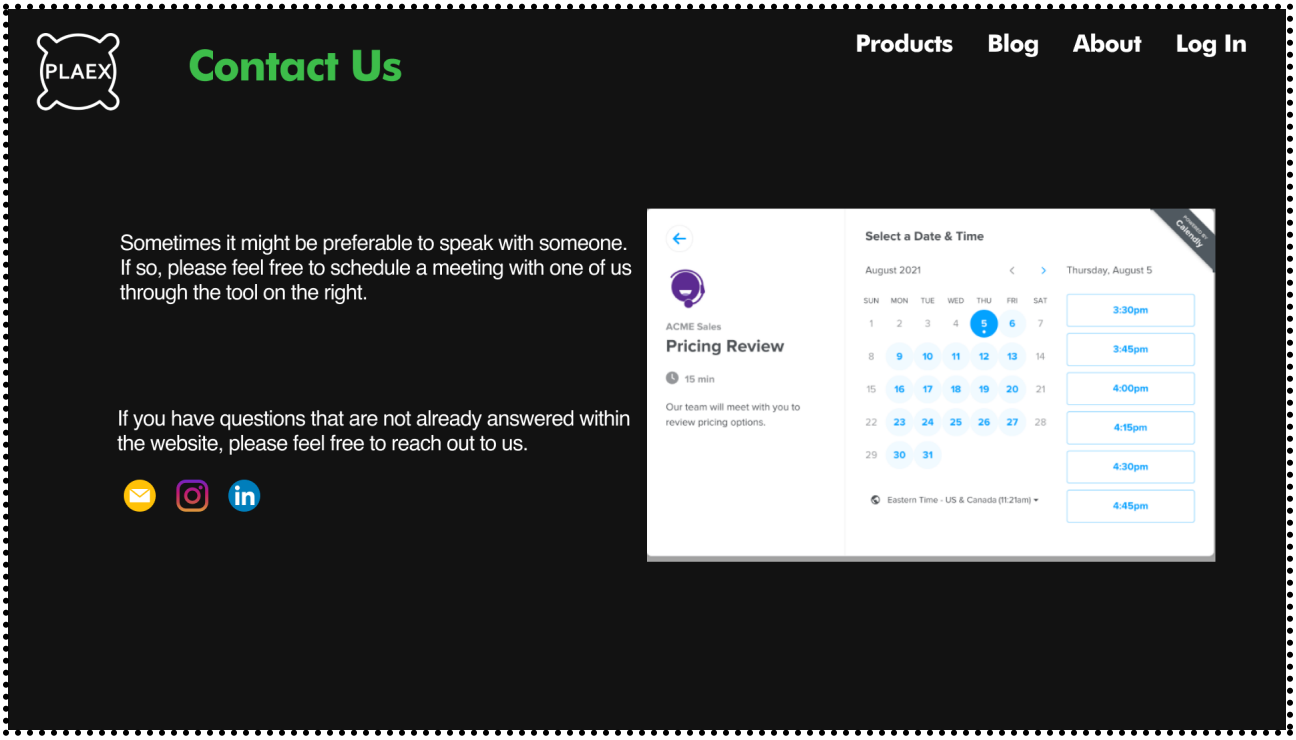


- The About page will present the current company employees, their roles and contact information.

- Plaex is a successful startup which has received numerous awards that will also be showcased below the employee's information.

- Underneath the awards, press-related activity the company was involved in will be displayed: such as interviews, publications etc.

Contact Us Page



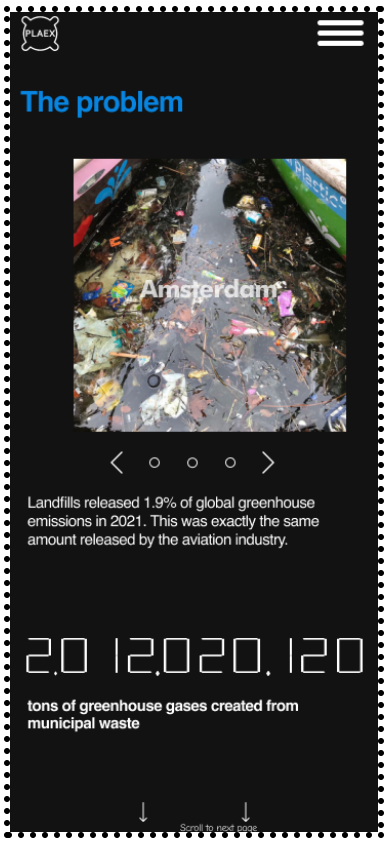
- The "Contact Us" page is designed to be user-friendly and informative. It features a simple layout. The main content area includes the addition of a calendar to the "Contact Us" page that is connected to Calendly is a great feature that can help streamline the appointment scheduling process. With Calendly, users can easily schedule appointments with the company directly from the website, without the need for back-and-forth emails or phone calls. The calendar will display the available dates and times for appointments, allowing users to select the one that works best for them. Once an appointment is scheduled, users will receive a confirmation email with all the necessary details, such as the date, time, and location of the meeting. This feature not only saves time and increases efficiency for both the company and the user, but it also enhances the overall user experience by providing a convenient way to schedule appointments.

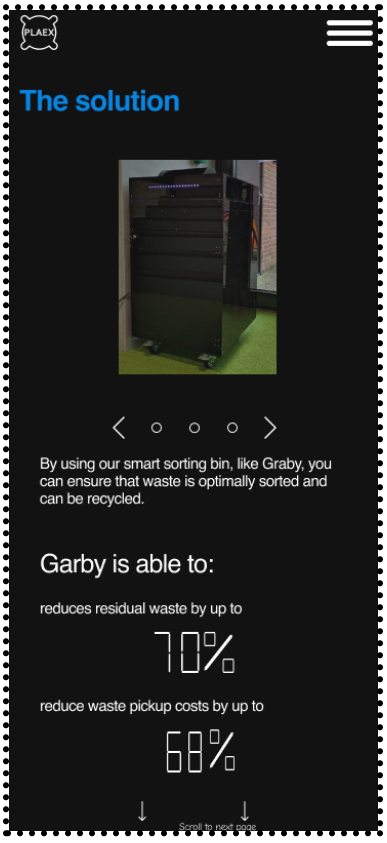
- The page also includes links to the company's social media pages and could also include a map and directions to their physical location in the final version of the website. Overall, the page is designed to provide users with easy access to the information they need to get in touch with the company and learn more about their products.

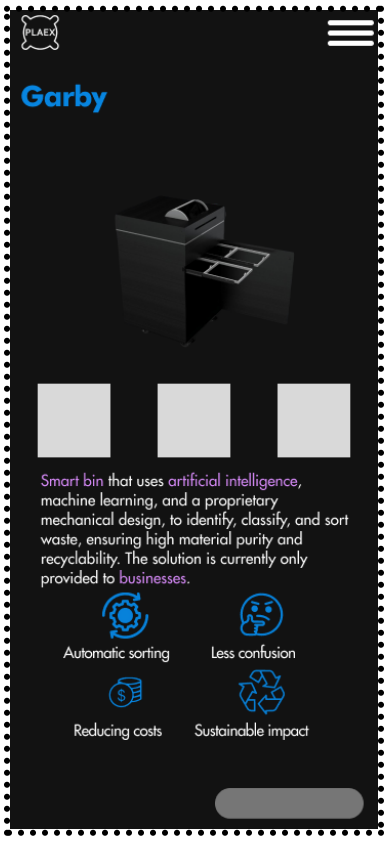
Blog Page

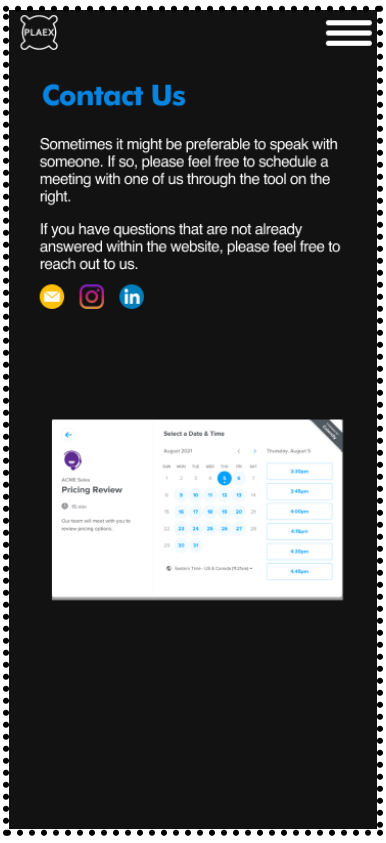
- The blog page of the website will provide users with a valuable resource for learning about EU mandates regarding recycling, proper waste management, and related topics. The blog will feature informative articles and resources on various aspects of waste management, such as the benefits of recycling, tips for reducing waste, and best practices for sustainable living. These articles will not only educate users on the importance of proper waste management, but they will also help raise awareness about the environmental impact of waste and inspire users to take action. The blog page aims to enhance the overall user experience and reinforce the company's commitment to promoting sustainable living.

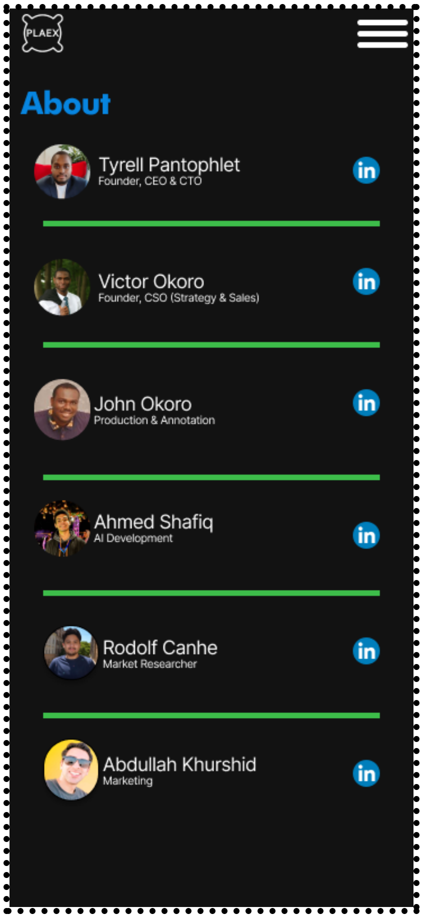
Appendix C - Mobile version of the mockup

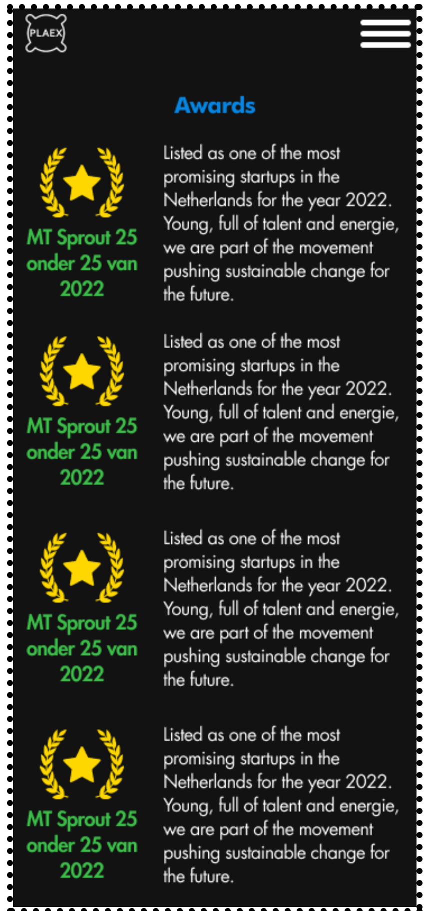












Appendix D - Test script

Test Script

Task 1: Introduction

Welcome the participant and explain the purpose of the testing session.
Ask the participant if they have any questions before beginning the testing session.

Task 2: Initial Impressions

Ask the participant to navigate to the homepage of the website.
Ask the participant to spend a few moments looking at the homepage.
Ask the participant to describe their initial impressions of the website.

Task 3: Navigation

Ask the participant to access various pages of the website and assess the difficulty of the navigation process.
Ask the participant if they have any suggestions for improving the navigation.

Task 4: Product Information

Ask the participant to read the information on the page about the smart bins and whether it is all understandable.

Ask the participant if they have any suggestions for improving the information provided.

Task 5: Visual Design

Ask the participant to navigate throughout the website and to describe the impressions with regards to the visual design of the pages.

Ask the participant if they have any suggestions for improving the visual design.

Task 6: Usability

Ask the participant to sign up for a newsletter or complete a contact form.

Observe the participant's actions and note any difficulties encountered.

Ask the participant if they have any suggestions for improving the usability of the website.

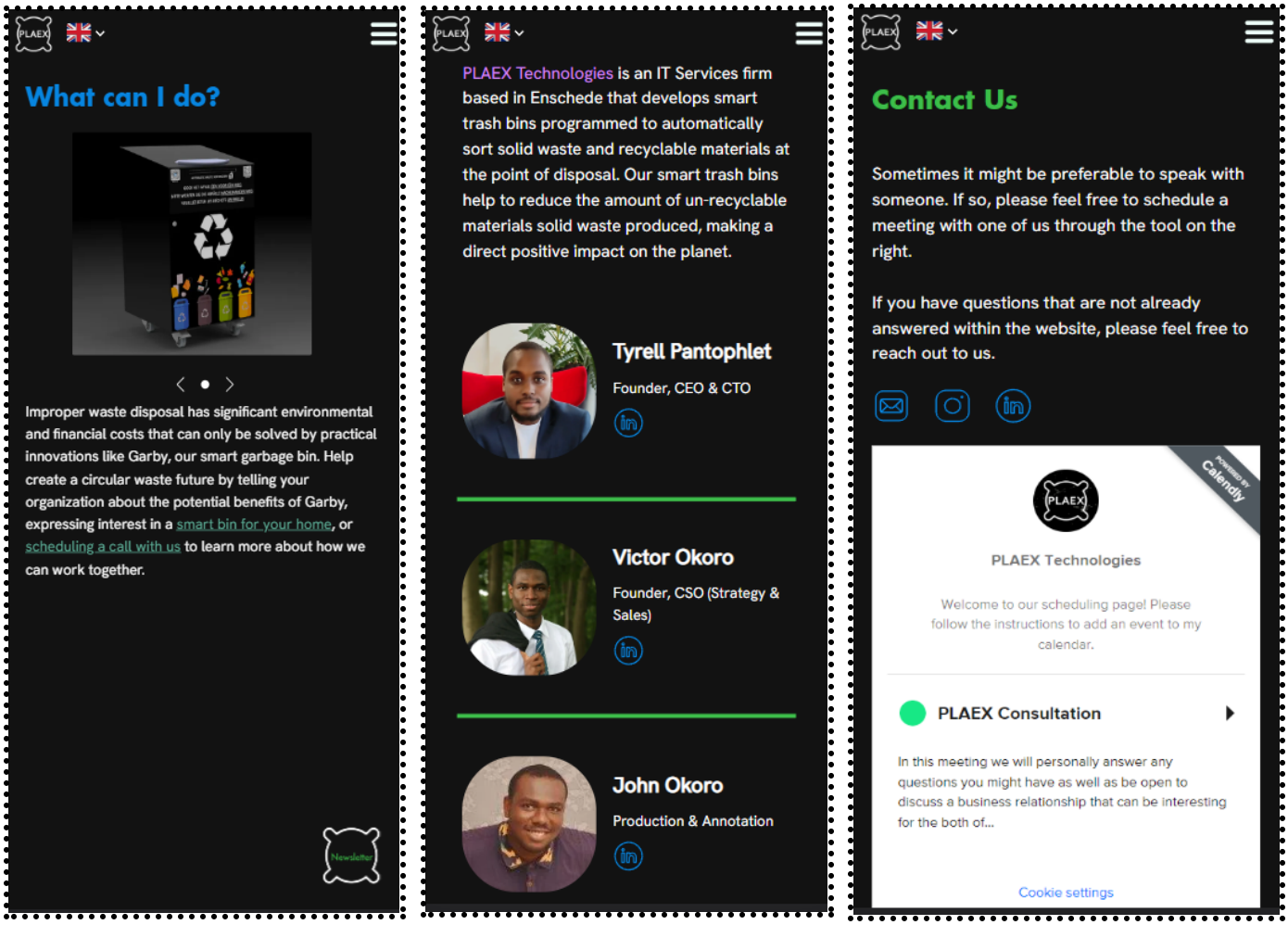
Task 7: Closing

Thank the participant for taking part in the testing.

Ask if they have any additional feedback or comments.

Appendix E - Final mobile version

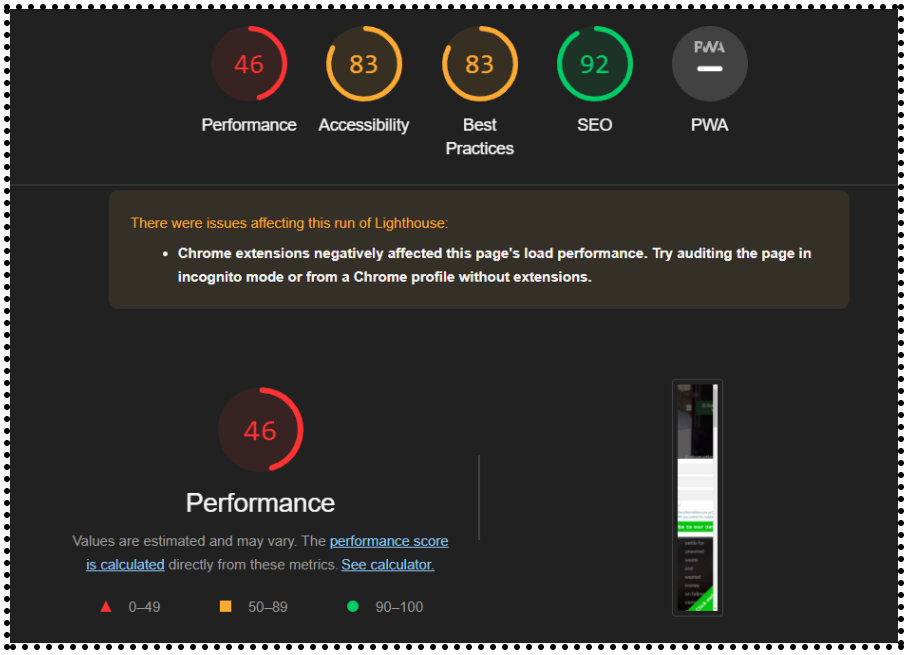
If you want to test it yourself, head [here](), then inspect and toggle device emulation



Appendix F - Website performance

Tested with Lighthouse, which is a built-in Chrome tool that shows the performance of a website.

Old version:



New version: