

Project Deliverable A1: Conceptual Design

Group SDG 12B:

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1. Motivation

The motivation for our project was learning more about the environmental footprint of fast fashion. We were surprised to learn that the equivalent of one garbage truck full of clothes is burned or dumped in a landfill every second. Approximately 60% of all materials used by the fashion industry are made from plastic and it is causing negative impacts to the environment such as pollution and emissions. Since fast fashion contributes to producing microplastic, which ends up polluting the oceans, we concluded that it would be a great theme to explore under SDG 12: Responsible consumption and production.

2. Concepts

In this section, each member provided three possible concepts for our project. For each concept, we included the theme, the story we are interested in telling with the concept, the visualization and the dataset we will use to represent the concept.

Ana	Concept 1	Concept 2	Concept 3
Theme	Exploring the amount of fossil fuel pollution caused by shipping of raw materials	Show how vast microplastic pollution is, to the point that it reaches isolated parts of the ocean	Raising awareness on the toxins used to dye clothes and their negative effects on the environment, with focus on water pollution in Bangladesh
Story	Our clothes travel vast distances before they	Microplastic has been a huge issue in the past	Bangladesh is one of the biggest producers

	get into our stores and eventually into our closets. Such great travel requires fossil fuel which is released as carbon emissions. The message behind this concept is to encourage brands to work with more local manufacturers to reduce the pollution created by shipping of raw materials	few decades to the point that it can be found in very remote and isolated parts of the ocean where it damages marine life.	of textile, but it comes with a price: many rivers in the country are polluted with leftover fabric dye which is dumped by clothing factories. The goal of this visualization is to encourage factories to install water cleaning systems and not dump leftover materials into rivers
Visualization	Represent the data in a way that looks like oil spills on the surface of the ocean. Alternatively, show the path each textile export took from their country of origin on a map of the world	A silhouette of arctic marine animals like whales with dots of colors representing the microplastics inside them.	Colorful yet unsettling, like the dead rivers in the countries affected. A map with splashes of color in the areas most affected.
Data	Textile export data from China and India https://tradingeconomics.com/china/exports-of-textile-yarn-fabrics-and-related-products https://tradingeconomics.com/india/textiles-and-clothing-percent-of-value-added-in-manufacturing-wb-data.html	Data on microplastic particles in an isolated part of the Canadian arctic https://frontiersin.figshare.com/articles/data_sheet/Data_Sheet_2_Remote_but_Not_Isolated_Microplastics_in_the_Surface_Waters_of_the_Canadian_Arctic_Archipelago_xlsx/14767653/1	Data from the world bank on clothing production in Bangladesh along with a study that found toxic chemicals inside vegetables from the polluted region https://www.mdpi.com/2071-1050/11/7/1951 https://documents1.worldbank.org/curated/en/614901468768707543/pdf/922610WP0P11950DELOFOR0GREEN0GROWTH.pdf

Joseph	Concept 1	Concept 2	Concept 3
Theme	Food loss by stage of production	Discrepancy between subsidy spending and commitment to climate action	Correlation between tourism and possible damage to local areas

Story	14% of the world's food is lost between production and consumption	Canada spends \$88.8 USD per person on fossil fuel subsidies, and the global government spend \$400 billion on the same per year even as action is needed to transition away from them.	Tourism can do damage to local cultures and environments
Visualization			
Data	Food loss by country, sector, year, and stage of production: https://www.fao.org/platform-food-loss-waste/flw-data/en/	Fossil fuel subsidies by country and sector https://www.iea.org/data-and-statistics/data-product/fossil-fuel-subsidies-database	https://www.tourismdashboard.org/explore-the-data/#1507372644651-3a952f8c-2191

Monica	Concept 1	Concept 2	Concept 3
Theme	Correlation between location of hazardous waste sites and mercury contamination found in air Layer 1: Hazardous waste sites coordinates Layer 2: Mercury contamination in air coordinates	Correlation between increase of steel production and air/water emissions	Correlation between pollutants from factories and food contamination
Story	Ontario has the highest level of mercury emissions into the air of all the Canadian provinces. In 2014, Ontario accounted for 28% of national emissions, at 1.2 tonnes. That same year, the US emitted 50 tonnes of mercury and in 2010, China emitted 537.9 tonnes of mercury.	Steel production requires large inputs of coke (a sort of coal) which is extremely damaging to the environment. Coke ovens emit air pollution such as naphthalene that is highly toxic and can cause cancer. Ref: https://www.theworldcounts.com/challenges/planet-	There are several articles in Canada about food being recalled from supermarkets due to contamination. Ref: https://www.mtlblog.com/theres-a-recall-in-canada-for-17-sandwich-products-due-to-possible-listeria-contamination

	Ref: https://www.ontario.ca/page/mercury-ontario	earth/mining/environmental-impact-of-steel-production/story	
Visualization	Using ArcGIS to create a geospatial map to represent the locations of waste sites and air contaminated sites	Use Tableau to create a data dashboard where data related with steel production and emissions can be represented	Represent location of pollutants and food recalls and if possible people with food poisoning diseases.
Data	<p>Coordinates of mercury emissions and hazardous waste sites</p> <p>Waste management sites in Canada: https://geohub.lio.gov.on.ca/datasets/lio::waste-management-site/about</p> <p>Locations of mercury compromised locations in Canada with Longitudes and Latitudes coordinates: https://open.canada.ca/data/en/dataset/d1082511-f5e6-46b1-8720-5ab7edf19e84</p>	<p>Coordinates of steel factories, coordinates of emissions levels, location of people experiencing diseases</p> <p>Metal production in Canada locations: https://open.canada.ca/data/en/dataset/156607b1-f02c-4f59-a59f-e11e7f4f5d95</p> <p>Locations of mercury compromised locations in Canada with Longitudes and Latitudes coordinates: https://open.canada.ca/data/en/dataset/d1082511-f5e6-46b1-8720-5ab7edf19e84</p>	<p>Coordinates of pollutants and food recalls and if possible people who reported of food poisoning.</p> <p>There is no data found for this concept.</p>

Sofia	Concept 1	Concept 2	Concept 3
Theme	Exploring the history of plastic since the 1950s and how it has spread to all aspects of our lives	Correlation between increase in fast fashion brands and microplastics in ocean and air	Built in obsolescence

<p>Story</p>	<p>Since plastic became widely used in the 1950s, due to the popularity of Tupperware, because of its cheap cost and durability, many different industries started to use it. Nowadays, it is hard to find products that do not have a plastic packaging. Plastic is more present in our lives than we realize, including in our clothes and even in food and water.</p>	<p>https://www.nature.com/articles/s41467-020-20347-1 This concept is related to Concept 1, as it shows how plastic is used everywhere, including clothes without most people realizing. As more fast fashion brands exist, there are more companies focused on big mass production and low-quality materials/production costs.</p>	<p>The term built in obsolescence is many times used referring to technology, such as smartphones, computers, etc. However, it is also used in the fast fashion industry, as clothing is not made to last, considering its low quality. This way, people continue to buy clothes.</p>
<p>Visualization</p>	<p>An artistic timeline, similar to what Giorgia Lupi showed in one of her works, for example, increasing dots as plastic becomes more common and used everywhere, each colour represents a different type of plastic or a different type of product, for example, containers (Tupperware), personal hygiene, clothing, wrapping products at the supermarket, etc.</p>	<p>Could be integrated with Concept 1, continuing the timeline to visually represent the fast fashion industries and the pollution in oceans. We could show special importance to the pollution in the Arctic, showing how plastic fibers go from our washing machines to the ocean. Also, it is important to represent ocean and air pollution, for example ocean pollution with shades of blue, where darker shades represent more pollution.</p>	<p>Photo or drawing of pile of discarded clothes, each piece of clothing tells the story of their “life”. Maybe keep interactive, once people click on the pile the piece of clothing will come forward and a balloon will show with their story written.</p>
<p>Data</p>	<p>https://ourworldindata.org/plastic-pollution Global plastic production from 1950 to 2015 and Plastic use/production by sector. Great datasets,</p>	<p>https://ourworldindata.org/plastic-pollution Microplastics in the surface ocean, until 2050 (projection).</p>	<p>https://ourworldindata.org/plastic-pollution (same dataset) Global plastic waste disposal. Plastic waste generation by sector.</p>

	but the data only goes up to 2015	https://www.fashionrevolution.org/about/transparency/ Updated view from 2021. Spotlight issues: sustainable materials, climate impact, chemicals. It is also good to point out that big brands, even fast fashion ones, are realizing that they need to be more transparent and sustainable.	
		https://www.verifiedmarketresearch.com/product/fast-fashion-market/ Interesting data, but we can only get the report or a sample, not the whole dataset.	

Yuxiao	Concept 1	Concept 2	Concept 3
Theme	The developing trends in clothing lifespan over decades	Correlation between increased pollution and slightly increased economic growth in developing countries	Microfiber pollution
Story	With the development of fast fashion, people are paying less attention to the sustainability of clothing, buying more clothes than they actually need to stay in fashion. We can examine how the lifespan of clothing has evolved, and we can even compare it further with other variables such as the increase of water pollution as a contrast.	https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2020)652025 The main manufactures for clothing textiles are mostly located in developing countries, which brings not only certain job opportunities but also massive pollution to the local environments.	Because of the wide usage of synthetic materials (such as nylon and polyester), microfiber pollution has been a serious topic over sustainable fashion. With each wash, tiny fibers can fall off from clothes made of synthetic materials and eventually find their way into the ocean.

Visualization	Display the trend on the background of images showing severe pollution caused by fashion industry	The idea of a flowing river, showing minimal profits caught and large amount of pollution into the water	Show the circulation of microfiber: customers buy clothes, wash clothes, microfiber enters the ocean, and flows back into customer's life.
Data	https://earth.org/data/visualization/the-9-biggest-fast-fashion-statistics/	https://wits.worldbank.org/CountryProfile/en/Country/WLD/Year/LTST/TradeFlow/Export/Partner/by-country/Product/50-63_TextCloth	Little datasets can be found on this topic. Most data come from research papers that suggest scientists' estimated numbers of microfiber pollution.

3. Evaluation

For the evaluation, each team member presented their 3 concepts and explained their ideas. After that, all members discussed each concept and calculated a score based on the fit with the theme, the artistic visualization, the availability of data and the feasibility considering the team background. The table below shows the group evaluation of each concept and the final score obtained by each concept.

For all criteria we were considering, the concept could score between 0 and 2 points. The total score is the sum of all scores obtained. The lowest score is 0 and the highest possible score is 8. Below is the legend for each score given:

0 - does not fit - no artistic visualization - no data available - not feasible

1 - fits partially - rough artistic visualization - not enough data found - not sure if it is feasible

2 - fits well - detailed artistic visualization - enough data found – feasible

It is worth mentioning that all concepts scored 2 points in the criteria “background of the team” because we are confident that all the concepts proposed are feasible considering all our skills and backgrounds. The concepts highlighted in green are each member's concept that achieved the highest score.

	Fit with the theme	Artistic visualization	Availability of data	Background of the team	Score (sum)	Comments
Ana 1	2	1	1	2	6	Data needs more support
Ana 2	1	1	2	2	6	Concept isn't directly related to fashion but could combine well with another concept
Ana 3	2	1	2	2	7	Need more work on the artistic visualization
Joseph 1	0	1	2	2	5	Concept is good but does not fit the original theme
Joseph 2	1	1	2	2	6	Need more work on artistic visualization

Joseph 3	0	0	1	2	3	Concept is good but it does not have enough data sources available
Monica 1	1	2	2	2	7	Doesn't directly fit the theme but is still a good concept to keep in mind
Monica 2	1	2	2	2	7	Doesn't directly fit the theme but is still a good concept to keep in mind
Monica 3	1	1	0	2	4	Concept is good but it does not have enough data sources available
Sofia 1	1	2	2	2	7	About plastics in general but can be combined with other concepts. Solid concept with good artistic visualization.
Sofia 2	2	2	2	2	8	Solid concept and plans
Sofia 3	2	2	1	2	7	Solid concept but needs more work on data
Yuxiao 1	2	1	1	2	6	Concept fits well with the theme. Need more work on the data.
Yuxiao 2	1	1	1	2	5	Concept is not directly related to the original topic but can be combined with other concept
Yuxiao 3	2	1	0	2	5	Concept fits well with the theme. Need more work on the data.

Table 1: Concepts Evaluation

4. Solutions Chosen

As each member was presenting their concepts, we thought of possible combinations of concepts that would fit well together. We also analyzed the concepts from two perspectives: first considering only the score obtained by each concept and then considering only the fit with the theme. We realized that if we focused on only one perspective, we would be missing other important criteria and the opportunity to create an interesting multi-dimensional project.

Hence, we combined not only the scores, but also the availability of data and the fit with the theme. The promising solutions we chose for our projects are:

- **Ana Concept 2** - Show how vast microplastic pollution is, to the point that it reaches isolated parts of the ocean
- **Joseph Concept 2** - Discrepancy between subsidy spending and commitment to climate action
- **Monica Concept 3** - Correlation between pollutants from factories and food contamination
- **Sofia Concept 2** - Correlation between increase in fast fashion brands and microplastics in ocean and air
- **Yuxiao Concept 3** - Microfiber pollution

5. Design Concept

Our main goal would be to show how vast microplastic pollution is, to the point that it reaches isolated parts of the ocean. We'll then focus on the correlation between an increase in fast fashion brands and microplastics in the ocean and air, pointing out how much of the pollution in the oceans and air is caused by fast fashion. We also want to represent the discrepancy between subsidy spending and commitment to climate action. We will represent the correlation between pollutants from factories and food contamination and the whole cycle showing the microplastic/microfiber going into the ocean and then coming back into humans' lives, into our food and water.

6. Visual Representation

In order to visually represent our concept, we wanted to show the cyclical process of how plastic produced becomes pollution and comes back into our lives. We came up with a factory polluting the air and the smoke resembles a tree. The "leaves" are circles and each color represents a different aspect of our concept. The tree roots are also pollution that comes from the factory and the ground is the ocean that gets contaminated from the microplastic pollution.



7. Final Evaluation

We evaluated the group design concept and it scored 2 points in all criteria. It fits with the theme chosen, the artistic visualization is elaborated and is flexible so that we can represent all the different aspects of our concept, there is enough data available and we are confident that we can combine all our skills and backgrounds to develop it further.

	Fit with the theme	Artistic visualization	Availability of data	Background of the team	Score (sum)	Comments
Group Design Concept	2	2	2	2	8	We combined one concept of each member and achieved a concept with the highest score

Table 2: Group Design Concept Evaluation

We have also thought of the benefits and the potential drawbacks of moving forward with this concept. The main benefit would be the possibility to cover a broad range of topics in one visualization. Also, another benefit would be to show a cycle since plastic production until it comes back into our lives, which is interesting as most existing data and visualizations focus on only one part of the process. The main drawback is that it will be challenging to combine all the aspects of the concept and the different ideas in a coherent way. However, we believe that we have the necessary skills to create a visualization that accurately represents those aspects and their relationship in a clear way.

References

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Fast fashion environmental pollution: <https://www.businessinsider.com/fast-fashion-environmental-impact-pollution-emissions-waste-water-2019-10?IR=T>

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