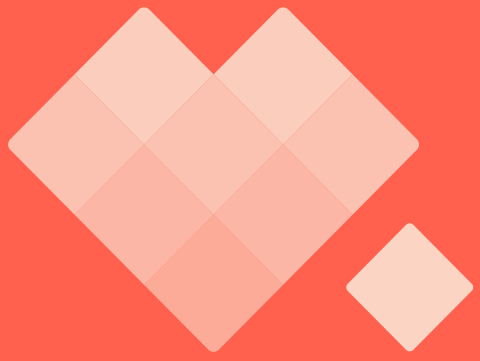


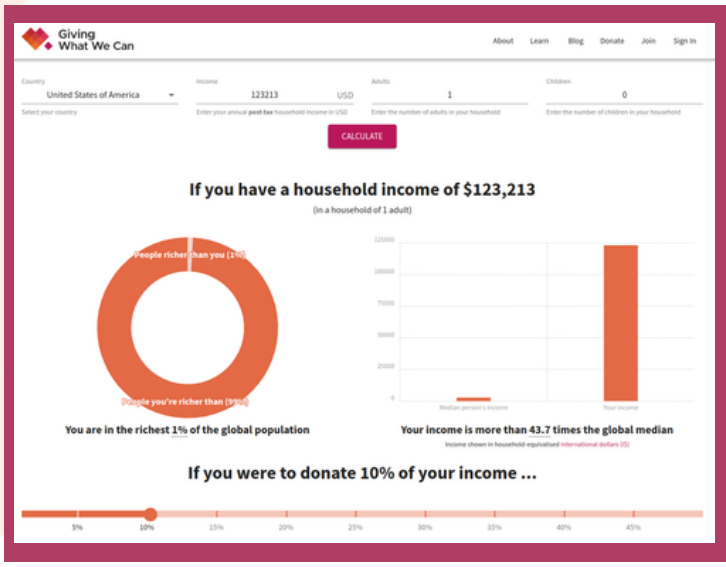
HOW RICH AM I?

A data visualization project by
Hain Luud, Tanguy Marbot, and Henry Papadatos

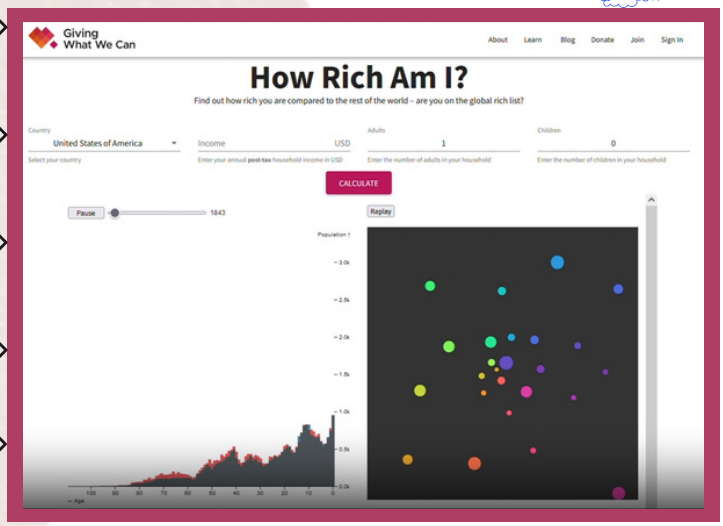
1. The path to making things better

The story begins with an already existing calculator made by a charity organization named Giving What We Can (GWWC). Their most popular tool, the "How Rich Am I?" calculator, had become outdated and was in need of improvement. Recognizing this opportunity, we offered our assistance to revamp the calculator accordingly.

With a focus on enhancing the visual appeal, aligning its design with the overall GWWC branding, and effectively conveying the user's wealth from a global perspective, our team embarked on this project to create an even more engaging and meaningful experience for users.



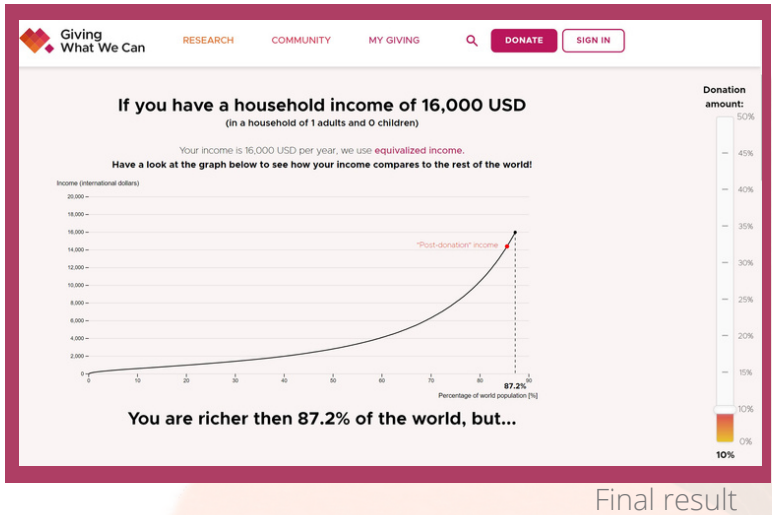
Original page



First prototype

We took apart the visuals from the previous calculator and brainstormed how to make them better. We also conducted research to uncover examples of how others effectively depicted wealth distribution and wealth gaps. Ultimately, we decided on four primary visual elements to accurately represent a user's wealth in perspective, and an additional visual to showcase the most impactful charitable organizations across various sectors for potential donations.

We discussed our ideas with Giving What We Can and received positive feedback from them. Once we had the visuals decided we took to implementation, starting first with getting a minimal working prototype to see if the visual would be as we had envisioned and to avoid realizing that it would be too hard to implement. From there the process was to iteratively improve the visuals, design and load time of the page.



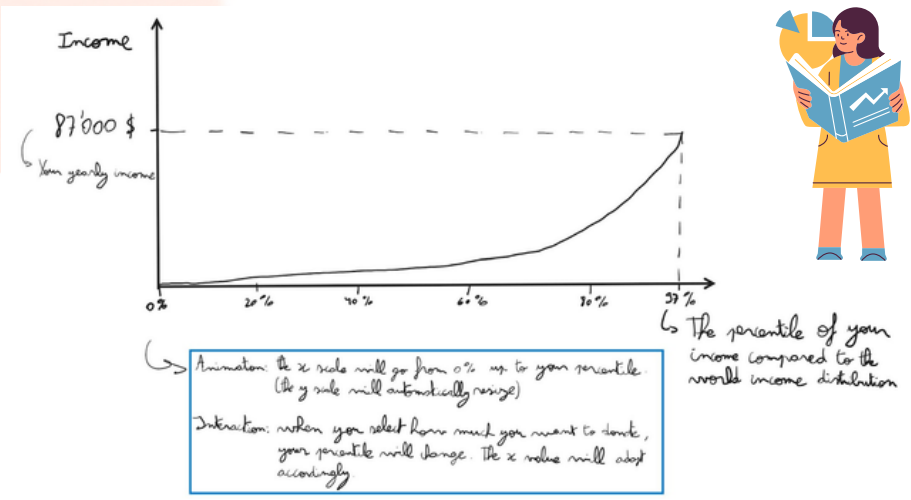
Final result

2. Page evolution

It was clear from the beginning that this would be a large and important project which would we difficult to pull off considering that none of us were experienced with web development. We will describe each visual's evolution through this development process in the order that it appears on the page. Before going to the components we should mention that the input section of the calculator also had to be adjusted to match the style, properties and tech stack as the rest of GWWC's website.

Wealth distribution line graph

In the initial iteration of our visualization, as seen on the right, we received substantial feedback indicating that it was challenging for users to comprehend. As a result, we decided to incorporate guiding text both above and below the visualization to aid the reader's understanding. Furthermore, we opted to maintain a fixed endpoint for the line, representing the user's income before donating.



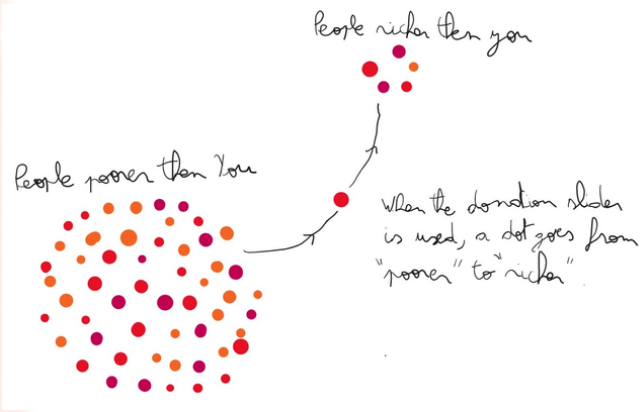
Draft of the visualization

To enhance the interactivity, we introduced a red dot corresponding to the user's post-donation income, which moves along the curve as the donation slider is adjusted. A label was included to clarify this dot's significance. Simultaneously, we unveiled the donation slider as the dot appeared, intuitively conveying their connection to the user.

Final version of the visualization along whith the donation slider

Circles grouping graph

The goal of this visualization is to give a sense of the number of people richer and poorer than you after donation. There are two groups of clustered bubbles: people richer than you and people poorer than you. When a user interacts with the donation sliders, their wealth changes, and some dots will migrate from one group to the other accordingly.

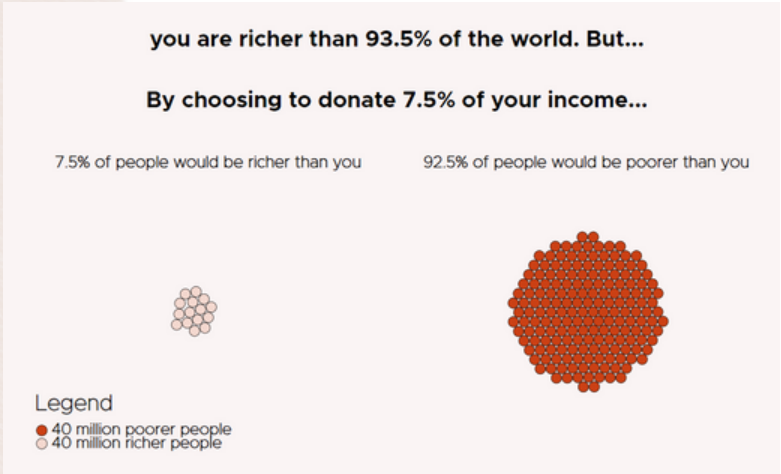


Draft for the visualization

From milestone 2, we have decided to use 194 circles instead of 400 to reduce complexity. Conveniently, by taking the world population of 2019 (7,764,951,032), the number of individuals per bubble becomes 40 million. Therefore on circle in the graph represents 40 million people. In our final version, we have also integrated descriptive text that is also updated interactively.

The main challenge was to create smooth animations and switches of groups. To handle circle group assignments, we have defined a large array of circles with a 'group' attribute that determines the color and group center coordinates.

We used the d3-force package to simulate physics appropriately for animations and placements. It was tricky to get right, as several forces with precise parameters had to be defined. Additionally, the transfer of bubbles shouldn't be too disruptive. We defined several forces in the simulation, such as center of gravities and repulsive forces between bubbles, and fine-tuned the parameters.

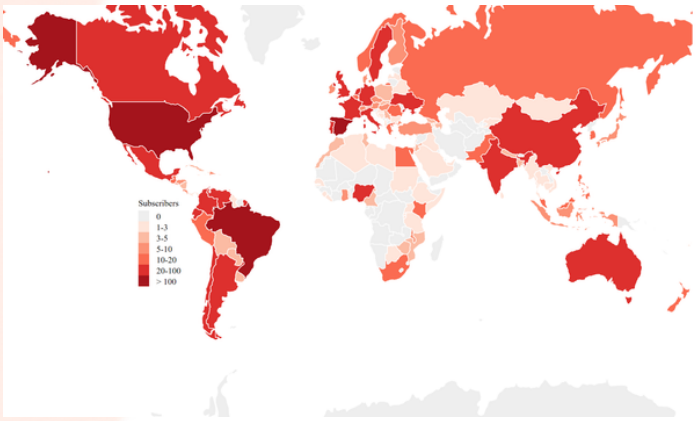


Final version of visualization

Another challenge was to efficiently use the 'income_centiles.json' file to make swift updates on group proportions as interactions from the donation slider can occur quickly. First, we need to extract the proportions from the 'income_centiles.json' based on the closest centile given the wealth, and then update the array of circles. We don't change the outer array of points but select some points on which we change the 'group' attribute. This can be done efficiently and concisely thanks to JavaScript's functional programming capabilities.

World Heatmap

The idea behind the world heatmap came from seeing how others have tried to show the impact of wealth disparity. We figured since most likely the people who will be using the calculator are rich on the global scale we could color each country based on how many times your household earns more than their average income (taking into account the purchasing power parity).



Initial idea concept image taken from online

Making the initial map was surprisingly difficult because initially we attempted to use Typescript as well to adhere to the current GWWC tech stack. This was soon however abandoned since we realized we couldn't manage learning Typescript and make this project at the same time.

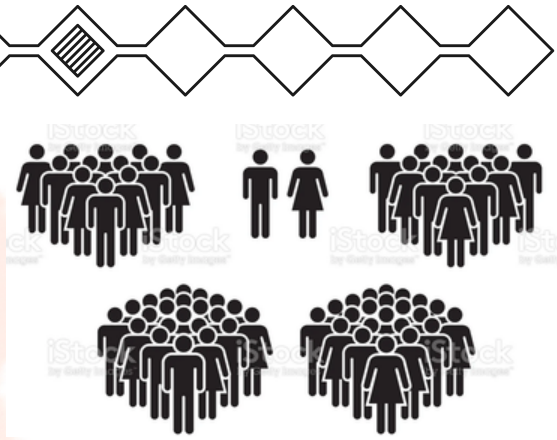
Another problem that we had with the world map was that it was slow when zooming in and causing lag for multiple reasons. After a long time of debugging we realized that changing the country boundary line width based on the zoom scale was causing the map to be jumpy when zoomed in. When loading the map it would also take around a second to load. Our best guess is that creating around 250 DOM elements with each being a very complex line that has to be rendered was causing the browser to stall and reduce the overall user experience. Batching the map creation did not seem to improve the situation so a compromise was made that the map would be loaded first when the user clicks on the Calculate button. Only after the map finishes loading would the first visual be loaded and smoothly scrolled into view.

One other problem was positioning the text box when a user hovers over a country. What we didn't realize is that it matters under which DOM element the text box was created causing very strange behaviour when trying to place the text box next to the user's mouse. We found that putting the text box inside the body tag would allow predictable and favorable positioning based on the mouse's location.

Compared to Milestone 2 the map saw minor changes. The color sceme was changed from linear to a manually specified scale threshold using specific colors for specific value ranges. This was made because when using the linear scale the different color hues were hard to tell apart. Another decision was to disable zooming for larger laptop screen sized displays since it didn't seem necessary and was more causing problems.

Crowd of People

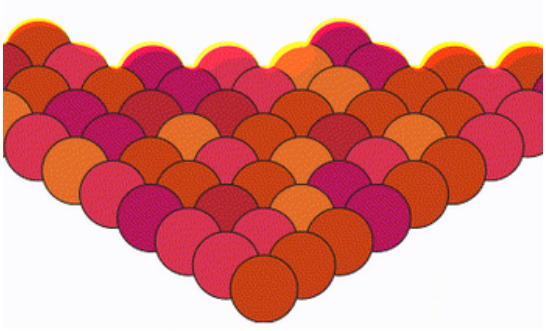
The crowd of people was an idea taken from the initial calculator where there was a static image of a few people next to a number that said how many healthy lives you could save. We thought this could be expanded so that the crowd size would be dynamic, depending on the donated amount.



Initial idea concept image taken from online

Creating an upside down pyramid of circles was relatively simple and required some basic math skills to get the positions right.

Things got more difficult when we tried to use stick figure lines instead of circles. It was unclear that there is a scaling factor at play that needs to be taken into account when positioning the stick figures. After figuring that out scaling and positioning the crowd of peoples was easy.



Proof of concept crowd in Milestone 2

Final version

One design choice we made was that since the crowd size was dependent on the number of figures for someone who earns a lot is also much larger than someone who earns less. To make all figures fit on the screen and also not let people who earn less feel that their contribution would be less valued we made the figures scale depending in the crowd size.

The crowd changed from the multicolored circles in Milestone 2 to multicolored stick figures in Milestone 3.

Charity Bubbles

While it is insightful to be aware of one's affluence and capability of saving individuals, it might remain uncertain where and how to act after using the calculator. At the end of the visualizations on the initial calculator, there is a link to a web page that lists suggested charities. We thought that GWWC could benefit from a more aesthetic presentation of charities and have opted for a charity bubbles explorer as the final visualization. This enables the user to have a broad and categorized view of the charity sector, with illustrations and accessible descriptions of interventions.

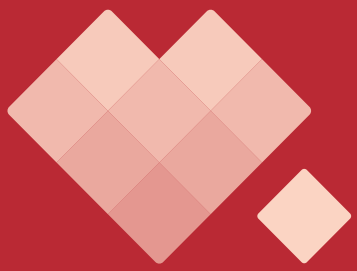
Proof of concept explorer in Milestone 2

The first challenge has been data collection, as no dataset of this kind exists yet. The information has been gathered from the GWWC website, and the chosen charities have been curated from the webpage givingwhatwecan.org/best-charities-to-donate-to-2023 and related sources. From there, we collected the URL, description, cause area, and selected the appropriate illustration image that can fit in a circle. The four main types of charities are those found on the webpage.

Final version of the visualization

The main challenge was to make everything pretty and concise, as it is tempting to add a lot of information which would turn overwhelming and irrelevant. We have decided to be conservative, visualizing a broad taxonomy of charities causes, leaving the user able to click on the bubbles to be redirected to webpages with more details.
There is a small animation in the visualization, first seeing all charities grouped, then separated under certain categories. Thus, we had to think about the coordination and proper timing.
Moreover, the user can see some details of the charities by hovering the cursor over them. Therefore, the idea of clicking on buttons to filter out some charities has been abandoned as it has been judged redundant.
Similar to the second visualization, the challenge was to deal with the physics to make everything smooth, which imply tuning some forces and preloading to prevent lag and stabilize the circles.
.

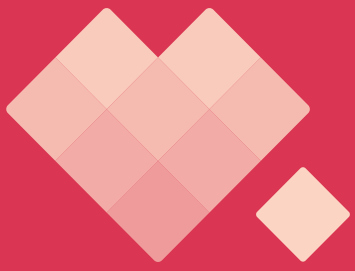
3. Peer Assessment



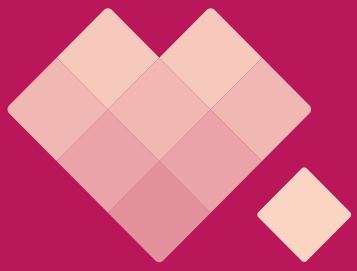
Hain Luud

Hain worked on the overall design of the calculator, making it look similar to how it was before, but also so it would fit the other GWWC pages. He also made the world heatmap, the crowd of people, the two other impact metrics (bednets and vitamin A tablets), the donation range amount meter and the page transitions.

Tanguy worked on the bubbles vizualisations, namely the circles grouping graph and the charity explorer. He had to make smooth interaction between the slider on which Hain worked on and the circles. He has also created the dataset of effective charities by collecting information and images from the Giving What We Can website and other related sources.



Tanguy Marbot



Henry Papadatos

First, Henry worked on the creation of the initial visualization, which focused on global income distribution and effectively showcased the consequences of donations. Moreover, Henry was in charge of curating the overarching narrative by ensuring that the conveyed message remained consistent and easily comprehensible. Additionally, he executed user testing to gather valuable feedback and enhance the project's overall quality. Lastly, Henry filmed and edited the presentation video.